The 30 indexed (fPi) canonical sets of 7 triples (which get sign masks applied to make valid octonions).

1	{{1, 2, 3}, {1, 4, 5}, {1, 6, 7}, {2, 4, 6}, {2, 5, 7}, {3, 4, 7}, {3, 5, 6}}
2	{{1, 2, 3}, {1, 4, 5}, {1, 6, 7}, {2, 4, 7}, {2, 5, 6}, {3, 4, 6}, {3, 5, 7}}
3	{{1, 2, 3}, {1, 4, 6}, {1, 5, 7}, {2, 4, 5}, {2, 6, 7}, {3, 4, 7}, {3, 5, 6}}
4	{{1, 2, 3}, {1, 4, 6}, {1, 5, 7}, {2, 4, 7}, {2, 5, 6}, {3, 4, 5}, {3, 6, 7}}
5	{{1, 2, 3}, {1, 4, 7}, {1, 5, 6}, {2, 4, 5}, {2, 6, 7}, {3, 4, 6}, {3, 5, 7}}
6	{{1, 2, 3}, {1, 4, 7}, {1, 5, 6}, {2, 4, 6}, {2, 5, 7}, {3, 4, 5}, {3, 6, 7}}
7	{{1, 2, 4}, {1, 3, 5}, {1, 6, 7}, {2, 3, 6}, {2, 5, 7}, {3, 4, 7}, {4, 5, 6}}
8	{{1, 2, 4}, {1, 3, 5}, {1, 6, 7}, {2, 3, 7}, {2, 5, 6}, {3, 4, 6}, {4, 5, 7}}
9	{{1, 2, 4}, {1, 3, 6}, {1, 5, 7}, {2, 3, 5}, {2, 6, 7}, {3, 4, 7}, {4, 5, 6}}
10	{{1, 2, 4}, {1, 3, 6}, {1, 5, 7}, {2, 3, 7}, {2, 5, 6}, {3, 4, 5}, {4, 6, 7}}
11	{{1, 2, 4}, {1, 3, 7}, {1, 5, 6}, {2, 3, 5}, {2, 6, 7}, {3, 4, 6}, {4, 5, 7}}
12	{{1, 2, 4}, {1, 3, 7}, {1, 5, 6}, {2, 3, 6}, {2, 5, 7}, {3, 4, 5}, {4, 6, 7}}
13	{{1, 2, 5}, {1, 3, 4}, {1, 6, 7}, {2, 3, 6}, {2, 4, 7}, {3, 5, 7}, {4, 5, 6}}
14	{{1, 2, 5}, {1, 3, 4}, {1, 6, 7}, {2, 3, 7}, {2, 4, 6}, {3, 5, 6}, {4, 5, 7}}
15	{{1, 2, 5}, {1, 3, 6}, {1, 4, 7}, {2, 3, 4}, {2, 6, 7}, {3, 5, 7}, {4, 5, 6}}
16	{{1, 2, 5}, {1, 3, 6}, {1, 4, 7}, {2, 3, 7}, {2, 4, 6}, {3, 4, 5}, {5, 6, 7}}
17	{{1, 2, 5}, {1, 3, 7}, {1, 4, 6}, {2, 3, 4}, {2, 6, 7}, {3, 5, 6}, {4, 5, 7}}
18	{{1, 2, 5}, {1, 3, 7}, {1, 4, 6}, {2, 3, 6}, {2, 4, 7}, {3, 4, 5}, {5, 6, 7}}
19	{{1, 2, 6}, {1, 3, 4}, {1, 5, 7}, {2, 3, 5}, {2, 4, 7}, {3, 6, 7}, {4, 5, 6}}
20	{{1, 2, 6}, {1, 3, 4}, {1, 5, 7}, {2, 3, 7}, {2, 4, 5}, {3, 5, 6}, {4, 6, 7}}
21	{{1, 2, 6}, {1, 3, 5}, {1, 4, 7}, {2, 3, 4}, {2, 5, 7}, {3, 6, 7}, {4, 5, 6}}
22	{{1, 2, 6}, {1, 3, 5}, {1, 4, 7}, {2, 3, 7}, {2, 4, 5}, {3, 4, 6}, {5, 6, 7}}
23	{{1, 2, 6}, {1, 3, 7}, {1, 4, 5}, {2, 3, 4}, {2, 5, 7}, {3, 5, 6}, {4, 6, 7}}
24	{{1, 2, 6}, {1, 3, 7}, {1, 4, 5}, {2, 3, 5}, {2, 4, 7}, {3, 4, 6}, {5, 6, 7}}
25	{{1, 2, 7}, {1, 3, 4}, {1, 5, 6}, {2, 3, 5}, {2, 4, 6}, {3, 6, 7}, {4, 5, 7}}
26	{{1, 2, 7}, {1, 3, 4}, {1, 5, 6}, {2, 3, 6}, {2, 4, 5}, {3, 5, 7}, {4, 6, 7}}
27	{{1, 2, 7}, {1, 3, 5}, {1, 4, 6}, {2, 3, 4}, {2, 5, 6}, {3, 6, 7}, {4, 5, 7}}
28	{{1, 2, 7}, {1, 3, 5}, {1, 4, 6}, {2, 3, 6}, {2, 4, 5}, {3, 4, 7}, {5, 6, 7}}
29	{{1, 2, 7}, {1, 3, 6}, {1, 4, 5}, {2, 3, 4}, {2, 5, 6}, {3, 5, 7}, {4, 6, 7}}
30	{{1, 2, 7}, {1, 3, 6}, {1, 4, 5}, {2, 3, 5}, {2, 4, 6}, {3, 4, 7}, {5, 6, 7}}

The 8 sets of sign masks. Each sign mask (or the set of 7 triples) can be permuted in a consistent way to produce isomorphic sets of 480 octonions.

1	{00, 07, 19, 1E, 2A, 2D, 33, 34}
2	{01, 06, 18, 1F, 2B, 2C, 32, 35}
3	{02, 05, 1B, 1C, 28, 2F, 31, 36}
4	{03, 04, 1A, 1D, 29, 2E, 30, 37}
5	{08, 0F, 11, 16, 22, 25, 3B, 3C}
6	{09, 0E, 10, 17, 23, 24, 3A, 3D}
7	{0A, 0D, 13, 14, 20, 27, 39, 3E}
8	{0B, 0C, 12, 15, 21, 26, 38, 3F}

The index of 8 sign masks (sm) to the 30 fPi (each with 8 Hexadecimal masks). These can be “inverted” (0↔1) making 16*30=480 octonion permutations. They are assigned to the 30 canonical sets of 7 triples using the maskList:

{5, 8, 4, 3, 7, 6, 3, 2, 6, 5, 1, 4, 6, 7, 3, 3, 8, 6, 3, 1, 6, 6, 2, 3, 5, 8, 4, 3, 7, 6}

Wikipedia's octonion (introduced by Schray and Manogue, 1994) is the same as the "not flipped" octonion on page 17 (E8 #209).
Baez' octonion is the same as the "flipped" octonion on page 83 (E8 #243).
Geoffrey Dixon (Octonion X - Product Orbits) introduces two more. One (on page 3) is the "not flipped" octonion on page 139 (E8 #242). Interestingly, this one and Baez' have a sign mask of Hex 00 such that they are one of the canonical 30 sets of 7 triples. Dixon also introduces (in eq. 21) the "not flipped" octonion on page 67 (E8 #163) with first and third triple elements reversed.

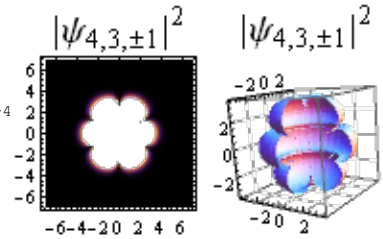
183 $e_{y_d}^{\vec{\nu}_L \to 0}$ Ref. Symbols: 2D 3D

0apccssgg
000000001_2

	Root{	1	1	2	2	2	1	0	0 }	Exp. m 0.51099892 MeV
	Weight{	-1	0	1	0	0	0	-1	0 }	Theo. m 0.510999
	Height= 10									Exp. τ ? s
Binary{	1	1	0	0	0	1	1	1	}	
E8{	0	0	0	1	1	0	0	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1	0	0	0	}	

Bit NKS CA Pascal E8

^{60}Nd[Xe]$6s^2 4f^4$



Flipped

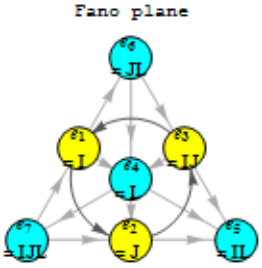
Octonion triads-fPi=1 Sign mask=1 Hex=08 L fp_sm=5

{{1, 2, 3}, {1, 4, 5}, {1, 6, 7},
{2, 6, 4}, {2, 5, 7}, {3, 4, 7}, {3, 5, 6}}

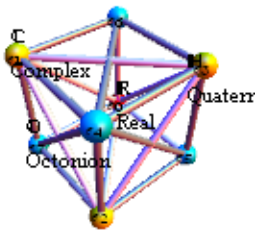
Flattened triad/mask bits
{1, 3, 2, 4, 5, 6, 7}
{0, 0, 0, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	7	-6
2	-3	-1	1	-6	7	4	-5
3	2	-1	-1	7	6	-5	-4
4	-5	6	-7	-1	1	-2	3
5	4	-7	-6	-1	-1	3	2
6	-7	-4	5	2	-3	-1	1
7	6	5	4	-3	-2	-1	-1

multiplication table

Not Flipped

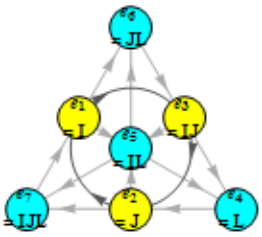
Octonion triads-fPi=2 Sign mask=1 Hex=0B L fp_sm=8

{{1, 3, 2}, {1, 5, 4}, {1, 6, 7},
{2, 7, 4}, {2, 5, 6}, {3, 4, 6}, {3, 5, 7}}

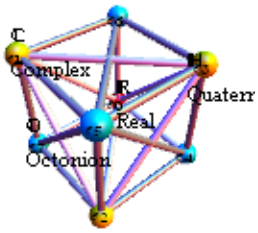
Flattened triad/mask bits
{1, 3, 2, 5, 4, 6, 7}
{1, 1, 0, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	7	-6
2	3	-1	-1	-7	6	-5	4
3	-2	1	-1	6	7	-4	-5
4	5	7	-6	-1	-1	3	-2
5	-4	-6	-7	1	-1	2	3
6	-7	5	4	-3	-2	-1	1
7	6	-4	5	2	-3	-1	-1

multiplication table

185 $\overline{\nu_e}$ $\overset{0\to1}{\underset{L}{\nu}}$ $\underset{w_d}{}$ Ref. Symbols: 2D ▼ 3D

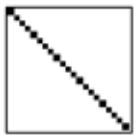
0apccssgg
011000001_2

Root{ 0 0 0 0 -1 -1 0 0 }
Weight{ 1 -1 -1 1 0 0 0 0 }
Height= 3

Exp. m $1.\times10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

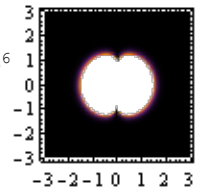
Binary{	1	0	1	1	1	0	1	0	}
E8{	0	0	1	0	-1	0	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	-1	0	0	0	}

Bit NKS CA Pascal E8

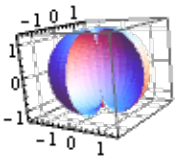


^{10}Ne[He]$2s^2 2p^6$

$|\psi_{2,1,\pm1}|^2$



$|\psi_{2,1,\pm1}|^2$



Flipped

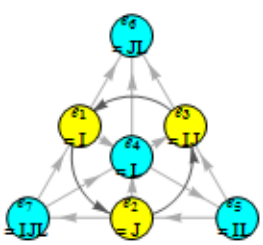
Octonion triads-fPi=1 Sign mask=1 Hex=70 L fp_sm=5

{{1, 2, 3}, {1, 4, 5}, {1, 6, 7},
{2, 4, 6}, {2, 7, 5}, {3, 7, 4}, {3, 6, 5}}

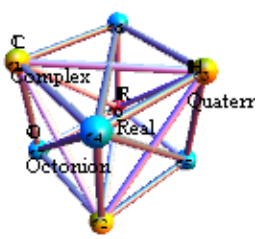
Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 4, 5, 6, 7}
{0, 0, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	7	-6
2	-3	-1	1	6	-7	-4	5
3	2	-1	-1	-7	-6	5	4
4	-5	-6	7	-1	1	2	-3
5	4	7	6	-1	-1	-3	-2
6	-7	4	-5	-2	3	-1	1
7	6	-5	-4	3	2	-1	-1

multiplication table

Not Flipped

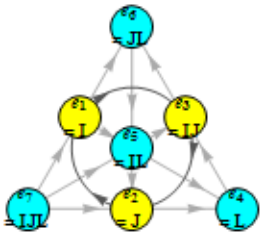
Octonion triads-fPi=2 Sign mask=1 Hex=73 L fp_sm=8

{{1, 3, 2}, {1, 5, 4}, {1, 6, 7},
{2, 4, 7}, {2, 6, 5}, {3, 6, 4}, {3, 7, 5}}

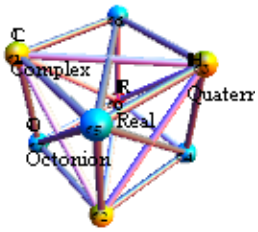
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 3, 2, 5, 4, 6, 7}
{1, 1, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	7	-6
2	3	-1	-1	7	-6	5	-4
3	-2	1	-1	-6	-7	4	5
4	5	-7	6	-1	-1	-3	2
5	-4	6	7	1	-1	-2	-3
6	-7	-5	-4	3	2	-1	1
7	6	4	-5	-2	3	-1	-1

multiplication table

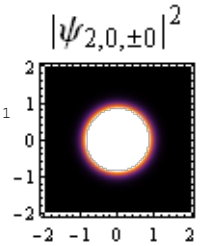
176 $\overline{V_e}$ $\overset{0}{\underset{w_1}{\hat{R}}}$ Ref. Symbols: 2D 3D

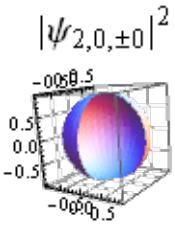
0apccssgg 011000101_2	Root{ 0 0 0 0 0 -1 0 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 1 -2 1 0 0 0 0 0 }	Theo. m	1.72318×10^{-7}
	Height= 2	Exp. τ	? s

Binary{	1	1	0	1	1	0	0	1	}
E8{	0	0	0	1	-1	0	0	0	}
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	-1	0	0	0	}

Bit NKS CA Pascal E8

^{3}Li[He]2s^1





Flipped

Octonion triads-fPi=1 Sign mask=2 Hex=6E fp_sm=5

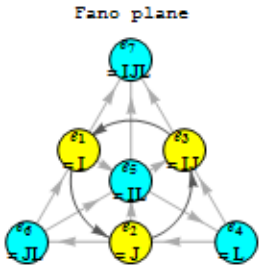
{{1, 2, 3}, {1, 5, 4}, {1, 7, 6},
{2, 6, 4}, {2, 5, 7}, {3, 7, 4}, {3, 6, 5}}

Flattened triad/mask bits

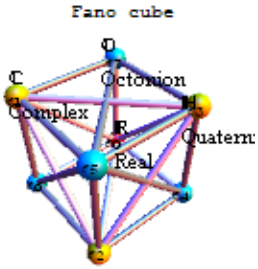
{1, 3, 2, 5, 4, 7, 6}
{0, 1, 1, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	-7	6
2	-3	-1	1	-6	7	4	-5
3	2	-1	-1	-7	-6	5	4
4	5	6	7	-1	-1	-2	-3
5	-4	-7	6	1	-1	-3	2
6	7	-4	-5	2	3	-1	-1
7	-6	5	-4	3	-2	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=2 Sign mask=2 Hex=6D fp_sm=8

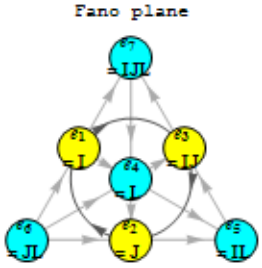
{{1, 3, 2}, {1, 4, 5}, {1, 7, 6},
{2, 7, 4}, {2, 5, 6}, {3, 6, 4}, {3, 7, 5}}

Flattened triad/mask bits

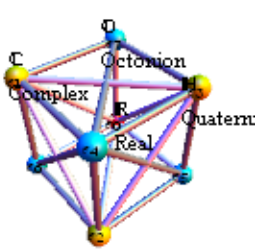
{1, 3, 2, 4, 5, 7, 6}
{1, 0, 1, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	-7	6
2	3	-1	-1	-7	6	-5	4
3	-2	1	-1	-6	-7	4	5
4	-5	7	6	-1	1	-3	-2
5	4	-6	7	-1	-1	2	-3
6	7	5	-4	3	-2	-1	-1
7	-6	-4	-5	2	3	1	-1

multiplication table

192 $e_{y_1}^{\vec{R}\to 1}$ Ref. Symbols: 2D △ 3D ▲

0apccssgg
000000101_2

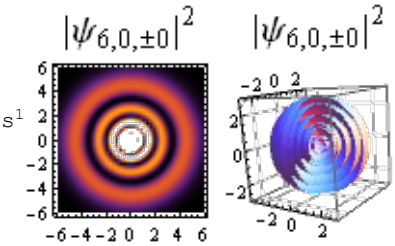
Root{	1	1	2	2	1	1	0	0	}
Weight{	-1	1	-1	1	0	0	-1	0	}
Height=	9								

Exp. m 0.51099892 MeV
Theo. m 0.510999
Exp. τ ? s

Binary{	1	0	1	0	1	0	1	1	}
E8{	0	0	1	0	1	0	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	1	0	0	0	}

Bit NKS CA Pascal E8

^{55}Cs[Xe]6s^1



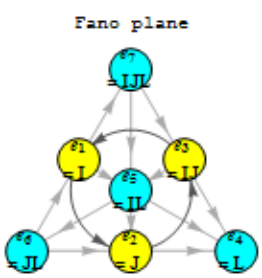
Flipped

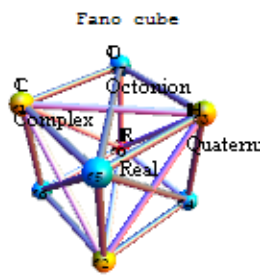
Octonion triads-fPi=1 Sign mask=2 Hex=16 fp_sm=5

{{1, 2, 3}, {1, 5, 4}, {1, 7, 6},
{2, 4, 6}, {2, 7, 5}, {3, 4, 7}, {3, 5, 6}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 5, 4, 7, 6}
{0, 1, 1, 0, 1, 0, 0}





0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	-7	6
2	-3	-1	1	6	-7	-4	5
3	2	-1	-1	7	6	-5	-4
4	5	-6	-7	-1	-1	2	3
5	-4	7	-6	1	-1	3	-2
6	7	4	5	-2	-3	-1	-1
7	-6	-5	4	-3	2	1	-1

multiplication table

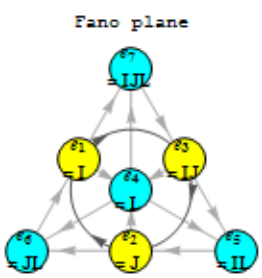
Not Flipped

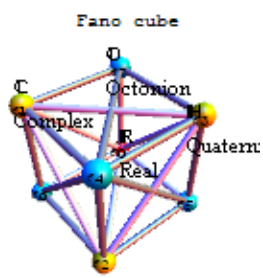
Octonion triads-fPi=2 Sign mask=2 Hex=15 fp_sm=8

{{1, 3, 2}, {1, 4, 5}, {1, 7, 6},
{2, 4, 7}, {2, 6, 5}, {3, 4, 6}, {3, 5, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 3, 2, 4, 5, 7, 6}
{1, 0, 1, 0, 1, 0, 0}





0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	-7	6
2	3	-1	-1	7	-6	5	-4
3	-2	1	-1	6	7	-4	-5
4	-5	-7	-6	-1	1	3	2
5	4	6	-7	-1	-1	-2	3
6	7	-5	4	-3	2	-1	-1
7	-6	4	5	-2	-3	1	-1

multiplication table

41 $\overline{\nu_e}$ w_m 0 L Ref. Symbols: 2D 3D

0apccssgg
011001001_2

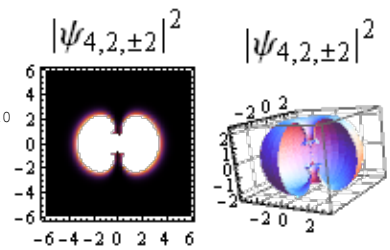
Root{ -1 -1 -2 -1 -1 -1 0 0 }
Weight{ 1 -1 0 1 -1 0 1 0 }
Height= 8

Exp. m $1.\times 10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

Binary{	1	1	0	0	0	1	0	0 }
E8{	-1	0	0	0	-1	0	0	0 }
Physics {	-1	0	0	0	-1	0	0	0 }

Bit NKS CA Pascal E8

^{48}Cd[Kr]5s^{2}4d^{10}



Flipped

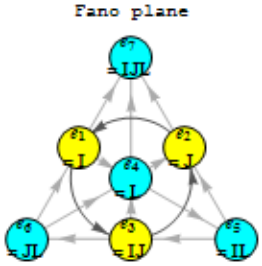
Octonion triads-fPi=1 Sign mask=3 Hex=5D L fp_sm=5

{{1, 3, 2}, {1, 4, 5}, {1, 7, 6},
{2, 6, 4}, {2, 7, 5}, {3, 4, 7}, {3, 6, 5}}

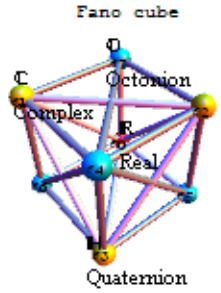
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 4, 5, 7, 6}
{1, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	-7	6
2	3	-1	-1	-6	-7	4	5
3	-2	1	-1	7	-6	5	-4
4	-5	6	-7	-1	1	-2	3
5	4	7	6	-1	-1	-3	-2
6	7	-4	-5	2	3	-1	-1
7	-6	-5	4	-3	2	1	-1

multiplication table

Not Flipped

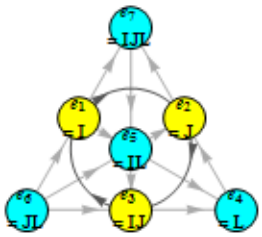
Octonion triads-fPi=2 Sign mask=3 Hex=5E L fp_sm=8

{{1, 2, 3}, {1, 5, 4}, {1, 7, 6},
{2, 7, 4}, {2, 6, 5}, {3, 4, 6}, {3, 7, 5}}

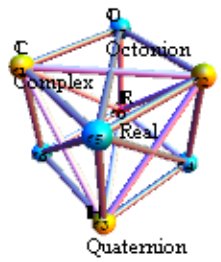
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 3, 5, 4, 7, 6}
{0, 1, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	-7	6
2	-3	-1	1	-7	-6	5	4
3	2	-1	-1	6	-7	-4	5
4	5	7	-6	-1	-1	3	-2
5	-4	6	7	1	-1	-2	-3
6	7	-5	4	-3	2	-1	-1
7	-6	-4	-5	2	3	1	-1

multiplication table

203 $e_{y_m \hat{L}}^{\to 0}$ Ref. Symbols: 2D △ 3D ▲

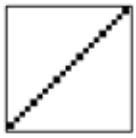
0apccssgg
000001001_2

Root{ 0 1 1 1 1 1 0 0 }
Weight{ -1 1 0 0 0 -1 0 1 }
Height= 6

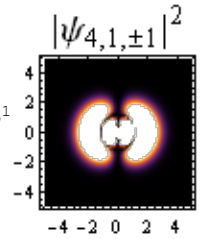
Exp. m 0.51099892 MeV
Theo. m 0.510999
Exp. τ ? s

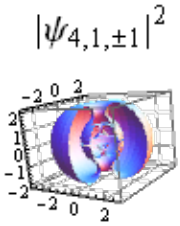
Binary{	0	1	1	1	0	1	0	1 }
E8{	0	1	0	0	1	0	0	0 }
Physics {	0	1	0	0	1	0	0	0 }

Bit NKS CA Pascal E8



^{31}Ga[Ar]$4s^2 3d^{10} 4p^1$





Flipped

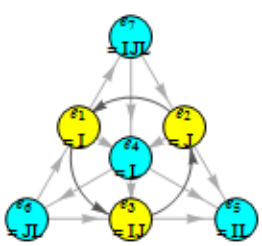
Octonion triads-fPi=1 Sign mask=3 Hex=25 L fp_sm=5

{{1, 3, 2}, {1, 4, 5}, {1, 7, 6},
{2, 4, 6}, {2, 5, 7}, {3, 7, 4}, {3, 5, 6}}

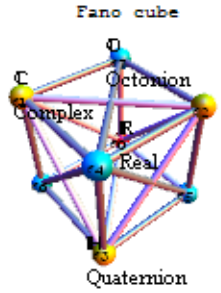
Flattened triad/mask bits
{1, 2, 3, 4, 5, 7, 6}
{1, 0, 1, 0, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	-7	6
2	3	-1	-1	6	7	-4	-5
3	-2	1	-1	-7	6	-5	4
4	-5	-6	7	-1	1	2	-3
5	4	-7	-6	-1	-1	3	2
6	7	4	5	-2	-3	-1	-1
7	-6	5	-4	3	-2	1	-1

multiplication table

Not Flipped

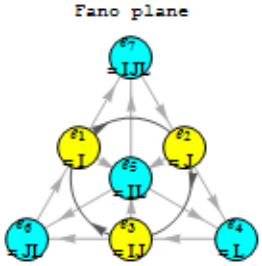
Octonion triads-fPi=2 Sign mask=3 Hex=26 L fp_sm=8

{{1, 2, 3}, {1, 5, 4}, {1, 7, 6},
{2, 4, 7}, {2, 5, 6}, {3, 6, 4}, {3, 5, 7}}

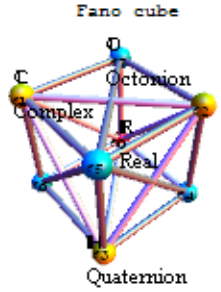
Flattened triad/mask bits
{1, 2, 3, 5, 4, 7, 6}
{0, 1, 1, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	-7	6
2	-3	-1	1	7	6	-5	-4
3	2	-1	-1	-6	7	4	-5
4	5	-7	6	-1	-1	-3	2
5	-4	-6	-7	1	-1	2	3
6	7	5	-4	3	-2	-1	-1
7	-6	4	5	-2	-3	1	-1

multiplication table

48 $e_{y_m}^{\vec{v}\to 0}$ Ref. Symbols: 2D △ 3D ▲

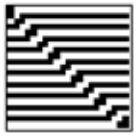
0apccssgg
000001101_2

Root{ 0 0 0 1 1 1 0 0 }
Weight{ -1 1 0 1 -1 0 0 0 }
Height= 4

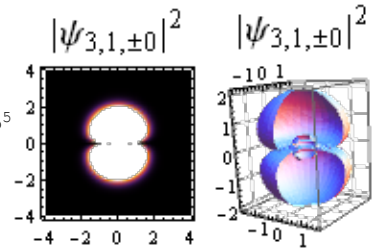
Exp. m 0.51099892 MeV
Theo. m 0.510999
Exp. τ ? s

Binary{	1	0	1	0	0	0	0	1 }
E8{	-1	0	0	0	1	0	0	0 }
Physics {	-1	0	0	0	1	0	0	0 }

Bit NKS CA Pascal E8



^{17}Cl[Ne]$3s^2 3p^5$



Flipped

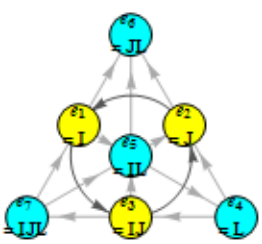
Octonion triads-fPi=1 Sign mask=4 Hex=3B L fp_sm=5

{{1, 3, 2}, {1, 5, 4}, {1, 6, 7},
{2, 6, 4}, {2, 7, 5}, {3, 7, 4}, {3, 5, 6}}

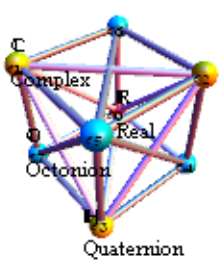
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 5, 4, 6, 7}
{1, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	7	-6
2	3	-1	-1	-6	-7	4	5
3	-2	1	-1	-7	6	-5	4
4	5	6	7	-1	-1	-2	-3
5	-4	7	-6	1	-1	3	-2
6	-7	-4	5	2	-3	-1	1
7	6	-5	-4	3	2	-1	-1

multiplication table

Not Flipped

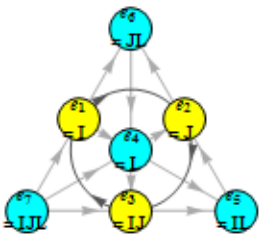
Octonion triads-fPi=2 Sign mask=4 Hex=38 L fp_sm=8

{{1, 2, 3}, {1, 4, 5}, {1, 6, 7},
{2, 7, 4}, {2, 6, 5}, {3, 6, 4}, {3, 5, 7}}

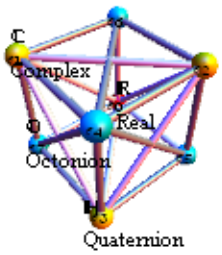
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 3, 4, 5, 6, 7}
{0, 0, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	7	-6
2	-3	-1	1	-7	-6	5	4
3	2	-1	-1	-6	7	4	-5
4	-5	7	6	-1	1	-3	-2
5	4	6	-7	-1	-1	-2	3
6	-7	-5	-4	3	2	-1	1
7	6	-4	5	2	-3	-1	-1

multiplication table

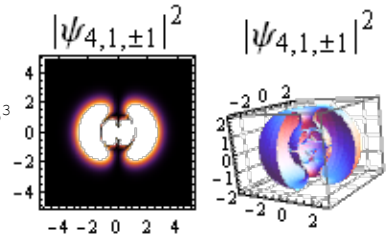
196 $\overline{\nu_e}$ 0 w_m R Ref. Symbols: 2D 3D

0apccssgg 011001101_2	Root{ -1 0 -1 -1 -1 -1 0 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 1 -1 0 0 0 -1 1 1 }	Theo. m	1.72318×10^{-7}
	Height= 6	Exp. τ	? s

Binary{	1	0	0	1	1	0	1	1 }
E8{	0	1	0	0	-1	0	0	0 }
Physics {	0	1	0	0	-1	0	0	0 }

Bit NKS CA Pascal E8

^{33}As[Ar]$4s^2 3d^{10} 4p^3$



Flipped

Octonion triads-fPi=1 Sign mask=4 Hex=43 L fp_sm=5

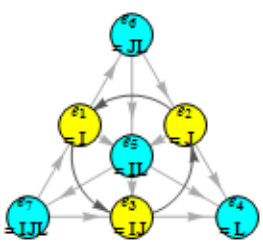
{{1, 3, 2}, {1, 5, 4}, {1, 6, 7},
{2, 4, 6}, {2, 5, 7}, {3, 4, 7}, {3, 6, 5}}

Coxeter (Cyan)

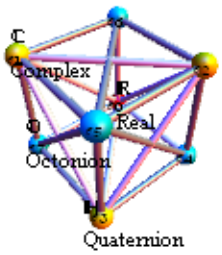
Flattened triad/mask bits

{1, 2, 3, 5, 4, 6, 7}
{1, 1, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	7	-6
2	3	-1	-1	6	7	-4	-5
3	-2	1	-1	7	-6	5	-4
4	5	-6	-7	-1	-1	2	3
5	-4	-7	6	1	-1	-3	2
6	-7	4	-5	-2	3	-1	1
7	6	5	4	-3	-2	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=2 Sign mask=4 Hex=40 L fp_sm=8

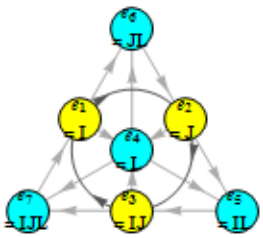
{{1, 2, 3}, {1, 4, 5}, {1, 6, 7},
{2, 4, 7}, {2, 5, 6}, {3, 4, 6}, {3, 7, 5}}

HoffmanSingleton (Yellow)

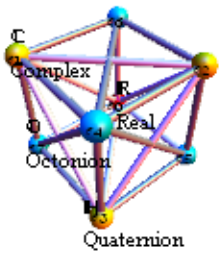
Flattened triad/mask bits

{1, 2, 3, 4, 5, 6, 7}
{0, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	7	-6
2	-3	-1	1	7	6	-5	-4
3	2	-1	-1	6	-7	-4	5
4	-5	-7	-6	-1	1	3	2
5	4	-6	7	-1	-1	2	-3
6	-7	5	4	-3	-2	-1	1
7	6	4	-5	-2	3	-1	-1

multiplication table

72 $\nu_e \overset{0\to-1}{\underset{w_d}{\overset{\vee}{L}}}$ Ref. Symbols: 2D ▲ 3D ▲

0apccssgg
001000001_2

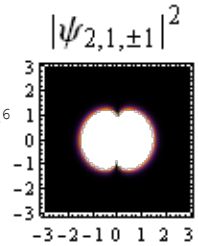
Root{ 0 0 0 0 1 1 0 0 }
Weight{ -1 1 1 -1 0 0 0 0 }
Height= 3

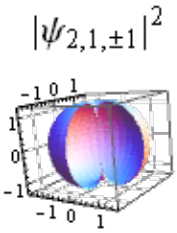
Exp. m $1.\times10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

Binary{	0	1	0	0	0	1	0	1 }
E8{	0	0	-1	0	1	0	0	0 }
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	1	0	0	0 }

Bit NKS CA Pascal E8

^{10}Ne[He]$2s^2 2p^6$





Flipped

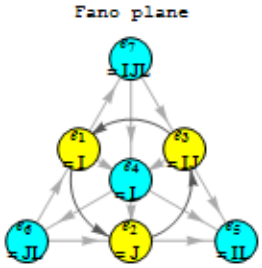
Octonion triads-fPi=2 Sign mask=1 Hex=0C L fp_sm=8

{{1, 2, 3}, {1, 4, 5}, {1, 7, 6},
{2, 7, 4}, {2, 5, 6}, {3, 4, 6}, {3, 5, 7}}

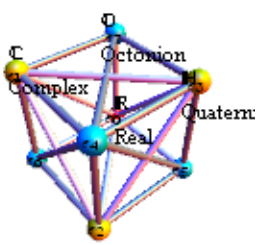
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 3, 2, 4, 5, 7, 6}
{0, 0, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	-7	6
2	-3	-1	1	-7	6	-5	4
3	2	-1	-1	6	7	-4	-5
4	-5	7	-6	-1	1	3	-2
5	4	-6	-7	-1	-1	2	3
6	7	5	4	-3	-2	-1	-1
7	-6	-4	5	2	-3	1	-1

multiplication table

Not Flipped

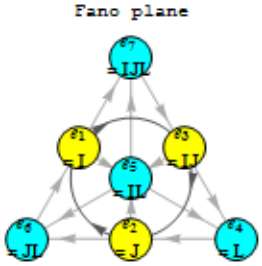
Octonion triads-fPi=1 Sign mask=1 Hex=0F L fp_sm=5

{{1, 3, 2}, {1, 5, 4}, {1, 7, 6},
{2, 6, 4}, {2, 5, 7}, {3, 4, 7}, {3, 5, 6}}

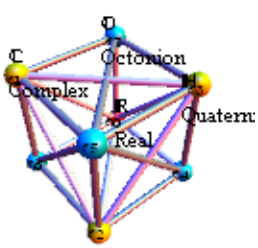
Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 5, 4, 7, 6}
{1, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	-7	6
2	3	-1	-1	-6	7	4	-5
3	-2	1	-1	7	6	-5	-4
4	5	6	-7	-1	-1	-2	3
5	-4	-7	-6	1	-1	3	2
6	7	-4	5	2	-3	-1	-1
7	-6	5	4	-3	-2	1	-1

multiplication table

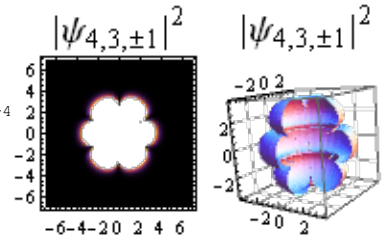
74 $\overline{e}_{y_d}^{\,t\to 0}\,\check{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ -1 -1 -2 -2 -2 -1 0 0 }	Exp. m	0.51099892 MeV
010000001_2	Weight{ 1 0 -1 0 0 0 1 0 }	Theo. m	0.510999
	Height= 10	Exp. τ	? s

Binary{	0	0	1	1	1	0	0	0	}
E8{	0	0	0	-1	-1	0	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	-1	0	0	0	}

Bit NKS CA Pascal E8

^{60}Nd[Xe]$6s^2 4f^4$



Flipped

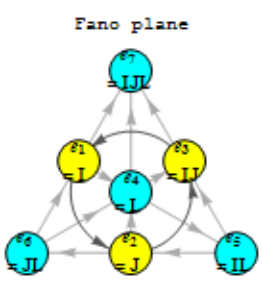
Octonion triads-fPi=2 Sign mask=1 Hex=74 L fp_sm=8

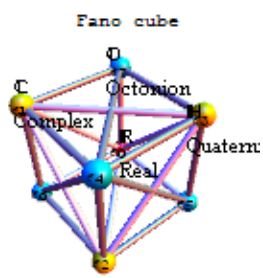
{{1, 2, 3}, {1, 4, 5}, {1, 7, 6},
{2, 4, 7}, {2, 6, 5}, {3, 6, 4}, {3, 7, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 3, 2, 4, 5, 7, 6}
{0, 0, 1, 0, 1, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	-7	6
2	-3	-1	1	7	-6	5	-4
3	2	-1	-1	-6	-7	4	5
4	-5	-7	6	-1	1	-3	2
5	4	6	7	-1	-1	-2	-3
6	7	-5	-4	3	2	-1	-1
7	-6	4	-5	-2	3	1	-1

multiplication table

Not Flipped

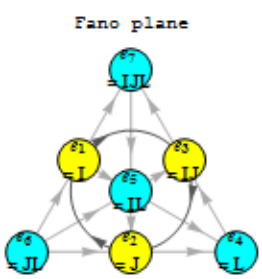
Octonion triads-fPi=1 Sign mask=1 Hex=77 L fp_sm=5

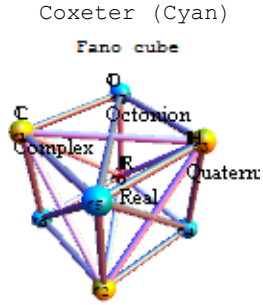
{{1, 3, 2}, {1, 5, 4}, {1, 7, 6},
{2, 4, 6}, {2, 7, 5}, {3, 7, 4}, {3, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 3, 2, 5, 4, 7, 6}
{1, 1, 1, 0, 1, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	-7	6
2	3	-1	-1	6	-7	-4	5
3	-2	1	-1	-7	-6	5	4
4	5	-6	7	-1	-1	2	-3
5	-4	7	6	1	-1	-3	-2
6	7	4	-5	-2	3	-1	-1
7	-6	-5	-4	3	2	1	-1

multiplication table

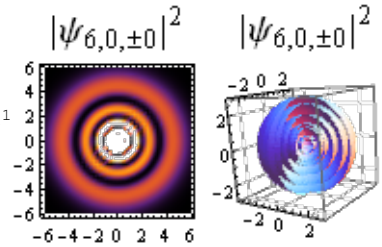
65 $\overline{e}_{y_1}^{\uparrow\to -1}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-2	-2	-1	-1	0	0 }	Exp. m	0.51099892 MeV
010000101_2	Weight{	1	-1	1	-1	0	0	1	0 }	Theo. m	0.510999
	Height=	9								Exp. τ	? s

Binary{	0	1	0	1	0	1	0	0	}
E8{	0	0	-1	0	-1	0	0	0	}
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	-1	0	0	0	}

Bit NKS CA Pascal E8

^{55}Cs[Xe]6s^1



Flipped

Octonion triads-fPi=2 Sign mask=2 Hex=6A L fp_sm=8

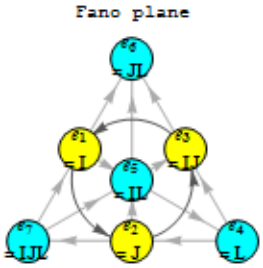
{{1, 2, 3}, {1, 5, 4}, {1, 6, 7},
{2, 7, 4}, {2, 5, 6}, {3, 6, 4}, {3, 7, 5}}

HoffmanSingleton (Yellow)

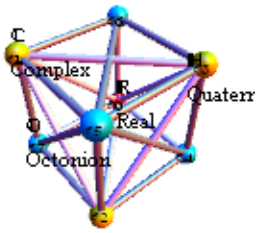
Flattened triad/mask bits

{1, 3, 2, 5, 4, 6, 7}
{0, 1, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	7	-6
2	-3	-1	1	-7	6	-5	4
3	2	-1	-1	-6	-7	4	5
4	5	7	6	-1	-1	-3	-2
5	-4	-6	7	1	-1	2	-3
6	-7	5	-4	3	-2	-1	1
7	6	-4	-5	2	3	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=1 Sign mask=2 Hex=69 L fp_sm=5

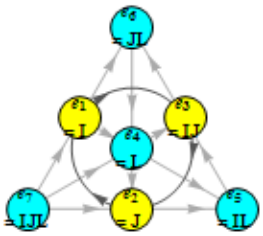
{{1, 3, 2}, {1, 4, 5}, {1, 6, 7},
{2, 6, 4}, {2, 5, 7}, {3, 7, 4}, {3, 6, 5}}

Coxeter (Cyan)

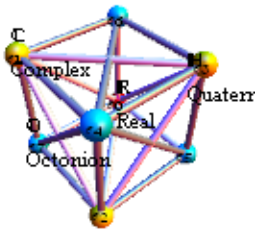
Flattened triad/mask bits

{1, 3, 2, 4, 5, 6, 7}
{1, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	7	-6
2	3	-1	-1	-6	7	4	-5
3	-2	1	-1	-7	-6	5	4
4	-5	6	7	-1	1	-2	-3
5	4	-7	6	-1	-1	-3	2
6	-7	-4	-5	2	3	-1	1
7	6	5	-4	3	-2	-1	-1

multiplication table

81 ν_e 0 w_1 R Ref. Symbols: 2D △ 3D ▲

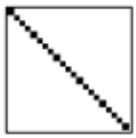
0apccssgg
001000101_2

Root{	0	0	0	0	0	1	0	0	}
Weight{	-1	2	-1	0	0	0	0	0	}
Height=	2								

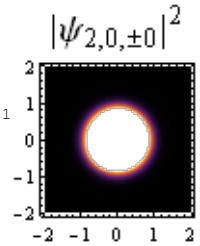
Exp. m $1.\times 10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

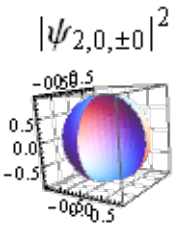
Binary{	0	0	1	0	0	1	1	0	}
E8{	0	0	0	-1	1	0	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	1	0	0	0	}

Bit NKS CA Pascal E8



^{3}Li[He]2s^1





Flipped

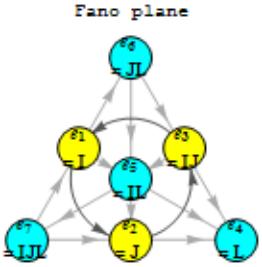
Octonion triads-fPi=2 Sign mask=2 Hex=12 fp_sm=8

{{1, 2, 3}, {1, 5, 4}, {1, 6, 7},
{2, 4, 7}, {2, 6, 5}, {3, 4, 6}, {3, 5, 7}}

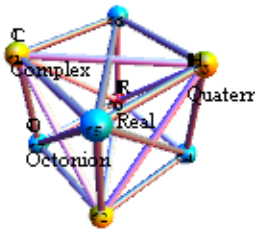
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 3, 2, 5, 4, 6, 7}
{0, 1, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	7	-6
2	-3	-1	1	7	-6	5	-4
3	2	-1	-1	6	7	-4	-5
4	5	-7	-6	-1	-1	3	2
5	-4	6	-7	1	-1	-2	3
6	-7	-5	4	-3	2	-1	1
7	6	4	5	-2	-3	-1	-1

multiplication table

Not Flipped

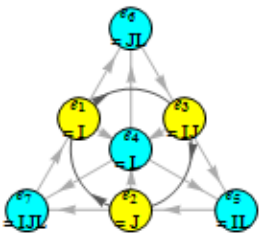
Octonion triads-fPi=1 Sign mask=2 Hex=11 fp_sm=5

{{1, 3, 2}, {1, 4, 5}, {1, 6, 7},
{2, 4, 6}, {2, 7, 5}, {3, 4, 7}, {3, 5, 6}}

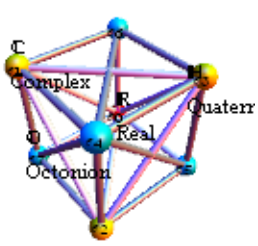
Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 4, 5, 6, 7}
{1, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	7	-6
2	3	-1	-1	6	-7	-4	5
3	-2	1	-1	7	6	-5	-4
4	-5	-6	-7	-1	1	2	3
5	4	7	-6	-1	-1	3	-2
6	-7	4	5	-2	-3	-1	1
7	6	-5	4	-3	2	-1	-1

multiplication table

54 $\overline{e}_{y_m}^{\uparrow\to 0}$ $\hat{L}$ Ref. Symbols: 2D 3D

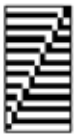
0apccssgg
010001001_2

Root{ 0 -1 -1 -1 -1 -1 0 0 }
Weight{ 1 -1 0 0 0 1 0 -1 }
Height= 6

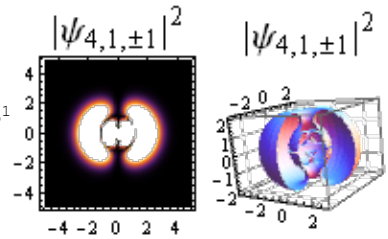
Exp. m 0.51099892 MeV
Theo. m 0.510999
Exp. τ ? s

Binary{	1	0	0	0	1	0	1	0 }
E8{	0	-1	0	0	-1	0	0	0 }
Physics {	0	-1	0	0	-1	0	0	0 }

Bit NKS CA Pascal E8



^{31}Ga[Ar]$4s^2 3d^{10} 4p^1$



Flipped

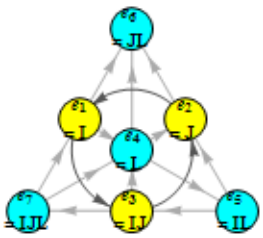
Octonion triads-fPi=2 Sign mask=3 Hex=59 L fp_sm=8

{{1, 3, 2}, {1, 4, 5}, {1, 6, 7},
{2, 7, 4}, {2, 6, 5}, {3, 4, 6}, {3, 7, 5}}

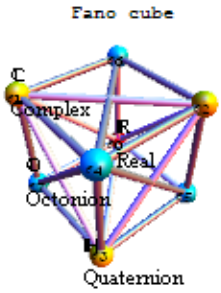
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 3, 4, 5, 6, 7}
{1, 0, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	7	-6
2	3	-1	-1	-7	-6	5	4
3	-2	1	-1	6	-7	-4	5
4	-5	7	-6	-1	1	3	-2
5	4	6	7	-1	-1	-2	-3
6	-7	-5	4	-3	2	-1	1
7	6	-4	-5	2	3	-1	-1

multiplication table

Not Flipped

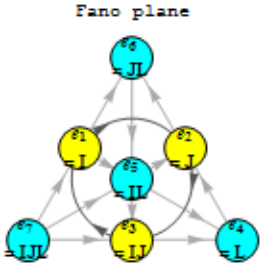
Octonion triads-fPi=1 Sign mask=3 Hex=5A L fp_sm=5

{{1, 2, 3}, {1, 5, 4}, {1, 6, 7},
{2, 6, 4}, {2, 7, 5}, {3, 4, 7}, {3, 6, 5}}

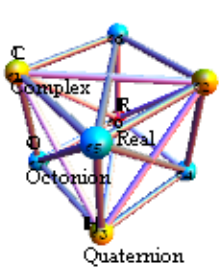
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 5, 4, 6, 7}
{0, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	7	-6
2	-3	-1	1	-6	-7	4	5
3	2	-1	-1	7	-6	5	-4
4	5	6	-7	-1	-1	-2	3
5	-4	7	6	1	-1	-3	-2
6	-7	-4	-5	2	3	-1	1
7	6	-5	4	-3	2	-1	-1

multiplication table

216 ν_e 0 w_m L Ref. Symbols: 2D 3D

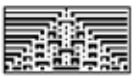
0apccssgg
001001001_2

Root{	1	1	2	1	1	1	0	0	}
Weight{	-1	1	0	-1	1	0	-1	0	}
Height=	8								

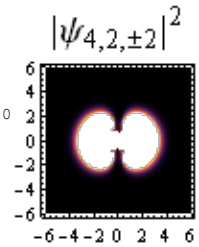
Exp. m $1.\times 10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

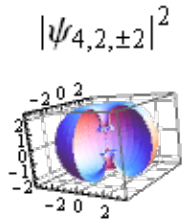
Binary{	0	0	1	1	1	0	1	1	}
E8{	1	0	0	0	1	0	0	0	}
Physics {	1	0	0	0	1	0	0	0	}

Bit NKS CA Pascal E8



^{48}Cd[Kr]5s^{2}4d^{10}





Flipped

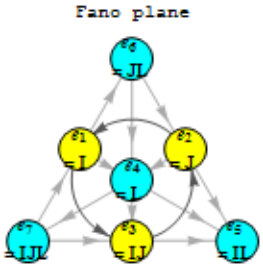
Octonion triads-fPi=2 Sign mask=3 Hex=21 L fp_sm=8

{{1, 3, 2}, {1, 4, 5}, {1, 6, 7},
{2, 4, 7}, {2, 5, 6}, {3, 6, 4}, {3, 5, 7}}

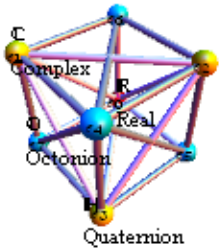
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, **2**, **3**, 4, 5, 6, 7}
{1, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	5	-4	7	-6
2	3	-1	-1	7	6	-5	-4
3	-2	1	-1	-6	7	4	-5
4	-5	-7	6	-1	1	-3	2
5	4	-6	-7	-1	-1	2	3
6	-7	5	-4	3	-2	-1	1
7	6	4	5	-2	-3	-1	-1

multiplication table

Not Flipped

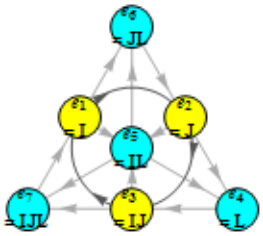
Octonion triads-fPi=1 Sign mask=3 Hex=22 L fp_sm=5

{{1, 2, 3}, {1, 5, 4}, {1, 6, 7},
{2, 4, 6}, {2, 5, 7}, {3, 7, 4}, {3, 5, 6}}

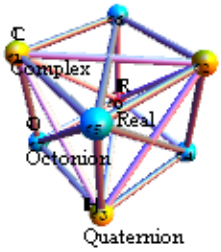
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 5, 4, 6, 7}
{0, 1, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-5	4	7	-6
2	-3	-1	1	6	7	-4	-5
3	2	-1	-1	-7	6	-5	4
4	5	-6	7	-1	-1	2	-3
5	-4	-7	-6	1	-1	3	2
6	-7	4	5	-2	-3	-1	1
7	6	5	-4	3	-2	-1	-1

multiplication table

61 ν_e 0 R w_m Ref. Symbols: 2D ▲ 3D ▲

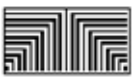
0apccssgg
001001101_2

Root{ 1 0 1 1 1 1 0 0 }
Weight{ -1 1 0 0 0 1 -1 -1 }
Height= 6

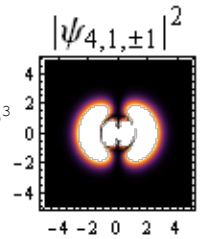
Exp. m $1.\times 10^{-18}$ MeV
Theo. m 1.72318×10^{-7}
Exp. τ ? s

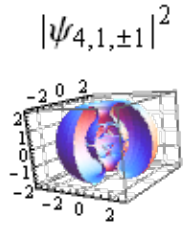
Binary{	0	1	1	0	0	1	0	0 }
E8{	0	-1	0	0	1	0	0	0 }
Physics {	0	-1	0	0	1	0	0	0 }

Bit NKS CA Pascal E8



$^{33}As[Ar]4s^2 3d^{10} 4p^3$



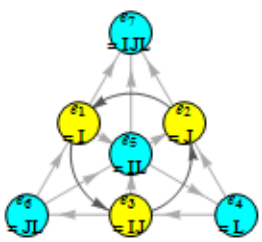


Flipped

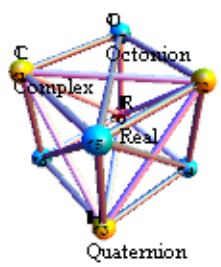
Octonion triads-fPi=2 Sign mask=4 Hex=3F L fp_sm=8
{{1, 3, 2}, {1, 5, 4}, {1, 7, 6},
{2, 7, 4}, {2, 6, 5}, {3, 6, 4}, {3, 5, 7}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 3, 5, 4, 7, 6}
{1, 1, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	-7	6
2	3	-1	-1	-7	-6	5	4
3	-2	1	-1	-6	7	4	-5
4	5	7	6	-1	-1	-3	-2
5	-4	6	-7	1	-1	-2	3
6	7	-5	-4	3	2	-1	-1
7	-6	-4	5	2	-3	1	-1

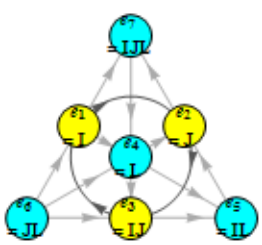
multiplication table

Not Flipped

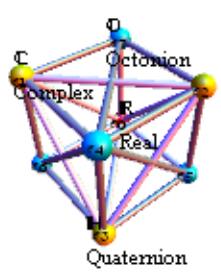
Octonion triads-fPi=1 Sign mask=4 Hex=3C L fp_sm=5
{{1, 2, 3}, {1, 4, 5}, {1, 7, 6},
{2, 6, 4}, {2, 7, 5}, {3, 7, 4}, {3, 5, 6}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 4, 5, 7, 6}
{0, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	-7	6
2	-3	-1	1	-6	-7	4	5
3	2	-1	-1	-7	6	-5	4
4	-5	6	7	-1	1	-2	-3
5	4	7	-6	-1	-1	3	-2
6	7	-4	5	2	-3	-1	-1
7	-6	-5	-4	3	2	1	-1

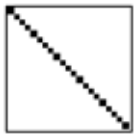
multiplication table

209 $\overline{e}_{y_m}^{\uparrow\to 0}$ Ref. Symbols: 2D ▽ 3D

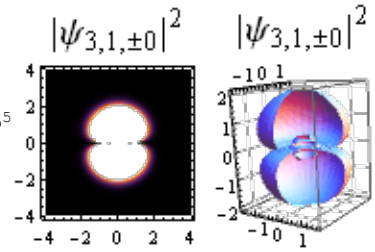
0apccssgg 010001101_2	Root{ 0 0 0 -1 -1 -1 0 0 } Weight{ 1 -1 0 -1 1 0 0 0 } Height= 4	Exp. m Theo. m Exp. τ	0.51099892 MeV 0.510999 ? s

Binary{	0	1	0	1	1	1	1	0 }
E8{	1	0	0	0	-1	0	0	0 }
Physics {	1	0	0	0	-1	0	0	0 }

Bit NKS CA Pascal E8



^{17}Cl[Ne]3s^{2}3p^5



Flipped

Octonion triads-fPi=2 Sign mask=4 Hex=47 L fp_sm=8

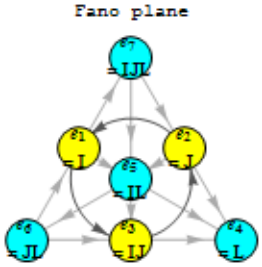
{{1, 3, 2}, {1, 5, 4}, {1, 7, 6},
{2, 4, 7}, {2, 5, 6}, {3, 4, 6}, {3, 7, 5}}

HoffmanSingleton (Yellow)

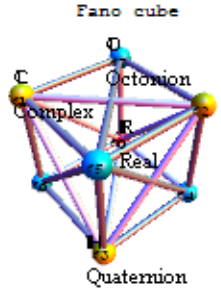
Flattened triad/mask bits

{1, **2**, **3**, 5, 4, 7, 6}
{1, 1, 1, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-5	4	-7	6
2	3	-1	-1	7	6	-5	-4
3	-2	1	-1	6	-7	-4	5
4	5	-7	-6	-1	-1	3	2
5	-4	-6	7	1	-1	2	-3
6	7	5	4	-3	-2	-1	-1
7	-6	4	-5	-2	3	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=1 Sign mask=4 Hex=44 L fp_sm=5

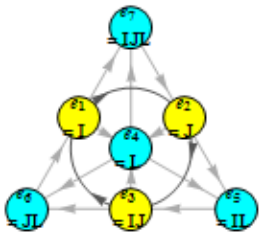
{{1, 2, 3}, {1, 4, 5}, {1, 7, 6},
{2, 4, 6}, {2, 5, 7}, {3, 4, 7}, {3, 6, 5}}

Coxeter (Cyan)

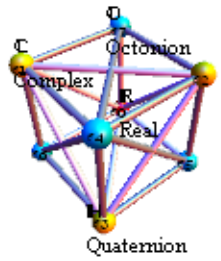
Flattened triad/mask bits

{1, 2, 3, 4, 5, 7, 6}
{0, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube



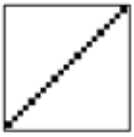
0↦1	1	2	3	4	5	6	7
1	-1	3	-2	5	-4	-7	6
2	-3	-1	1	6	7	-4	-5
3	2	-1	-1	7	-6	5	-4
4	-5	-6	-7	-1	1	2	3
5	4	-7	6	-1	-1	-3	2
6	7	4	-5	-2	3	-1	-1
7	-6	5	4	-3	-2	1	-1

multiplication table

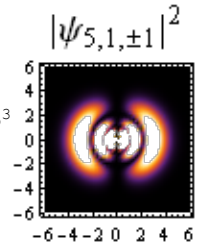
109 $\overline{\nu_\mu}$ $^{0}_{w_d}$ $^{\nu}_{L}$ Ref. Symbols: 2D 3D

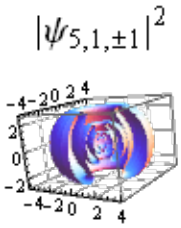
0apccssgg	Root{	-1	-1	-1	-1	-1	-1	-1	-1 }	Exp. m $1.\times 10^{-18}$ MeV
011000010_2	Weight{	-1	0	0	0	1	0	-1	-1 }	Theo. m 8.38312×10^{-10}
	Height= 9									Exp. τ ? s
Binary{	1	0	1	1	1	0	0	0	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}	

Bit NKS CA Pascal E8



$^{51}Sb[Kr]5s^2 4d^{10} 5p^3$





Flipped

Octonion triads-fPi=3 Sign mask=1 Hex=7B R fp_sm=4

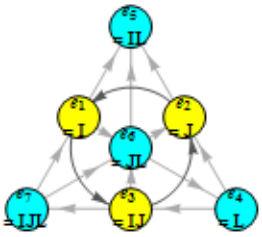
{{1, 3, 2}, {1, 6, 4}, {1, 5, 7},
{2, 5, 4}, {2, 7, 6}, {3, 7, 4}, {3, 6, 5}}

HoffmanSingleton (Yellow)

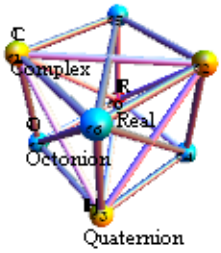
Flattened triad/mask bits

{1, 2, 3, 6, 4, 5, 7}
{1, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	7	4	-5
2	3	-1	-1	-5	4	-7	6
3	-2	1	-1	-7	-6	5	4
4	6	5	7	-1	-2	-1	-3
5	-7	-4	6	2	-1	-3	1
6	-4	7	-5	1	3	-1	-2
7	5	-6	-4	3	-1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=1 Hex=72 R fp_sm=7

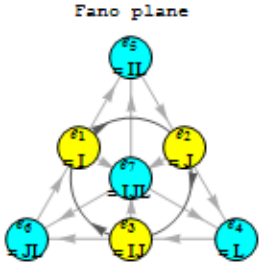
{{1, 2, 3}, {1, 7, 4}, {1, 5, 6},
{2, 4, 5}, {2, 7, 6}, {3, 6, 4}, {3, 7, 5}}

Coxeter (Cyan)

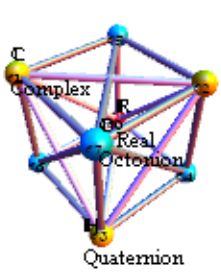
Flattened triad/mask bits

{1, 2, 3, 7, 4, 5, 6}
{0, 1, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	6	-5	4
2	-3	-1	1	5	-4	-7	6
3	2	-1	-1	-6	-7	4	5
4	7	-5	6	-1	2	-3	-1
5	-6	4	7	-2	-1	1	-3
6	5	7	-4	3	-1	-1	-2
7	-4	-6	-5	1	3	2	-1

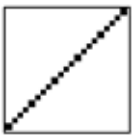
multiplication table

244 $\mu_{y_d}^{\vec{\nu}_L^{\to 1}}$ Ref. Symbols: 2D ▲ 3D ▲

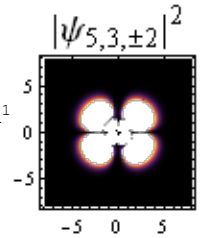
0apccssgg 000000010_2	Root{	2	2	3	3	2	1	1	1 }	Exp. m	105.658369 MeV
	Weight{	1	-1	0	1	-1	0	0	1 }	Theo. m	105.038
	Height= 16									Exp. τ	2.19704×10^{-6} s

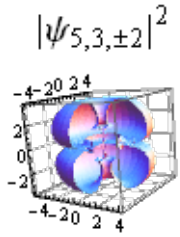
Binary{	0	1	1	1	0	1	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{91}Pa[Rn]$7s^2 5f^2 6d^1$





Flipped

Octonion triads-fPi=3 Sign mask=1 Hex=03 R fp_sm=4

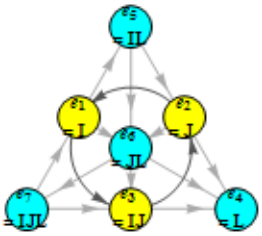
{{1, 3, 2}, {1, 6, 4}, {1, 5, 7},
{2, 4, 5}, {2, 6, 7}, {3, 4, 7}, {3, 5, 6}}

HoffmanSingleton (Yellow)

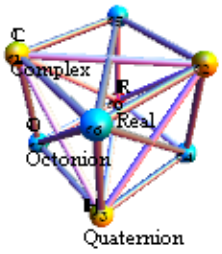
Flattened triad/mask bits

{1, 2, 3, 6, 4, 5, 7}
{1, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	7	4	-5
2	3	-1	-1	5	-4	7	-6
3	-2	1	-1	7	6	-5	-4
4	6	-5	-7	-1	2	-1	3
5	-7	4	-6	-2	-1	3	1
6	-4	-7	5	1	-3	-1	2
7	5	6	4	-3	-1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=1 Hex=0A R fp_sm=7

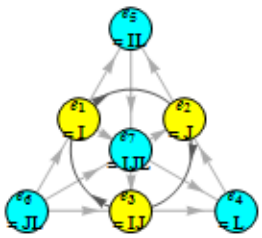
{{1, 2, 3}, {1, 7, 4}, {1, 5, 6},
{2, 5, 4}, {2, 6, 7}, {3, 4, 6}, {3, 5, 7}}

Coxeter (Cyan)

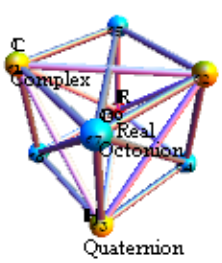
Flattened triad/mask bits

{1, 2, 3, 7, 4, 5, 6}
{0, 1, 0, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	6	-5	4
2	-3	-1	1	-5	4	7	-6
3	2	-1	-1	6	7	-4	-5
4	7	5	-6	-1	-2	3	-1
5	-6	-4	-7	2	-1	1	3
6	5	-7	4	-3	-1	-1	2
7	-4	6	5	1	-3	-2	-1

multiplication table

129 $\overline{V_\mu}^{\,0}_{w_1}\,\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg 011000110_2

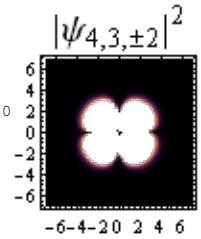
Root{ -2 -1 -2 -1 -1 -1 -1 -1 }
Weight{ -1 0 0 1 0 -1 0 0 }
Height= 11

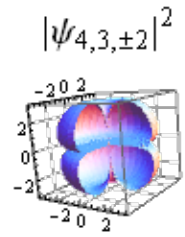
Exp. m $1.\times 10^{-18}$ MeV
Theo. m 8.38312×10^{-10}
Exp. τ ? s

Binary{	0	1	1	1	1	0	0	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{66}Dy[Xe]$6s^2 4f^{10}$





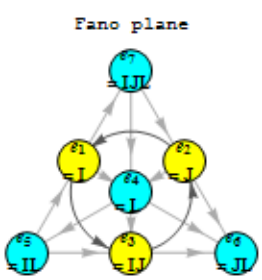
Flipped

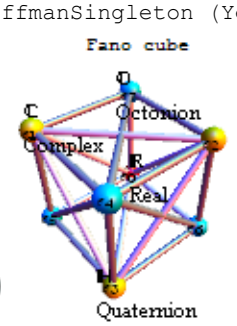
Octonion triads-fPi=3 Sign mask=2 Hex=65 ℝ fp_sm=4

{{1, 3, 2}, {1, 4, 6}, {1, 7, 5},
{2, 4, 5}, {2, 6, 7}, {3, 7, 4}, {3, 6, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 3, 4, 6, 7, 5}
{1, 0, 1, 0, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	-7	-4	5
2	3	-1	-1	5	-4	7	-6
3	-2	1	-1	-7	-6	5	4
4	-6	-5	7	-1	2	1	-3
5	7	4	6	-2	-1	-3	-1
6	4	-7	-5	-1	3	-1	2
7	-5	6	-4	3	1	-2	-1

multiplication table

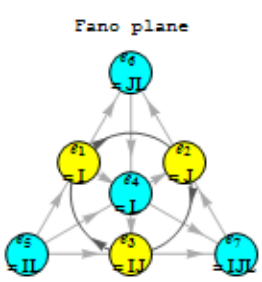
Not Flipped

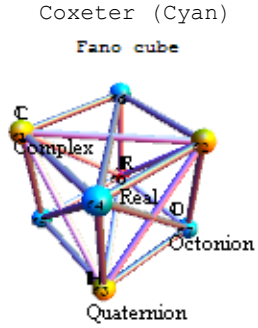
Octonion triads-fPi=5 Sign mask=2 Hex=6C ℝ fp_sm=7

{{1, 2, 3}, {1, 4, 7}, {1, 6, 5},
{2, 5, 4}, {2, 6, 7}, {3, 6, 4}, {3, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 4, 7, 6, 5}
{0, 0, 1, 1, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	-6	5	-4
2	-3	-1	1	-5	4	7	-6
3	2	-1	-1	-6	-7	4	5
4	-7	5	6	-1	-2	-3	1
5	6	-4	7	2	-1	-1	-3
6	-5	-7	-4	3	1	-1	2
7	4	6	-5	-1	3	-2	-1

multiplication table

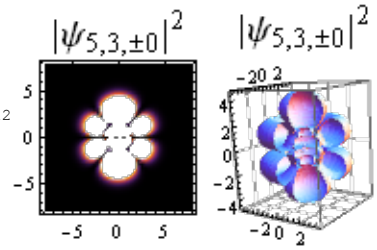
238 $\mu_{y_1}^{\vec{R}\to 1}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	3	2	4	3	2	1	1	1 }	Exp. m	105.658369 MeV
000000110_2	Weight{	1	-1	0	0	0	1	-1	0 }	Theo. m	105.038
	Height= 18									Exp. τ	2.19704×10^{-6} s

Binary{	1	0	1	1	0	1	1	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{100}Fm[Rn]$7s^2 5f^{12}$



Flipped

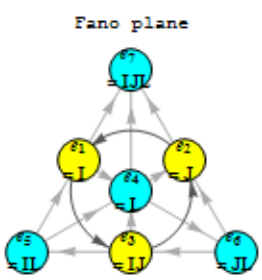
Octonion triads-fPi=3 Sign mask=2 Hex=1D R fp_sm=4

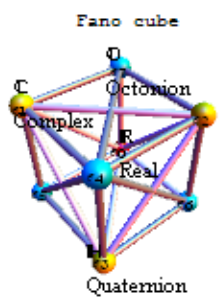
{{1, 3, 2}, {1, 4, 6}, {1, 7, 5},
{2, 5, 4}, {2, 7, 6}, {3, 4, 7}, {3, 5, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 3, 4, 6, 7, 5}
{1, 0, 1, 1, 1, 0, 0}





0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	-7	-4	5
2	3	-1	-1	-5	4	-7	6
3	-2	1	-1	7	6	-5	-4
4	-6	5	-7	-1	-2	1	3
5	7	-4	-6	2	-1	3	-1
6	4	7	5	-1	-3	-1	-2
7	-5	-6	4	-3	1	2	-1

multiplication table

Not Flipped

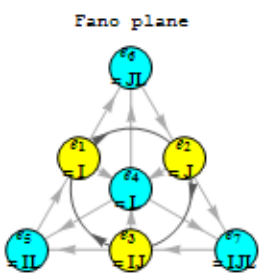
Octonion triads-fPi=5 Sign mask=2 Hex=14 R fp_sm=7

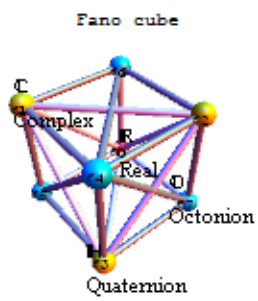
{{1, 2, 3}, {1, 4, 7}, {1, 6, 5},
{2, 4, 5}, {2, 7, 6}, {3, 4, 6}, {3, 5, 7}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 3, 4, 7, 6, 5}
{0, 0, 1, 0, 1, 0, 0}





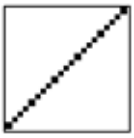
0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	-6	5	-4
2	-3	-1	1	5	-4	-7	6
3	2	-1	-1	6	7	-4	-5
4	-7	-5	-6	-1	2	3	1
5	6	4	-7	-2	-1	-1	3
6	-5	7	4	-3	1	-1	-2
7	4	-6	5	-1	-3	2	-1

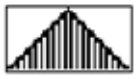
multiplication table

95 $\overline{V_\mu}^{\,0}_{w_m}\,\hat{L}$ Ref. Symbols: 2D 3D

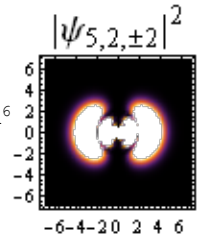
0apccssgg 011001010_2	Root{	-2	-1	-2	-2	-2	-1	-1	-1 }	Exp. m $1.\times 10^{-18}$ MeV
	Weight{	-1	1	-1	0	1	-1	0	0 }	Theo. m 8.38312×10^{-10}
	Height= 13									Exp. τ ? s
Binary{	1	1	1	0	1	0	0	0	}	
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}	

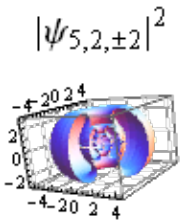
Bit NKS CA Pascal E8





^{76}Os[Xe]$6s^2 4f^{14} 5d^6$





Flipped

Octonion triads-fPi=3 Sign mask=3 Hex=56 ℝ fp_sm=4

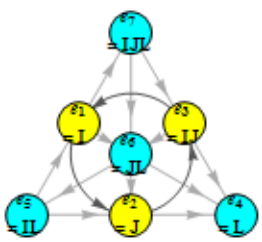
{{1, 2, 3}, {1, 6, 4}, {1, 7, 5},
{2, 4, 5}, {2, 7, 6}, {3, 4, 7}, {3, 6, 5}}

HoffmanSingleton (Yellow)

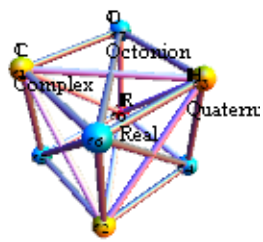
Flattened triad/mask bits

{1, 3, 2, 6, 4, 7, 5}
{0, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	-7	4	5
2	-3	-1	1	5	-4	-7	6
3	2	-1	-1	7	-6	5	-4
4	6	-5	-7	-1	2	-1	3
5	7	4	6	-2	-1	-3	-1
6	-4	7	-5	1	3	-1	-2
7	-5	-6	4	-3	1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=3 Hex=5F ℝ fp_sm=7

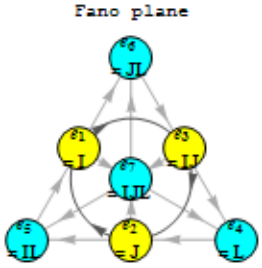
{{1, 3, 2}, {1, 7, 4}, {1, 6, 5},
{2, 5, 4}, {2, 7, 6}, {3, 4, 6}, {3, 7, 5}}

Coxeter (Cyan)

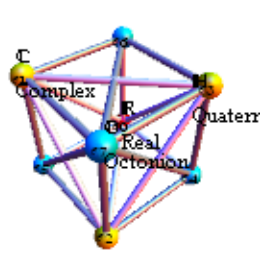
Flattened triad/mask bits

{1, 3, 2, 7, 4, 6, 5}
{1, 1, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	-6	5	4
2	3	-1	-1	-5	4	-7	6
3	-2	1	-1	6	-7	-4	5
4	7	5	-6	-1	-2	3	-1
5	6	-4	7	2	-1	-1	-3
6	-5	7	4	-3	1	-1	-2
7	-4	-6	-5	1	3	2	-1

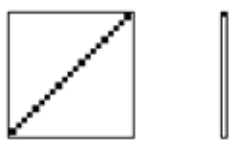
multiplication table

233 $\mu_{y_m}^{\vec{L}\to 0}$ Ref. Symbols: 2D ▲ 3D ▲

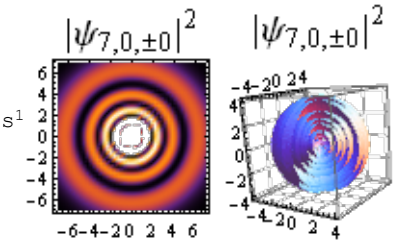
0apccssgg 000001010_2	Root{ 2 2 3 2 2 1 1 1 }	Exp. m	105.658369 MeV
	Weight{ 1 -1 1 -1 0 0 0 1 }	Theo. m	105.038
	Height= 15	Exp. τ	2.19704×10^{-6} s

Binary{	1	1	0	1	0	1	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{87}Fr[Rn]7s^1



Flipped

Octonion triads-fPi=3 Sign mask=3 Hex=2E ℝ fp_sm=4

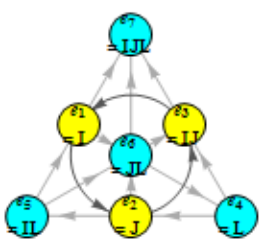
{{1, 2, 3}, {1, 6, 4}, {1, 7, 5},
{2, 5, 4}, {2, 6, 7}, {3, 7, 4}, {3, 5, 6}}

HoffmanSingleton (Yellow)

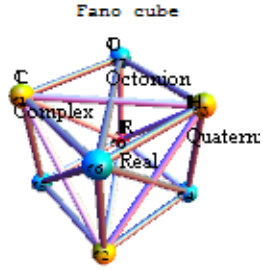
Flattened triad/mask bits

{1, 3, 2, 6, 4, 7, 5}
{0, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	-7	4	5
2	-3	-1	1	-5	4	7	-6
3	2	-1	-1	-7	6	-5	4
4	6	5	7	-1	-2	-1	-3
5	7	-4	-6	2	-1	3	-1
6	-4	-7	5	1	-3	-1	2
7	-5	6	-4	3	1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=3 Hex=27 ℝ fp_sm=7

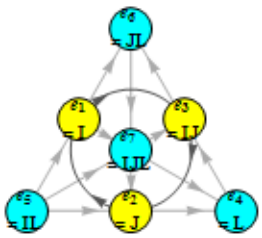
{{1, 3, 2}, {1, 7, 4}, {1, 6, 5},
{2, 4, 5}, {2, 6, 7}, {3, 6, 4}, {3, 5, 7}}

Coxeter (Cyan)

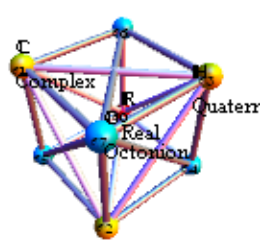
Flattened triad/mask bits

{1, 3, 2, 7, 4, 6, 5}
{1, 1, 1, 0, 0, 1, 0}

Fano plane



Fano cube



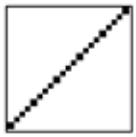
0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	-6	5	4
2	3	-1	-1	5	-4	7	-6
3	-2	1	-1	-6	7	4	-5
4	7	-5	6	-1	2	-3	-1
5	6	4	-7	-2	-1	-1	3
6	-5	-7	-4	3	1	-1	2
7	-4	6	5	1	-3	-2	-1

multiplication table

99 $\overline{V_\mu}^{\,0\to-1}_{\,w_m\ \check{R}}$ Ref. Symbols: 2D 3D

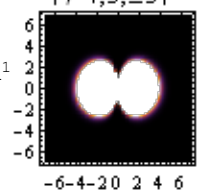
0apccssgg 011001110_2	Root{	-2	-1	-2	-2	-1	-1	-1	-1 }	Exp. m $1.\times10^{-18}$ MeV
	Weight{	-1	0	1	-1	1	-1	0	0 }	Theo. m 8.38312×10^{-10}
	Height= 12									Exp. τ ? s
Binary{	1	1	0	1	1	0	0	0	}	
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}	

Bit NKS CA Pascal E8

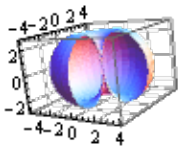


^{71}Lu[Xe]$6s^2 4f^{14} 5d^1$

$|\psi_{4,3,\pm3}|^2$



$|\psi_{4,3,\pm3}|^2$



Flipped

Octonion triads-fPi=3 Sign mask=4 Hex=48 ℝ fp_sm=4

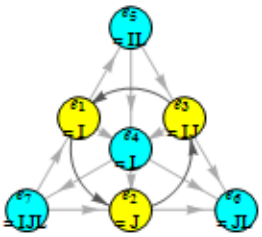
{{1, 2, 3}, {1, 4, 6}, {1, 5, 7},
{2, 5, 4}, {2, 6, 7}, {3, 4, 7}, {3, 6, 5}}

HoffmanSingleton (Yellow)

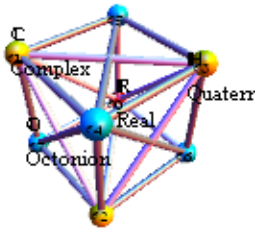
Flattened triad/mask bits

{1, 3, 2, 4, 6, 5, 7}
{0, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	7	-4	-5
2	-3	-1	1	-5	4	7	-6
3	2	-1	-1	7	-6	5	-4
4	-6	5	-7	-1	-2	1	3
5	-7	-4	6	2	-1	-3	1
6	4	-7	-5	-1	3	-1	2
7	5	6	4	-3	-1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=4 Hex=41 ℝ fp_sm=7

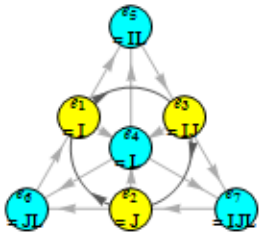
{{1, 3, 2}, {1, 4, 7}, {1, 5, 6},
{2, 4, 5}, {2, 6, 7}, {3, 4, 6}, {3, 7, 5}}

Coxeter (Cyan)

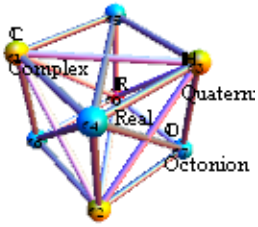
Flattened triad/mask bits

{1, 3, 2, 4, 7, 5, 6}
{1, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	6	-5	-4
2	3	-1	-1	5	-4	7	-6
3	-2	1	-1	6	-7	-4	5
4	-7	-5	-6	-1	2	3	1
5	-6	4	7	-2	-1	1	-3
6	5	-7	4	-3	-1	-1	2
7	4	6	-5	-1	3	-2	-1

multiplication table

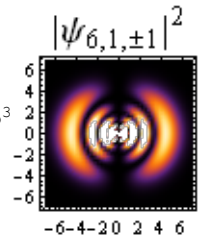
229 $\mu_{y_m}^{\vec{\nu}_R^{\to 1}}$ Ref. Symbols: 2D 3D

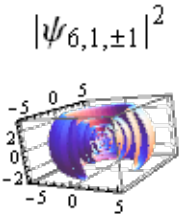
0apccssgg 000001110_2	Root{	2	2	3	2	1	1	1	1 }	Exp. m	105.658369 MeV
	Weight{	1	0	-1	0	0	0	0	1 }	Theo. m	105.038
	Height= 14									Exp. τ	2.19704×10^{-6} s

Binary{	1	1	1	0	0	1	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{83}Bi[Xe]$6s^2 4f^{14} 5d^{10} 6p^3$





Flipped

Octonion triads-fPi=3 Sign mask=4 Hex=30 R fp_sm=4

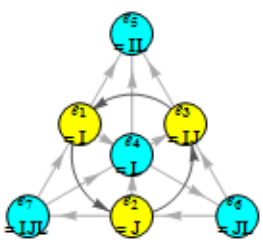
{{1, 2, 3}, {1, 4, 6}, {1, 5, 7},
{2, 4, 5}, {2, 7, 6}, {3, 7, 4}, {3, 5, 6}}

Flattened triad/mask bits

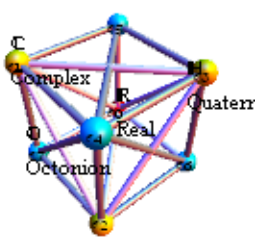
{1, 3, 2, 4, 6, 5, 7}
{0, 0, 0, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	7	-4	-5
2	-3	-1	1	5	-4	-7	6
3	2	-1	-1	-7	6	-5	4
4	-6	-5	7	-1	2	1	-3
5	-7	4	-6	-2	-1	3	1
6	4	7	5	-1	-3	-1	-2
7	5	-6	-4	3	-1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=5 Sign mask=4 Hex=39 R fp_sm=7

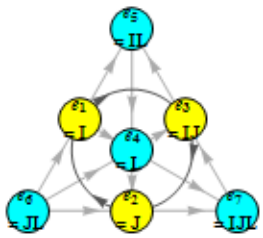
{{1, 3, 2}, {1, 4, 7}, {1, 5, 6},
{2, 5, 4}, {2, 7, 6}, {3, 6, 4}, {3, 5, 7}}

Flattened triad/mask bits

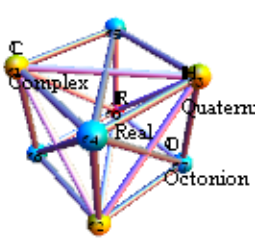
{1, 3, 2, 4, 7, 5, 6}
{1, 0, 0, 1, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	6	-5	-4
2	3	-1	-1	-5	4	-7	6
3	-2	1	-1	-6	7	4	-5
4	-7	5	6	-1	-2	-3	1
5	-6	-4	-7	2	-1	1	3
6	5	7	-4	3	-1	-1	-2
7	4	-6	5	-1	-3	2	-1

multiplication table

Convert::incomp: Incompatible units in 1_{Hg} and eVperC2 Mega. ≫

53 $\overline{e_S \Phi}_{r_d}^{0} \vee_{L}$ Ref. Symbols: 2D 3D

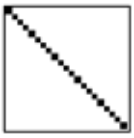
0apccssgg
011010000_2

Root{ 0 -1 -1 -1 -1 0 0 0 }
Weight{ 0 1 -1 0 0 1 0 -1 }
Height= 5

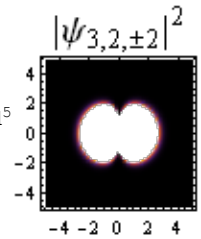
Exp. m $1.\times 10^{-18}$ MeV
Theo. m $\frac{1_{Hg}}{\text{eVperC2 Mega}}$
Exp. τ ? s

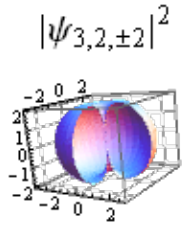
Binary{	1	0	0	0	1	1	0	0 }
E8{	0	-1	0	-1	0	0	0	0 }
Physics {	0	-1	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0 }

Bit NKS CA Pascal E8



^{25}Mn[Ar]$4s^2 3d^5$





Flipped

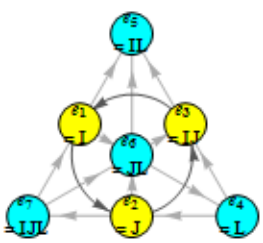
Octonion triads-fPi=4 Sign mask=1 Hex=7A L fp_sm=3

{{1, 2, 3}, {1, 6, 4}, {1, 5, 7},
{2, 7, 4}, {2, 6, 5}, {3, 5, 4}, {3, 7, 6}}

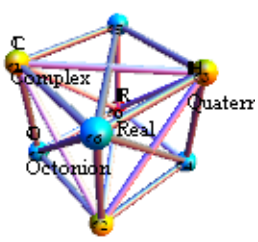
Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 6, 4, 5, 7}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	7	4	-5
2	-3	-1	1	-7	-6	5	4
3	2	-1	-1	-5	4	-7	6
4	6	7	5	-1	-3	-1	-2
5	-7	6	-4	3	-1	-2	1
6	-4	-5	7	1	2	-1	-3
7	5	-4	-6	2	-1	3	-1

multiplication table

Not Flipped

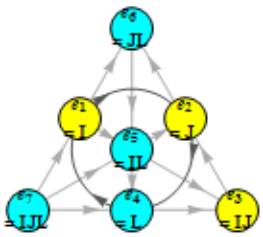
Octonion triads-fPi=7 Sign mask=1 Hex=7A L fp_sm=3

{{1, 2, 4}, {1, 5, 3}, {1, 6, 7},
{2, 6, 3}, {2, 7, 5}, {3, 7, 4}, {4, 6, 5}}

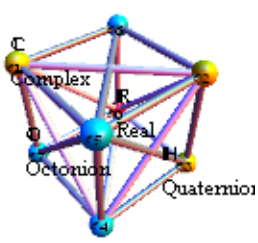
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 4, 5, 3, 6, 7}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	7	-6
2	-4	-1	-6	1	-7	3	5
3	5	6	-1	-7	-1	-2	4
4	2	-1	7	-1	-6	5	-3
5	-3	7	1	6	-1	-4	-2
6	-7	-3	2	-5	4	-1	1
7	6	-5	-4	3	2	-1	-1

multiplication table

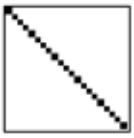
Convert::incomp: Incompatible units in 2_{Hg} and eVperC2 Mega. ≫

87 $x_1 \Phi_{o_d}^{\vec{L}^{\frac{1}{3}}}$ Ref. Symbols: 2D 3D

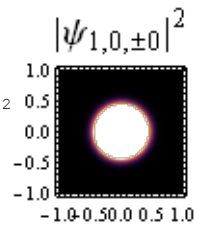
0apccssgg 000010000_2	Root{ 0 0 0 0 0 0 1 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 2 -1 0 0 0 0 0 0 }	Theo. m	$\frac{2_{Hg}}{\text{eVperC2 Mega}}$
	Height= 2	Exp. τ	? s

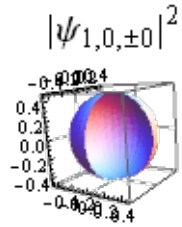
Binary{	0	0	0	1	0	1	1	0	}
E8{	0	0	0	0	-1	1	0	0	}
Physics {	0	0	0	0	-1	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{2}He1s^2





Flipped

Octonion triads-fPi=4 Sign mask=1 Hex=02 L fp_sm=3

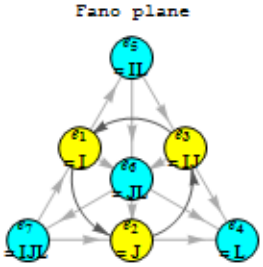
{{1, 2, 3}, {1, 6, 4}, {1, 5, 7},
{2, 4, 7}, {2, 5, 6}, {3, 4, 5}, {3, 6, 7}}

Coxeter (Cyan)

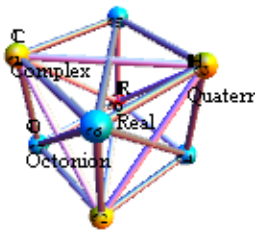
Flattened triad/mask bits

{1, 3, 2, 6, 4, 5, 7}
{0, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	7	4	-5
2	-3	-1	1	7	6	-5	-4
3	2	-1	-1	5	-4	7	-6
4	6	-7	-5	-1	3	-1	2
5	-7	-6	4	-3	-1	2	1
6	-4	5	-7	1	-2	-1	3
7	5	4	6	-2	-1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=1 Hex=02 L fp_sm=3

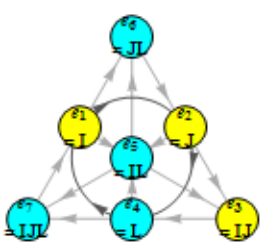
{{1, 2, 4}, {1, 5, 3}, {1, 6, 7},
{2, 3, 6}, {2, 5, 7}, {3, 4, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

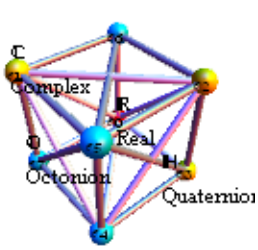
Flattened triad/mask bits

{1, 2, 4, 5, 3, 6, 7}
{0, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	7	-6
2	-4	-1	6	1	7	-3	-5
3	5	-6	-1	7	-1	2	-4
4	2	-1	-7	-1	6	-5	3
5	-3	-7	1	-6	-1	4	2
6	-7	3	-2	5	-4	-1	1
7	6	5	4	-3	-2	-1	-1

multiplication table

Convert::incomp: Incompatible units in 0_{Hg} and eVperC2 Mega. ≫

General::stop: Further output of Convert::incomp will be suppressed during this calculation. ≫

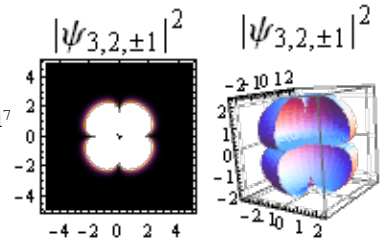
62 $\overline{e_S \Phi}_{r_1}^{0}{}_{\hat{R}}$ Ref. Symbols: 2D 3D

0apccssgg 011010100_2	Root{ 1 0 1 1 1 0 0 0 } Weight{ 0 -1 1 0 0 1 -1 -1 } Height= 5	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{0_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	0	1	1	0	0	0	1	0	}
E8{	0	-1	0	1	0	0	0	0	}
Physics {	0	-1	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{27}Co[Ar]4s^{2}3d^7



Flipped

Octonion triads-fPi=4 Sign mask=2 Hex=64 L fp_sm=3

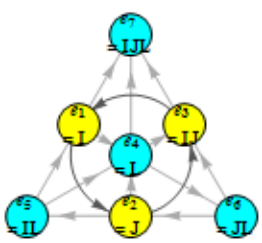
{{1, 2, 3}, {1, 4, 6}, {1, 7, 5},
{2, 4, 7}, {2, 5, 6}, {3, 5, 4}, {3, 7, 6}}

Coxeter (Cyan)

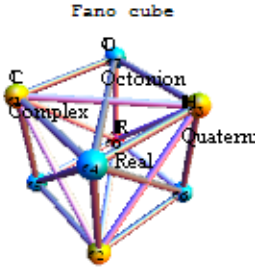
Flattened triad/mask bits

{1, 3, 2, 4, 6, 7, 5}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	-7	-4	5
2	-3	-1	1	7	6	-5	-4
3	2	-1	-1	-5	4	-7	6
4	-6	-7	5	-1	-3	1	2
5	7	-6	-4	3	-1	2	-1
6	4	5	7	-1	-2	-1	-3
7	-5	4	-6	-2	1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=2 Hex=64 L fp_sm=3

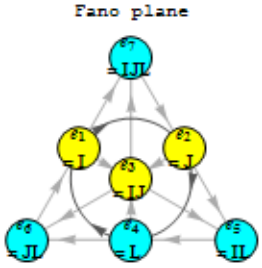
{{1, 2, 4}, {1, 3, 5}, {1, 7, 6},
{2, 3, 6}, {2, 5, 7}, {3, 7, 4}, {4, 6, 5}}

HoffmanSingleton (Yellow)

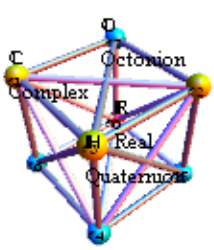
Flattened triad/mask bits

{1, 2, 4, 3, 5, 7, 6}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	-7	6
2	-4	-1	6	1	7	-3	-5
3	-5	-6	-1	-7	1	2	4
4	2	-1	7	-1	-6	5	-3
5	3	-7	-1	6	-1	-4	2
6	7	3	-2	-5	4	-1	-1
7	-6	5	-4	3	-2	1	-1

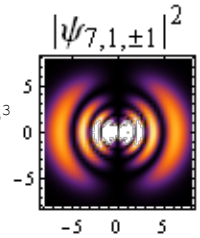
multiplication table

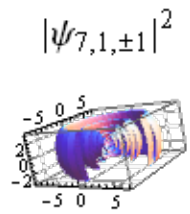
92 $x_1 \Phi_{\hat{R}}^{\to -\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 000010100_2	Root{	-4	-3	-5	-4	-3	-2	-1	-2 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{	0	0	0	0	1	-1	0	-1 }	Theo. m	$\frac{1_{Hg}}{\text{eVperC2 Mega}}$
	Height=	25								Exp. τ	? s
Binary{	0	0	0	0	1	0	1	1	}		
E8{	0	0	0	0	0	0	-1	-1	}		
Physics {	0	0	0	0	0	$-\frac{2}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}		

Bit NKS CA Pascal E8

^{115}Uup[Rn]$7s^2 5f^{14} 6d^{10} 7p^3$





Flipped

Octonion triads-fPi=4 Sign mask=2 Hex=1C L fp_sm=3

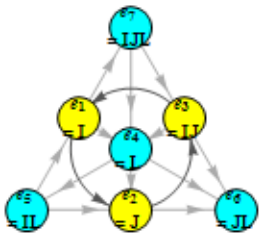
{{1, 2, 3}, {1, 4, 6}, {1, 7, 5},
{2, 7, 4}, {2, 6, 5}, {3, 4, 5}, {3, 6, 7}}

Coxeter (Cyan)

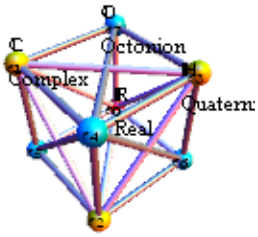
Flattened triad/mask bits

{1, 3, 2, 4, 6, 7, 5}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	-7	-4	5
2	-3	-1	1	-7	-6	5	4
3	2	-1	-1	5	-4	7	-6
4	-6	7	-5	-1	3	1	-2
5	7	6	4	-3	-1	-2	-1
6	4	-5	-7	-1	2	-1	3
7	-5	-4	6	2	1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=2 Hex=1C L fp_sm=3

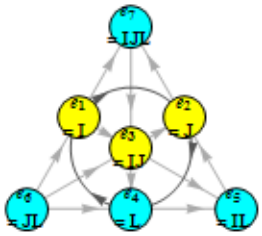
{{1, 2, 4}, {1, 3, 5}, {1, 7, 6},
{2, 6, 3}, {2, 7, 5}, {3, 4, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

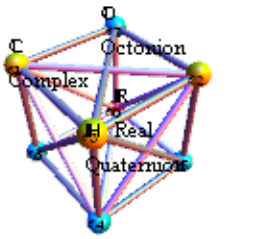
Flattened triad/mask bits

{1, 2, 4, 3, 5, 7, 6}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	-7	6
2	-4	-1	-6	1	-7	3	5
3	-5	6	-1	7	1	-2	-4
4	2	-1	-7	-1	6	-5	3
5	3	7	-1	-6	-1	4	-2
6	7	-3	2	5	-4	-1	-1
7	-6	-5	4	-3	2	1	-1

multiplication table

39 $\overline{e_S \Phi}_{r_m}^{\,0\to -1}$ Ref. Symbols: 2D 3D

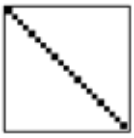
0apccssgg
011011000_2

Root{ -1 -1 -2 -1 0 0 0 0 }
Weight{ 0 0 1 0 -1 0 1 0 }
Height= 6

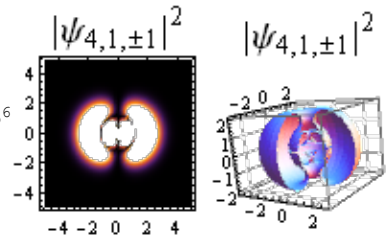
Exp. m $1.\times 10^{-18}$ MeV
Theo. m $\frac{1_{Hg}}{\text{eVperC2 Mega}}$
Exp. τ ? s

Binary{	1	1	0	1	0	0	0	0	}
E8{	-1	0	-1	0	0	0	0	0	}
Physics {	-1	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8



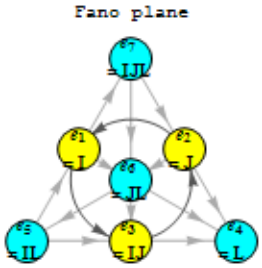
^{36}Kr[Ar]$4s^2 3d^{10} 4p^6$

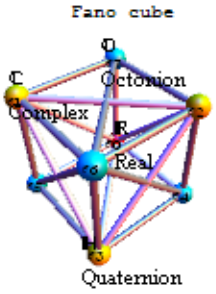


Flipped

Octonion triads-fPi=4 Sign mask=3 Hex=57 L fp_sm=3
{{1, 3, 2}, {1, 6, 4}, {1, 7, 5},
{2, 4, 7}, {2, 6, 5}, {3, 4, 5}, {3, 7, 6}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 6, 4, 7, 5}
{1, 1, 1, 0, 1, 0, 1}





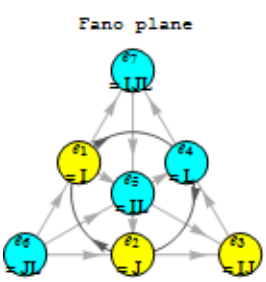
0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	-7	4	5
2	3	-1	-1	7	-6	5	-4
3	-2	1	-1	5	-4	-7	6
4	6	-7	-5	-1	3	-1	2
5	7	6	4	-3	-1	-2	-1
6	-4	-5	7	1	2	-1	-3
7	-5	4	-6	-2	1	3	-1

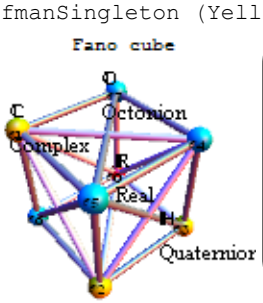
multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=3 Hex=57 L fp_sm=3
{{1, 4, 2}, {1, 5, 3}, {1, 7, 6},
{2, 3, 6}, {2, 7, 5}, {3, 4, 7}, {4, 6, 5}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 4, 2, 5, 3, 7, 6}
{1, 1, 1, 0, 1, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	-7	6
2	4	-1	6	-1	-7	-3	5
3	5	-6	-1	7	-1	2	-4
4	-2	1	-7	-1	-6	5	3
5	-3	7	1	6	-1	-4	-2
6	7	3	-2	-5	4	-1	-1
7	-6	-5	4	-3	2	1	-1

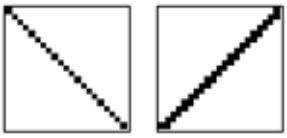
multiplication table

175 $x_1 \Phi_{o_m} \overset{\hat{L}}{\longrightarrow}^{\frac{1}{3}}$ Ref. Symbols: 2D 3D

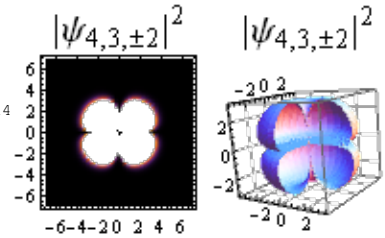
0apccssgg 000011000_2	Root{ 1 1 2 2 2 2 1 0 } Weight{ 0 1 0 0 0 0 -1 0 } Height= 12	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{1_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	1	0	1	1	0	1	0 }
E8{	0	0	0	0	1	1	0	0 }
Physics {	0	0	0	0	1	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



^{70}Yb[Xe]$6s^2 4f^{14}$



Flipped

Octonion triads-fPi=4 Sign mask=3 Hex=2F L fp_sm=3

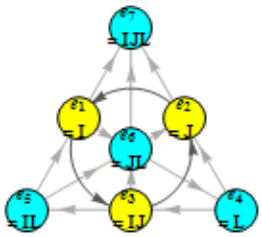
{{1, 3, 2}, {1, 6, 4}, {1, 7, 5},
{2, 7, 4}, {2, 5, 6}, {3, 5, 4}, {3, 6, 7}}

Coxeter (Cyan)

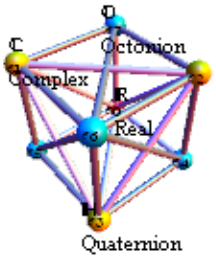
Flattened triad/mask bits

{1, 2, 3, 6, 4, 7, 5}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	-7	4	5
2	3	-1	-1	-7	6	-5	4
3	-2	1	-1	-5	4	7	-6
4	6	7	5	-1	-3	-1	-2
5	7	-6	-4	3	-1	2	-1
6	-4	5	-7	1	-2	-1	3
7	-5	-4	6	2	1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=3 Hex=2F L fp_sm=3

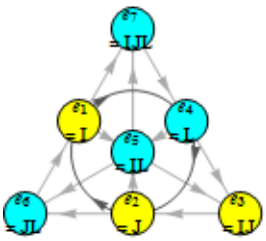
{{1, 4, 2}, {1, 5, 3}, {1, 7, 6},
{2, 6, 3}, {2, 5, 7}, {3, 7, 4}, {4, 5, 6}}

HoffmanSingleton (Yellow)

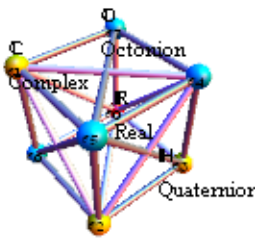
Flattened triad/mask bits

{1, 4, 2, 5, 3, 7, 6}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	-7	6
2	4	-1	-6	-1	7	3	-5
3	5	6	-1	-7	-1	-2	4
4	-2	1	7	-1	6	-5	-3
5	-3	-7	1	-6	-1	4	2
6	7	-3	2	5	-4	-1	-1
7	-6	5	-4	3	-2	1	-1

multiplication table

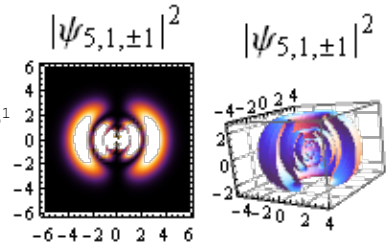
64 $\overline{\omega_L}_{r_m}^{0\to -1}$ Ref. Symbols: 2D 3D

0apccssgg 011011100_2	Root{ -1 -1 -2 -2 -1 0 0 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 0 1 0 -1 0 0 1 0 }	Theo. m	2.9674×10^{-18}
	Height= 8	Exp. τ	? s

Binary{	0	1	0	1	1	0	0	0	}
E8{	0	0	-1	-1	0	0	0	0	}
Physics {	0	0	0	$-\sqrt{2}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{49}In[Kr]5s^{2}4d^{10}5p^1



Flipped

Octonion triads-fPi=4 Sign mask=4 Hex=49 L fp_sm=3

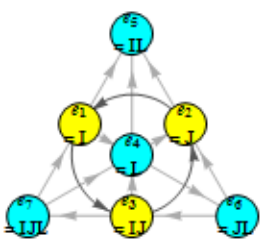
{{1, 3, 2}, {1, 4, 6}, {1, 5, 7},
{2, 7, 4}, {2, 5, 6}, {3, 4, 5}, {3, 7, 6}}

Coxeter (Cyan)

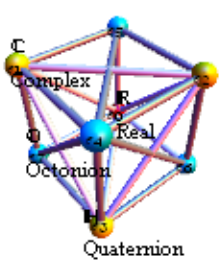
Flattened triad/mask bits

{1, **2**, **3**, 4, 6, 5, 7}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	7	-4	-5
2	3	-1	-1	-7	6	-5	4
3	-2	1	-1	5	-4	-7	6
4	-6	7	-5	-1	3	1	-2
5	-7	-6	4	-3	-1	2	1
6	4	5	7	-1	-2	-1	-3
7	5	-4	-6	2	-1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=4 Hex=49 L fp_sm=3

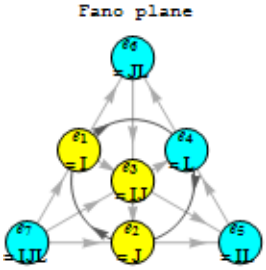
{{1, 4, 2}, {1, 3, 5}, {1, 6, 7},
{2, 6, 3}, {2, 5, 7}, {3, 4, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

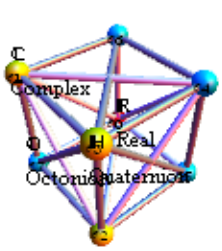
Flattened triad/mask bits

{1, 4, 2, 3, 5, 6, 7}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	7	-6
2	4	-1	-6	-1	7	3	-5
3	-5	6	-1	7	1	-2	-4
4	-2	1	-7	-1	-6	5	3
5	3	-7	-1	6	-1	-4	2
6	-7	-3	2	-5	4	-1	1
7	6	5	4	-3	-2	-1	-1

multiplication table

90 $g^{g\bar{b}}_{o_m} \xrightarrow[\vec{R}]{} 0$ Ref. Symbols: 2D 3D

0apccssgg 000011100_2	Root{	0	0	-1	-1	-1	-1	-1	0 }
	Weight{	-1	0	0	0	-1	1	0	1 }
	Height=	6							

Exp. m $1.\times 10^{-18}$ MeV

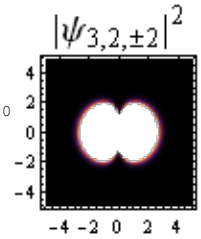
Theo. m 2.9674×10^{-18}

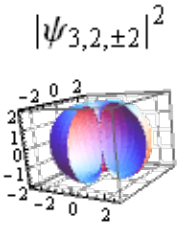
Exp. τ ? s

Binary{	0	0	0	0	1	1	1	0	}
E8{	0	0	0	0	0	-1	0	1	}
Physics {	0	0	0	0	0	0	$\frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{2}}$	}

Bit NKS CA Pascal E8

^{30}Zn[Ar]$4s^2 3d^{10}$





Flipped

Octonion triads-fPi=4 Sign mask=4 Hex=31 fp_sm=3

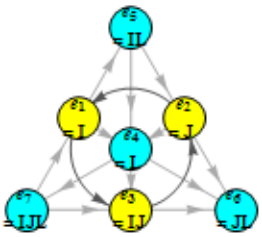
{{1, 3, 2}, {1, 4, 6}, {1, 5, 7},
{2, 4, 7}, {2, 6, 5}, {3, 5, 4}, {3, 6, 7}}

Coxeter (Cyan)

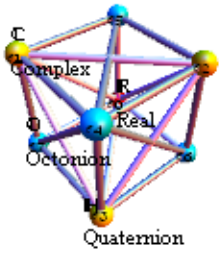
Flattened triad/mask bits

{1, **2**, **3**, 4, 6, 5, 7}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	7	-4	-5
2	3	-1	-1	7	-6	5	-4
3	-2	1	-1	-5	4	7	-6
4	-6	-7	5	-1	-3	1	2
5	-7	6	-4	3	-1	-2	1
6	4	-5	-7	-1	2	-1	3
7	5	4	6	-2	-1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=7 Sign mask=4 Hex=31 fp_sm=3

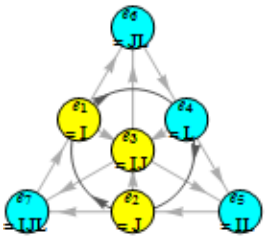
{{1, 4, 2}, {1, 3, 5}, {1, 6, 7},
{2, 3, 6}, {2, 7, 5}, {3, 7, 4}, {4, 5, 6}}

HoffmanSingleton (Yellow)

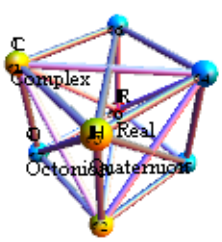
Flattened triad/mask bits

{1, 4, 2, 3, 5, 6, 7}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



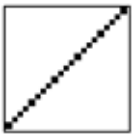
0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	7	-6
2	4	-1	6	-1	-7	-3	5
3	-5	-6	-1	-7	1	2	4
4	-2	1	7	-1	6	-5	-3
5	3	7	-1	-6	-1	4	-2
6	-7	3	-2	5	-4	-1	1
7	6	-5	-4	3	2	-1	-1

multiplication table

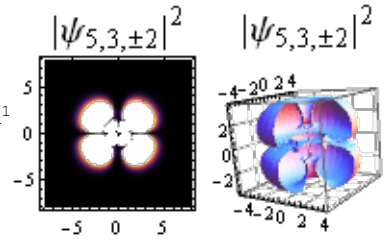
13 $\overline{\mu}_{y_d}^{+\to-1}$ $\check{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-2	-3	-3	-2	-1	-1	-1 }	Exp. m	105.658369 MeV
010000010_2	Weight{	-1	1	0	-1	1	0	0	-1 }	Theo. m	105.038
	Height=	16								Exp. τ	2.19704×10^{-6} s
Binary{		1	0	0	0	1	0	0	0 }		
E8{		$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }		
Physics {		$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0 }		

Bit NKS CA Pascal E8



^{91}Pa[Rn]$7s^2 5f^2 6d^1$



Flipped

Octonion triads-fPi=5 Sign mask=1 Hex=75 ℝ fp_sm=7

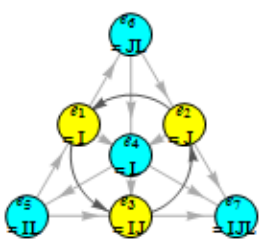
{{1, 3, 2}, {1, 4, 7}, {1, 6, 5},
{2, 4, 5}, {2, 7, 6}, {3, 6, 4}, {3, 7, 5}}

Coxeter (Cyan)

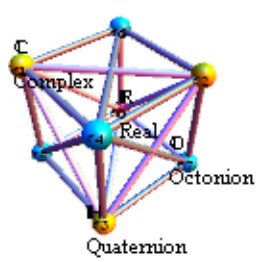
Flattened triad/mask bits

{1, 2, 3, 4, 7, 6, 5}
{1, 0, 1, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	-6	5	-4
2	3	-1	-1	5	-4	-7	6
3	-2	1	-1	-6	-7	4	5
4	-7	-5	6	-1	2	-3	1
5	6	4	7	-2	-1	-1	-3
6	-5	7	-4	3	1	-1	-2
7	4	-6	-5	-1	3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=1 Hex=7C ℝ fp_sm=4

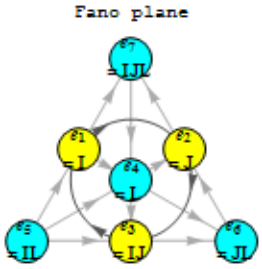
{{1, 2, 3}, {1, 4, 6}, {1, 7, 5},
{2, 5, 4}, {2, 7, 6}, {3, 7, 4}, {3, 6, 5}}

HoffmanSingleton (Yellow)

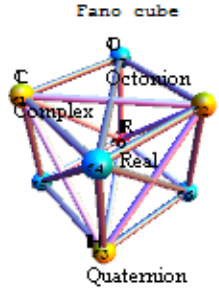
Flattened triad/mask bits

{1, 2, 3, 4, 6, 7, 5}
{0, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



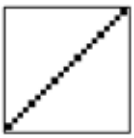
0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	-7	-4	5
2	-3	-1	1	-5	4	-7	6
3	2	-1	-1	-7	-6	5	4
4	-6	5	7	-1	-2	1	-3
5	7	-4	6	2	-1	-3	-1
6	4	7	-5	-1	3	-1	-2
7	-5	-6	-4	3	1	2	-1

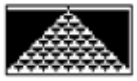
multiplication table

148 ν_μ $\overset{0}{\underset{w_d}{\nu}}$ $\overset{}{\underset{L}{}}$ Ref. Symbols: 2D ▲ 3D ▲

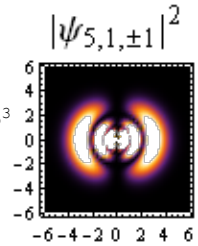
0apccssgg 001000010_2	Root{	1	1	1	1	1	1	1	1 }	Exp. m					$1.\times 10^{-18}$ MeV		
	Weight{	1	0	0	0	-1	0	1	1 }	Theo. m					8.38312×10^{-10}		
	Height=	9								Exp. τ					? s		
Binary{		0		1		0		0		0		1		1		1	}
E8{		$-\frac{1}{2}$		$\frac{1}{2}$		$-\frac{1}{2}$		$-\frac{1}{2}$		$-\frac{1}{2}$		$\frac{1}{2}$		$\frac{1}{2}$		$\frac{1}{2}$	}
Physics {		$-\frac{1}{2}$		$\frac{1}{2}$		0		$-\frac{1}{\sqrt{2}}$		$-\frac{1}{2}$		$\frac{\sqrt{3}}{2}$		0		0	}

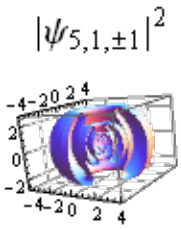
Bit NKS CA Pascal E8





$^{51}Sb[Kr]5s^2 4d^{10} 5p^3$





Flipped

Octonion triads-fPi=5 Sign mask=1 Hex=0D R fp_sm=7

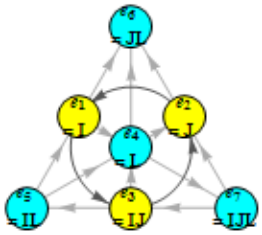
{{1, 3, 2}, {1, 4, 7}, {1, 6, 5},
{2, 5, 4}, {2, 6, 7}, {3, 4, 6}, {3, 5, 7}}

Coxeter (Cyan)

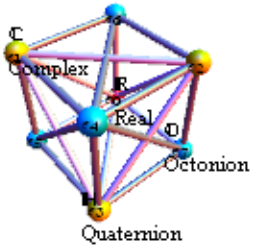
Flattened triad/mask bits

{1, 2, 3, 4, 7, 6, 5}
{1, 0, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	-6	5	-4
2	3	-1	-1	-5	4	7	-6
3	-2	1	-1	6	7	-4	-5
4	-7	5	-6	-1	-2	3	1
5	6	-4	-7	2	-1	-1	3
6	-5	-7	4	-3	1	-1	2
7	4	6	5	-1	-3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=1 Hex=04 R fp_sm=4

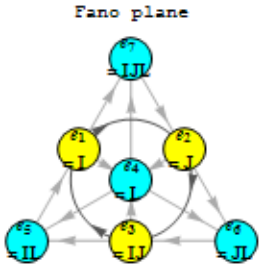
{{1, 2, 3}, {1, 4, 6}, {1, 7, 5},
{2, 4, 5}, {2, 6, 7}, {3, 4, 7}, {3, 5, 6}}

HoffmanSingleton (Yellow)

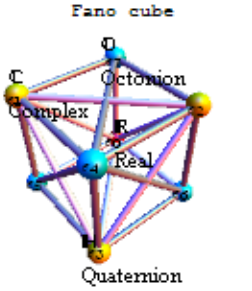
Flattened triad/mask bits

{1, 2, 3, 4, 6, 7, 5}
{0, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	-7	-4	5
2	-3	-1	1	5	-4	7	-6
3	2	-1	-1	7	6	-5	-4
4	-6	-5	-7	-1	2	1	3
5	7	4	-6	-2	-1	3	-1
6	4	-7	5	-1	-3	-1	2
7	-5	6	4	-3	1	-2	-1

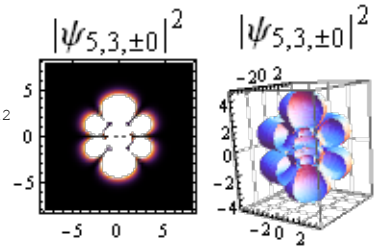
multiplication table

19 $\overline{\mu}_{y_1}^{+\to-1}$ $\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg 010000110_2	Root{	-3	-2	-4	-3	-2	-1	-1	-1 }	Exp. m 105.658369 MeV
	Weight{	-1	1	0	0	0	-1	1	0 }	Theo. m 105.038
	Height=	18								Exp. τ 2.19704×10^{-6} s
Binary{		0	1	0	0	1	0	0	0 }	
E8{		$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0 }	

Bit NKS CA Pascal E8

$^{100}Fm[Rn]7s^2 5f^{12}$



Flipped

Octonion triads-fPi=5 Sign mask=2 Hex=6B R fp_sm=7

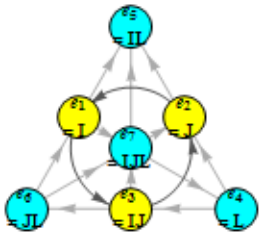
{{1, 3, 2}, {1, 7, 4}, {1, 5, 6},
{2, 5, 4}, {2, 6, 7}, {3, 6, 4}, {3, 7, 5}}

Coxeter (Cyan)

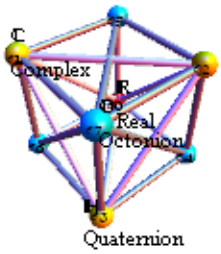
Flattened triad/mask bits

{1, 2, 3, 7, 4, 5, 6}
{1, 1, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	6	-5	4
2	3	-1	-1	-5	4	7	-6
3	-2	1	-1	-6	-7	4	5
4	7	5	6	-1	-2	-3	-1
5	-6	-4	7	2	-1	1	-3
6	5	-7	-4	3	-1	-1	2
7	-4	6	-5	1	3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=2 Hex=62 R fp_sm=4

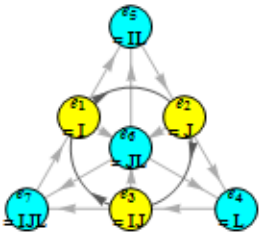
{{1, 2, 3}, {1, 6, 4}, {1, 5, 7},
{2, 4, 5}, {2, 6, 7}, {3, 7, 4}, {3, 6, 5}}

HoffmanSingleton (Yellow)

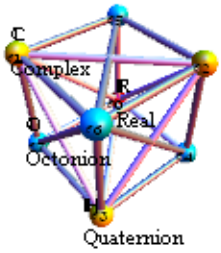
Flattened triad/mask bits

{1, 2, 3, 6, 4, 5, 7}
{0, 1, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	7	4	-5
2	-3	-1	1	5	-4	7	-6
3	2	-1	-1	-7	-6	5	4
4	6	-5	7	-1	2	-1	-3
5	-7	4	6	-2	-1	-3	1
6	-4	-7	-5	1	3	-1	2
7	5	6	-4	3	-1	-2	-1

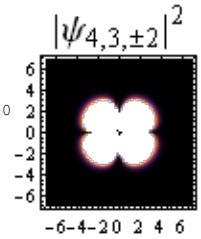
multiplication table

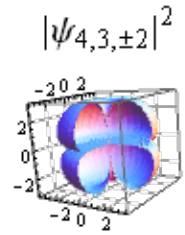
128 ν_μ $\overset{0}{\underset{w_1}{\hat{R}}}$ Ref. Symbols: 2D △ 3D ▲

0apccssgg	Root{	2	1	2	1	1	1	1	1 }	Exp. m $1.\times 10^{-18}$ MeV
001000110_2	Weight{	1	0	0	-1	0	1	0	0 }	Theo. m 8.38312×10^{-10}
	Height= 11									Exp. τ ? s
Binary{	1	0	0	0	0	1	1	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}	

Bit NKS CA Pascal E8

^{66}Dy[Xe]$6s^2 4f^{10}$





Flipped

Octonion triads-fPi=5 Sign mask=2 Hex=13 ℝ fp_sm=7

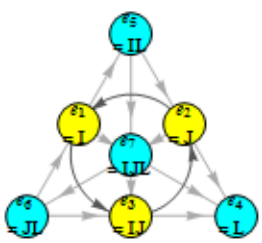
{{1, 3, 2}, {1, 7, 4}, {1, 5, 6},
{2, 4, 5}, {2, 7, 6}, {3, 4, 6}, {3, 5, 7}}

Coxeter (Cyan)

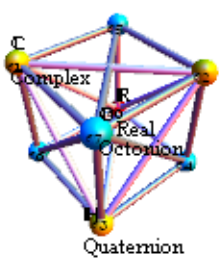
Flattened triad/mask bits

{1, 2, 3, 7, 4, 5, 6}
{1, 1, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	6	-5	4
2	3	-1	-1	5	-4	-7	6
3	-2	1	-1	6	7	-4	-5
4	7	-5	-6	-1	2	3	-1
5	-6	4	-7	-2	-1	1	3
6	5	7	4	-3	-1	-1	-2
7	-4	-6	5	1	-3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=2 Hex=1A ℝ fp_sm=4

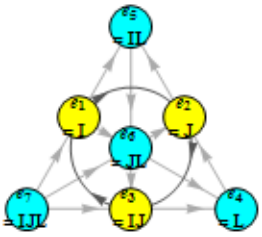
{{1, 2, 3}, {1, 6, 4}, {1, 5, 7},
{2, 5, 4}, {2, 7, 6}, {3, 4, 7}, {3, 5, 6}}

HoffmanSingleton (Yellow)

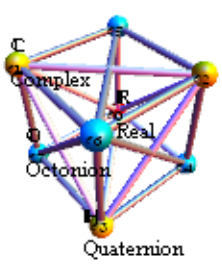
Flattened triad/mask bits

{1, 2, 3, 6, 4, 5, 7}
{0, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



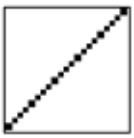
0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	7	4	-5
2	-3	-1	1	-5	4	-7	6
3	2	-1	-1	7	6	-5	-4
4	6	5	-7	-1	-2	-1	3
5	-7	-4	-6	2	-1	3	1
6	-4	7	5	1	-3	-1	-2
7	5	-6	4	-3	-1	2	-1

multiplication table

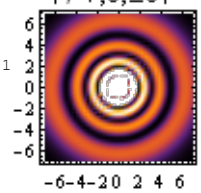
24 $\overline{\mu}_{y_m}^{\hat{L}\,+\to 0}$ Ref. Symbols: 2D 3D

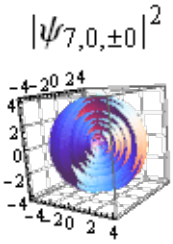
0apccssgg 010001010_2	Root{	-2	-2	-3	-2	-2	-1	-1	-1 }	Exp. m 105.658369 MeV
	Weight{	-1	1	-1	1	0	0	0	-1 }	Theo. m 105.038
	Height= 15									Exp. τ 2.19704×10^{-6} s
Binary{		0	0	1	0	1	0	0	0	}
E8{		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{87}Fr[Rn]7s^1





Flipped

Octonion triads-fPi=5 Sign mask=3 Hex=58 ℝ fp_sm=7

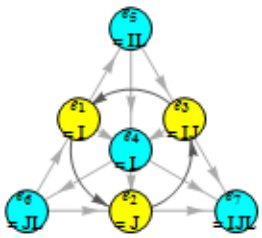
{{1, 2, 3}, {1, 4, 7}, {1, 5, 6},
{2, 5, 4}, {2, 7, 6}, {3, 4, 6}, {3, 7, 5}}

Coxeter (Cyan)

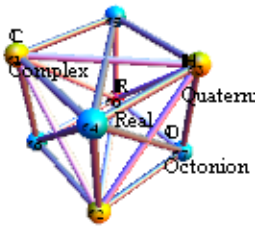
Flattened triad/mask bits

{1, 3, 2, 4, 7, 5, 6}
{0, 0, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	6	-5	-4
2	-3	-1	1	-5	4	-7	6
3	2	-1	-1	6	-7	-4	5
4	-7	5	-6	-1	-2	3	1
5	-6	-4	7	2	-1	1	-3
6	5	7	4	-3	-1	-1	-2
7	4	-6	-5	-1	3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=3 Hex=51 ℝ fp_sm=4

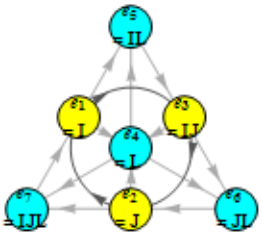
{{1, 3, 2}, {1, 4, 6}, {1, 5, 7},
{2, 4, 5}, {2, 7, 6}, {3, 4, 7}, {3, 6, 5}}

HoffmanSingleton (Yellow)

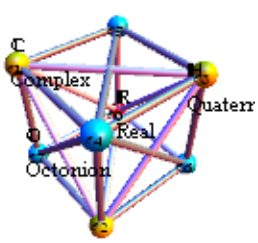
Flattened triad/mask bits

{1, 3, 2, 4, 6, 5, 7}
{1, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	7	-4	-5
2	3	-1	-1	5	-4	-7	6
3	-2	1	-1	7	-6	5	-4
4	-6	-5	-7	-1	2	1	3
5	-7	4	6	-2	-1	-3	1
6	4	7	-5	-1	3	-1	-2
7	5	-6	4	-3	-1	2	-1

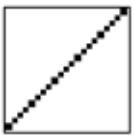
multiplication table

162 ν_μ $\overset{0}{\underset{w_m}{\hat{L}}}$ Ref. Symbols: 2D ▲ 3D ▲

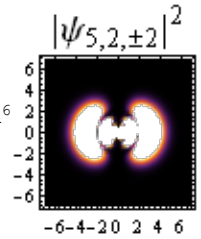
0apccssgg 001001010_2	Root{ 2 1 2 2 2 1 1 1 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 1 -1 1 0 -1 1 0 0 }	Theo. m	8.38312×10^{-10}
	Height= 13	Exp. τ	? s

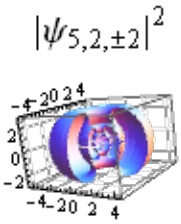
Binary{	0	0	0	1	0	1	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{76}Os[Xe]$6s^2 4f^{14} 5d^6$





Flipped

Octonion triads-fPi=5 Sign mask=3 Hex=20 ℝ fp_sm=7

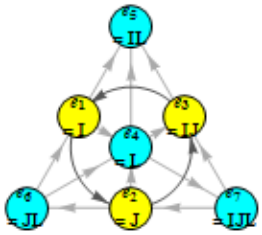
{{1, 2, 3}, {1, 4, 7}, {1, 5, 6},
{2, 4, 5}, {2, 6, 7}, {3, 6, 4}, {3, 5, 7}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 3, 2, 4, 7, 5, 6}
{0, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	6	-5	-4
2	-3	-1	1	5	-4	7	-6
3	2	-1	-1	-6	7	4	-5
4	-7	-5	6	-1	2	-3	1
5	-6	4	-7	-2	-1	1	3
6	5	-7	-4	3	-1	-1	2
7	4	6	5	-1	-3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=3 Hex=29 ℝ fp_sm=4

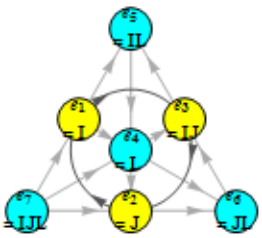
{{1, 3, 2}, {1, 4, 6}, {1, 5, 7},
{2, 5, 4}, {2, 6, 7}, {3, 7, 4}, {3, 5, 6}}

HoffmanSingleton (Yellow)

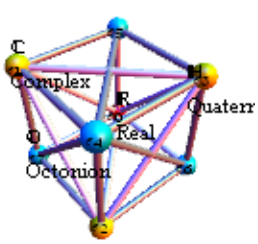
Flattened triad/mask bits

{1, 3, 2, 4, 6, 5, 7}
{1, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	7	-4	-5
2	3	-1	-1	-5	4	7	-6
3	-2	1	-1	-7	6	-5	4
4	-6	5	7	-1	-2	1	-3
5	-7	-4	-6	2	-1	3	1
6	4	-7	5	-1	-3	-1	2
7	5	6	-4	3	-1	-2	-1

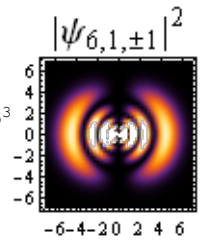
multiplication table

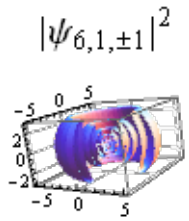
28 $\overline{\mu}_{y_m}^{+\to-1}$ Ref. Symbols: 2D 3D

0apccssgg 010001110_2	Root{	-2	-2	-3	-2	-1	-1	-1	-1 }	Exp. m	105.658369 MeV
	Weight{	-1	0	1	0	0	0	0	-1 }	Theo. m	105.038
	Height= 14									Exp. τ	2.19704×10^{-6} s
Binary{	0	0	0	1	1	0	0	0	}		
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}		
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}		

Bit NKS CA Pascal E8

^{83}Bi[Xe]$6s^2 4f^{14} 5d^{10} 6p^3$





Flipped

Octonion triads-fPi=5 Sign mask=4 Hex=46 R fp_sm=7

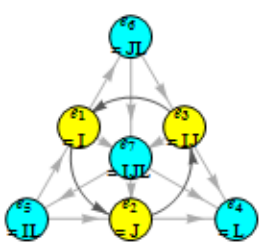
{{1, 2, 3}, {1, 7, 4}, {1, 6, 5},
{2, 4, 5}, {2, 6, 7}, {3, 4, 6}, {3, 7, 5}}

Coxeter (Cyan)

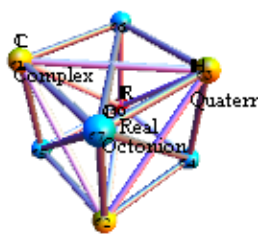
Flattened triad/mask bits

{1, 3, 2, 7, 4, 6, 5}
{0, 1, 1, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	-6	5	4
2	-3	-1	1	5	-4	7	-6
3	2	-1	-1	6	-7	-4	5
4	7	-5	-6	-1	2	3	-1
5	6	4	7	-2	-1	-1	-3
6	-5	-7	4	-3	1	-1	2
7	-4	6	-5	1	3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=4 Hex=4F R fp_sm=4

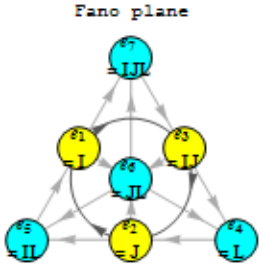
{{1, 3, 2}, {1, 6, 4}, {1, 7, 5},
{2, 5, 4}, {2, 6, 7}, {3, 4, 7}, {3, 6, 5}}

HoffmanSingleton (Yellow)

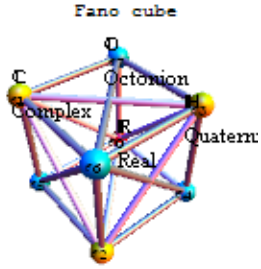
Flattened triad/mask bits

{1, 3, 2, 6, 4, 7, 5}
{1, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	-7	4	5
2	3	-1	-1	-5	4	7	-6
3	-2	1	-1	7	-6	5	-4
4	6	5	-7	-1	-2	-1	3
5	7	-4	6	2	-1	-3	-1
6	-4	-7	-5	1	3	-1	2
7	-5	6	4	-3	1	-2	-1

multiplication table

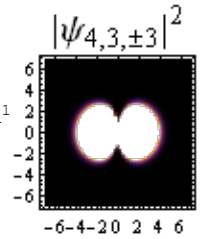
158 $\nu_{\mu}{}^{0\to 1}_{w_m\ \check{}\ R}$ Ref. Symbols: 2D ▲ 3D ▲

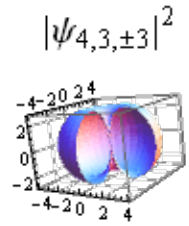
0apccssgg	Root{	2	1	2	2	1	1	1	1 }	Exp. m	$1.\times 10^{-18}$ MeV
001001110_2	Weight{	1	0	-1	1	-1	1	0	0 }	Theo. m	8.38312×10^{-10}
	Height=	12								Exp. τ	? s

Binary{	0	0	1	0	0	1	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{71}Lu[Xe]$6s^2 4f^{14} 5d^1$





Flipped

Octonion triads-fPi=5 Sign mask=4 Hex=3E ℝ fp_sm=7

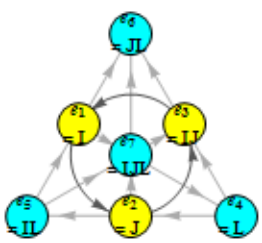
{{1, 2, 3}, {1, 7, 4}, {1, 6, 5},
{2, 5, 4}, {2, 7, 6}, {3, 6, 4}, {3, 5, 7}}

Coxeter (Cyan)

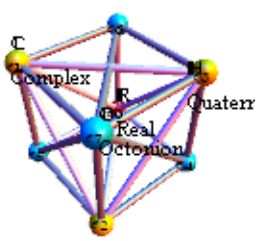
Flattened triad/mask bits

{1, 3, 2, 7, 4, 6, 5}
{0, 1, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	-6	5	4
2	-3	-1	1	-5	4	-7	6
3	2	-1	-1	-6	7	4	-5
4	7	5	6	-1	-2	-3	-1
5	6	-4	-7	2	-1	-1	3
6	-5	7	-4	3	1	-1	-2
7	-4	-6	5	1	-3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=3 Sign mask=4 Hex=37 ℝ fp_sm=4

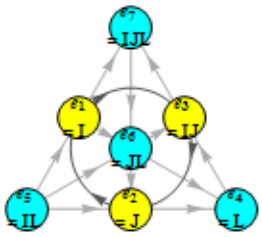
{{1, 3, 2}, {1, 6, 4}, {1, 7, 5},
{2, 4, 5}, {2, 7, 6}, {3, 7, 4}, {3, 5, 6}}

HoffmanSingleton (Yellow)

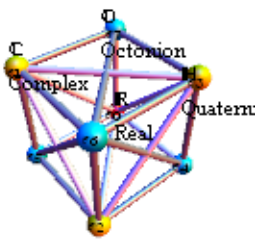
Flattened triad/mask bits

{1, 3, 2, 6, 4, 7, 5}
{1, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



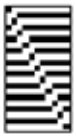
0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	-7	4	5
2	3	-1	-1	5	-4	-7	6
3	-2	1	-1	-7	6	-5	4
4	6	-5	7	-1	2	-1	-3
5	7	4	-6	-2	-1	3	-1
6	-4	7	5	1	-3	-1	-2
7	-5	-6	-4	3	1	2	-1

multiplication table

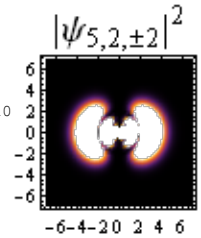
94 $\tau_{\nu_d}^{\nu_L \to 0}$ Ref. Symbols: 2D 3D

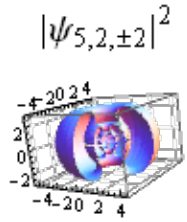
0apccssgg 000000011_2	Root{	-2	-1	-2	-2	-2	-2	-1	-1 }	Exp. m 1776.99 MeV
	Weight{	0	-1	0	0	1	-1	0	0 }	Theo. m 1799.25
	Height= 14									Exp. τ 2.90601×10^{-13} s
Binary{	1	1	1	1	0	0	0	0	}	
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}	

Bit NKS CA Pascal E8



^{80}Hg[Xe]$6s^2 4f^{14} 5d^{10}$





Flipped

Octonion triads-fPi=6 Sign mask=1 Hex=09 R fp_sm=6

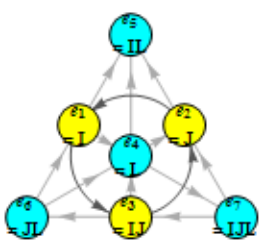
{{1, 3, 2}, {1, 4, 7}, {1, 5, 6},
{2, 6, 4}, {2, 5, 7}, {3, 4, 5}, {3, 6, 7}}

Flattened triad/mask bits

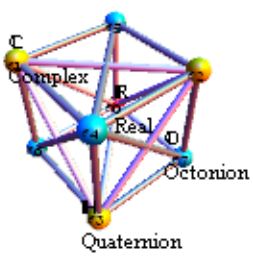
{1, 2, 3, 4, 7, 5, 6}
{1, 0, 0, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	6	-5	-4
2	3	-1	-1	-6	7	4	-5
3	-2	1	-1	5	-4	7	-6
4	-7	6	-5	-1	3	-2	1
5	-6	-7	4	-3	-1	1	2
6	5	-4	-7	2	-1	-1	3
7	4	5	6	-1	-2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=1 Hex=09 R fp_sm=6

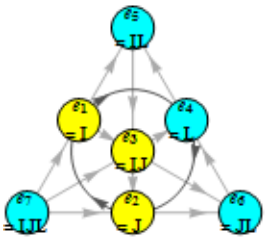
{{1, 4, 2}, {1, 3, 6}, {1, 5, 7},
{2, 5, 3}, {2, 6, 7}, {3, 4, 7}, {4, 5, 6}}

Flattened triad/mask bits

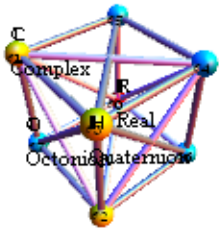
{1, 4, 2, 3, 6, 5, 7}
{1, 0, 0, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	7	-3	-5
2	4	-1	-5	-1	3	7	-6
3	-6	5	-1	7	-2	1	-4
4	-2	1	-7	-1	6	-5	3
5	-7	-3	2	-6	-1	4	1
6	3	-7	-1	5	-4	-1	2
7	5	6	4	-3	-1	-2	-1

multiplication table

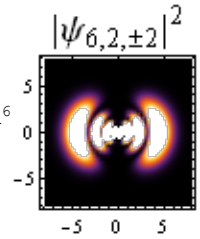
247 $\overline{V_\tau}$ $\overset{0\to1}{\underset{L}{\vee}}$ w_d Ref. Symbols: 2D 3D

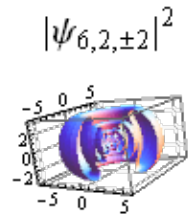
0apccssgg	Root{ 3 2 4 4 3 2 1 1 }	Exp. m	$1.\times10^{-18}$ MeV
011000011_2	Weight{ 0 0 0 1 -1 1 -1 0 }	Theo. m	4.89396×10^{-11}
	Height= 21	Exp. τ	? s

Binary{	0	0	1	1	1	1	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{108}Hs[Rn]$7s^2 5f^{14} 6d^6$





Flipped

Octonion triads-fPi=6 Sign mask=1 Hex=71 ℝ fp_sm=6

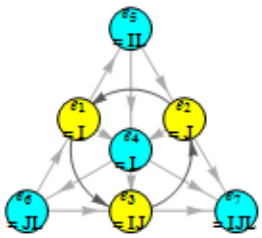
{{1, 3, 2}, {1, 4, 7}, {1, 5, 6},
{2, 4, 6}, {2, 7, 5}, {3, 5, 4}, {3, 7, 6}}

Flattened triad/mask bits

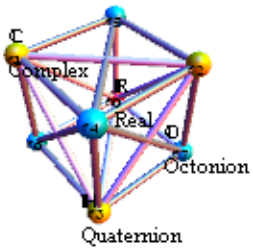
{1, 2, 3, 4, 7, 5, 6}
{1, 0, 0, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	6	-5	-4
2	3	-1	-1	6	-7	-4	5
3	-2	1	-1	-5	4	-7	6
4	-7	-6	5	-1	-3	2	1
5	-6	7	-4	3	-1	1	-2
6	5	4	7	-2	-1	-1	-3
7	4	-5	-6	-1	2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=1 Hex=71 ℝ fp_sm=6

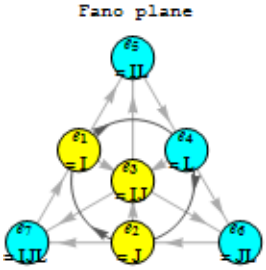
{{1, 4, 2}, {1, 3, 6}, {1, 5, 7},
{2, 3, 5}, {2, 7, 6}, {3, 7, 4}, {4, 6, 5}}

Flattened triad/mask bits

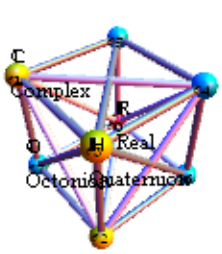
{1, 4, 2, 3, 6, 5, 7}
{1, 0, 0, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	7	-3	-5
2	4	-1	5	-1	-3	-7	6
3	-6	-5	-1	-7	2	1	4
4	-2	1	7	-1	-6	5	-3
5	-7	3	-2	6	-1	-4	1
6	3	7	-1	-5	4	-1	-2
7	5	-6	-4	3	-1	2	-1

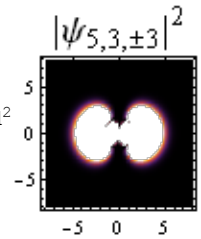
multiplication table

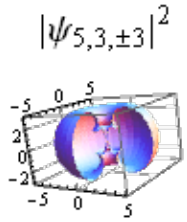
23 $\tau_{y_1 \vec{R}}^{\to 0}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-2	-3	-2	-2	-2	-1	-1 }	Exp. m 1776.99 MeV
000000111_2	Weight{	0	-1	0	1	0	0	0	-1 }	Theo. m 1799.25
	Height= 16									Exp. τ 2.90601×10^{-13} s
Binary{		0	0	1	1	0	0	0	0 }	
E8{		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0 }	

Bit NKS CA Pascal E8

^{90}Th[Rn]$7s^2 6d^2$





Flipped

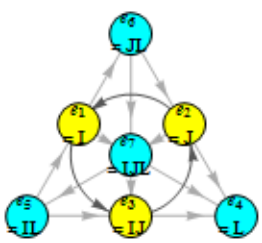
Octonion triads-fPi=6 Sign mask=2 Hex=17 R fp_sm=6

{{1, 3, 2}, {1, 7, 4}, {1, 6, 5},
{2, 4, 6}, {2, 7, 5}, {3, 4, 5}, {3, 6, 7}}

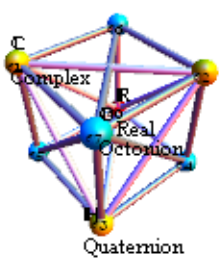
Flattened triad/mask bits
{1, 2, 3, 7, 4, 6, 5}
{1, 1, 1, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	-6	5	4
2	3	-1	-1	6	-7	-4	5
3	-2	1	-1	5	-4	7	-6
4	7	-6	-5	-1	3	2	-1
5	6	7	4	-3	-1	-1	-2
6	-5	4	-7	-2	1	-1	3
7	-4	-5	6	1	2	-3	-1

multiplication table

Not Flipped

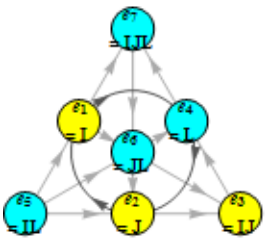
Octonion triads-fPi=9 Sign mask=2 Hex=17 R fp_sm=6

{{1, 4, 2}, {1, 6, 3}, {1, 7, 5},
{2, 3, 5}, {2, 7, 6}, {3, 4, 7}, {4, 5, 6}}

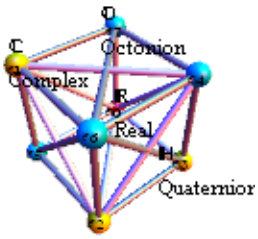
Flattened triad/mask bits
{1, 4, 2, 6, 3, 7, 5}
{1, 1, 1, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	-7	3	5
2	4	-1	5	-1	-3	-7	6
3	6	-5	-1	7	2	-1	-4
4	-2	1	-7	-1	6	-5	3
5	7	3	-2	-6	-1	4	-1
6	-3	7	1	5	-4	-1	-2
7	-5	-6	4	-3	1	2	-1

multiplication table

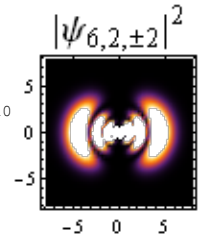
256 $\overline{V_\tau}^{\,0\to1}_{w_1\ \hat{R}}$ Ref. Symbols: 2D 3D

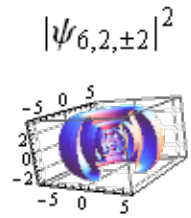
0apccssgg 011000111_2	Root{ 3 3 5 4 3 2 1 1 }	Exp. m	$1.\times10^{-18}$ MeV
	Weight{ 0 0 0 0 0 0 -1 1 }	Theo. m	4.89396×10^{-11}
	Height= 23	Exp. τ	? s

Binary{	1	1	1	1	1	1	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{112}Cn[Rn]$7s^2 5f^{14} 6d^{10}$





Flipped

Octonion triads-fPi=6 Sign mask=2 Hex=6F ℝ fp_sm=6

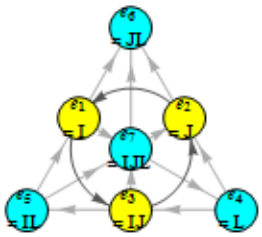
{{1, 3, 2}, {1, 7, 4}, {1, 6, 5},
{2, 6, 4}, {2, 5, 7}, {3, 5, 4}, {3, 7, 6}}

Flattened triad/mask bits

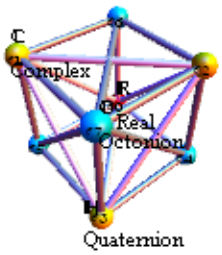
{1, 2, 3, 7, 4, 6, 5}
{1, 1, 1, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	-6	5	4
2	3	-1	-1	-6	7	4	-5
3	-2	1	-1	-5	4	-7	6
4	7	6	5	-1	-3	-2	-1
5	6	-7	-4	3	-1	-1	2
6	-5	-4	7	2	1	-1	-3
7	-4	5	-6	1	-2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=2 Hex=6F ℝ fp_sm=6

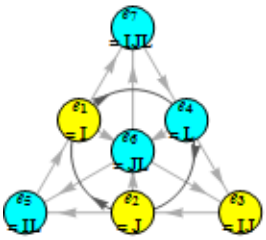
{{1, 4, 2}, {1, 6, 3}, {1, 7, 5},
{2, 5, 3}, {2, 6, 7}, {3, 7, 4}, {4, 6, 5}}

Flattened triad/mask bits

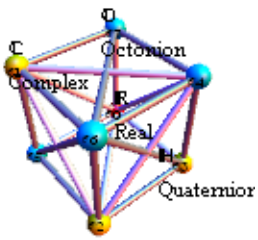
{1, 4, 2, 6, 3, 7, 5}
{1, 1, 1, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	-7	3	5
2	4	-1	-5	-1	3	7	-6
3	6	5	-1	-7	-2	-1	4
4	-2	1	7	-1	-6	5	-3
5	7	-3	2	6	-1	-4	-1
6	-3	-7	1	-5	4	-1	2
7	-5	6	-4	3	1	-2	-1

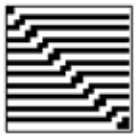
multiplication table

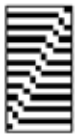
18 τ $\bar{\ }$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-2	-4	-3	-2	-2	-1	-1 }	Exp. m	1776.99 MeV
000001011_2	Weight{	0	-1	1	0	0	-1	1	0 }	Theo. m	1799.25
	Height=	19								Exp. τ	2.90601×10^{-13} s

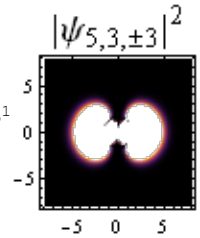
Binary{	0	1	0	1	0	0	0	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

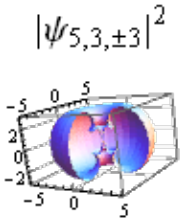
Bit NKS CA Pascal E8





^{103}Lr[Rn]$7s^2 5f^{14} 7p^1$





Flipped

Octonion triads-fPi=6 Sign mask=3 Hex=24 R fp_sm=6

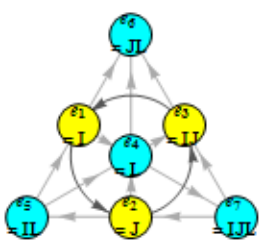
{{1, 2, 3}, {1, 4, 7}, {1, 6, 5},
{2, 4, 6}, {2, 5, 7}, {3, 5, 4}, {3, 6, 7}}

Flattened triad/mask bits

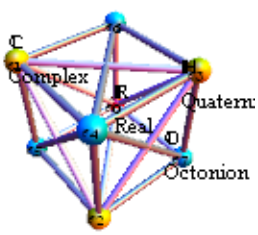
{1, 3, 2, 4, 7, 6, 5}
{0, 0, 1, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	-6	5	-4
2	-3	-1	1	6	7	-4	-5
3	2	-1	-1	-5	4	7	-6
4	-7	-6	5	-1	-3	2	1
5	6	-7	-4	3	-1	-1	2
6	-5	4	-7	-2	1	-1	3
7	4	5	6	-1	-2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=3 Hex=24 R fp_sm=6

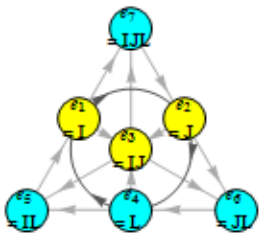
{{1, 2, 4}, {1, 3, 6}, {1, 7, 5},
{2, 3, 5}, {2, 6, 7}, {3, 7, 4}, {4, 5, 6}}

Flattened triad/mask bits

{1, 2, 4, 3, 6, 7, 5}
{0, 0, 1, 0, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	-7	-3	5
2	-4	-1	5	1	-3	7	-6
3	-6	-5	-1	-7	2	1	4
4	2	-1	7	-1	6	-5	-3
5	7	3	-2	-6	-1	4	-1
6	3	-7	-1	5	-4	-1	2
7	-5	6	-4	3	1	-2	-1

multiplication table

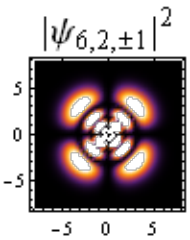
240 $\overline{V_\tau}$ $\overset{0}{\underset{w_m}{\hat{L}}}$ Ref. Symbols: 2D 3D

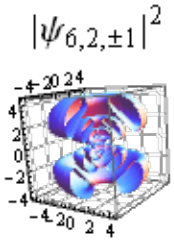
0apccssgg	Root{	3	2	4	3	3	2	1	1 }	Exp. m $1.\times 10^{-18}$ MeV
011001011_2	Weight{	0	0	1	-1	0	1	-1	0 }	Theo. m 4.89396×10^{-11}
	Height= 20									Exp. τ ? s

Binary{	1	0	0	1	1	1	1	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

$^{106}Sg[Rn]7s^2 5f^{14} 6d^4$





Flipped

Octonion triads-fPi=6 Sign mask=3 Hex=5C R fp_sm=6

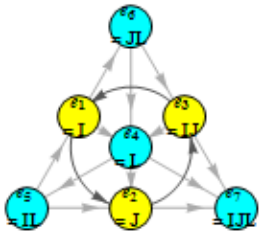
{{1, 2, 3}, {1, 4, 7}, {1, 6, 5},
{2, 6, 4}, {2, 7, 5}, {3, 4, 5}, {3, 7, 6}}

HoffmanSingleton (Yellow)

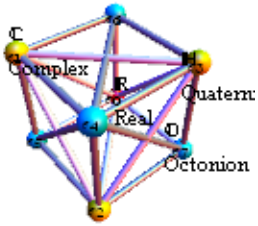
Flattened triad/mask bits

{1, 3, 2, 4, 7, 6, 5}
{0, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	-6	5	-4
2	-3	-1	1	-6	-7	4	5
3	2	-1	-1	5	-4	-7	6
4	-7	6	-5	-1	3	-2	1
5	6	7	4	-3	-1	-1	-2
6	-5	-4	7	2	1	-1	-3
7	4	-5	-6	-1	2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=3 Hex=5C R fp_sm=6

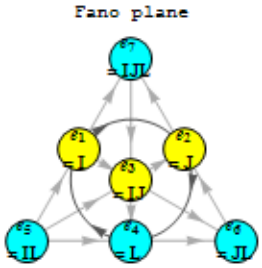
{{1, 2, 4}, {1, 3, 6}, {1, 7, 5},
{2, 5, 3}, {2, 7, 6}, {3, 4, 7}, {4, 6, 5}}

Coxeter (Cyan)

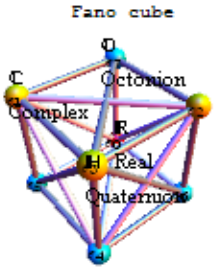
Flattened triad/mask bits

{1, 2, 4, 3, 6, 7, 5}
{0, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	-7	-3	5
2	-4	-1	-5	1	3	-7	6
3	-6	5	-1	7	-2	1	-4
4	2	-1	-7	-1	-6	5	3
5	7	-3	2	6	-1	-4	-1
6	3	7	-1	-5	4	-1	-2
7	-5	-6	4	-3	1	2	-1

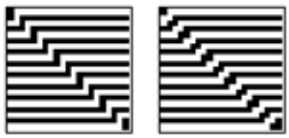
multiplication table

12 τ $\bar{\tau}$ Ref. Symbols: 2D 3D

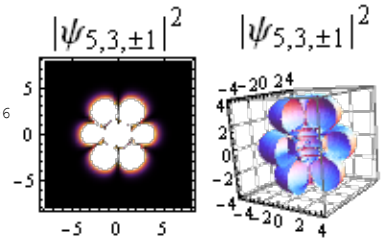
0apccssgg	Root{	-2	-2	-3	-3	-2	-2	-1	-1 }	Exp. m	1776.99 MeV
000001111_2	Weight{	0	-1	1	-1	1	0	0	-1 }	Theo. m	1799.25
	Height=	17								Exp. τ	2.90601×10^{-13} s

Binary{	1	0	0	1	0	0	0	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{94}Pu[Rn]$7s^2 5f^6$



Flipped

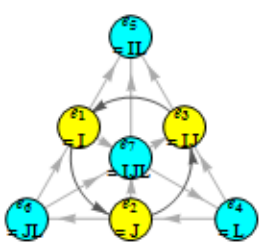
Octonion triads-fPi=6 Sign mask=4 Hex=3A R fp_sm=6

{{1, 2, 3}, {1, 7, 4}, {1, 5, 6},
{2, 6, 4}, {2, 7, 5}, {3, 5, 4}, {3, 6, 7}}

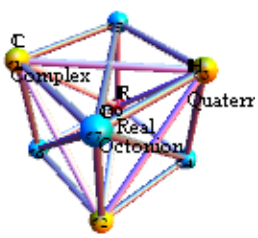
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 3, 2, 7, 4, 5, 6}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	6	-5	4
2	-3	-1	1	-6	-7	4	5
3	2	-1	-1	-5	4	7	-6
4	7	6	5	-1	-3	-2	-1
5	-6	7	-4	3	-1	1	-2
6	5	-4	-7	2	-1	-1	3
7	-4	-5	6	1	2	-3	-1

multiplication table

Not Flipped

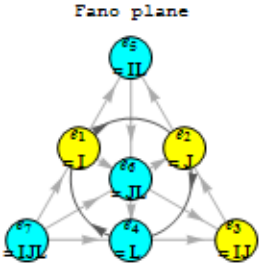
Octonion triads-fPi=9 Sign mask=4 Hex=3A R fp_sm=6

{{1, 2, 4}, {1, 6, 3}, {1, 5, 7},
{2, 5, 3}, {2, 7, 6}, {3, 7, 4}, {4, 5, 6}}

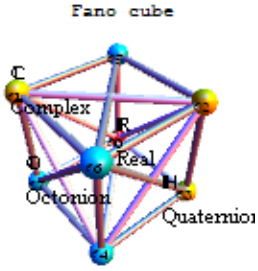
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 4, 6, 3, 5, 7}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	7	3	-5
2	-4	-1	-5	1	3	-7	6
3	6	5	-1	-7	-2	-1	4
4	2	-1	7	-1	6	-5	-3
5	-7	-3	2	-6	-1	4	1
6	-3	7	1	5	-4	-1	-2
7	5	-6	-4	3	-1	2	-1

multiplication table

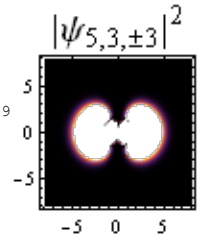
246 $\overline{V_\tau}$ $\overset{0}{\underset{w_m}{\vee}}$ R Ref. Symbols: 2D 3D

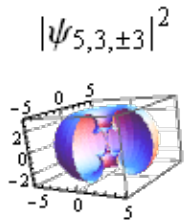
0apccssgg 011001111_2	Root{ 2 2 3 3 3 2 1 1 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 0 0 1 0 -1 0 0 1 }	Theo. m	4.89396×10^{-11}
	Height= 18	Exp. τ	? s

Binary{	0	1	0	1	1	1	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{97}Bk[Rn]7s^{2}5f^9





Flipped

Octonion triads-fPi=6 Sign mask=4 Hex=42 ℝ fp_sm=6

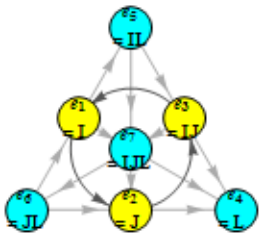
{{1, 2, 3}, {1, 7, 4}, {1, 5, 6},
{2, 4, 6}, {2, 5, 7}, {3, 4, 5}, {3, 7, 6}}

Flattened triad/mask bits

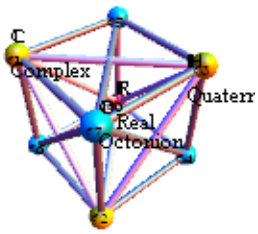
{1, 3, 2, 7, 4, 5, 6}
{0, 1, 0, 0, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	6	-5	4
2	-3	-1	1	6	7	-4	-5
3	2	-1	-1	5	-4	-7	6
4	7	-6	-5	-1	3	2	-1
5	-6	-7	4	-3	-1	1	2
6	5	4	7	-2	-1	-1	-3
7	-4	5	-6	1	-2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=9 Sign mask=4 Hex=42 ℝ fp_sm=6

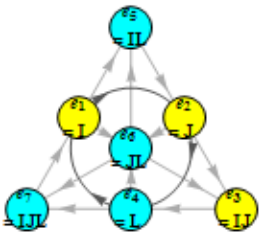
{{1, 2, 4}, {1, 6, 3}, {1, 5, 7},
{2, 3, 5}, {2, 6, 7}, {3, 4, 7}, {4, 6, 5}}

Flattened triad/mask bits

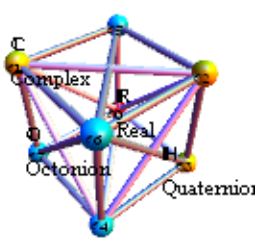
{1, 2, 4, 6, 3, 5, 7}
{0, 1, 0, 0, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	7	3	-5
2	-4	-1	5	1	-3	7	-6
3	6	-5	-1	7	2	-1	-4
4	2	-1	-7	-1	-6	5	3
5	-7	3	-2	6	-1	-4	1
6	-3	-7	1	-5	4	-1	2
7	5	6	4	-3	-1	-2	-1

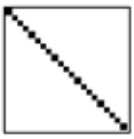
multiplication table

170 $\overline{x_1 \Phi}_{o_d}^{\,+\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

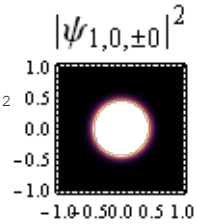
0apccssgg 010010000_2	Root{ 0 0 0 0 0 0 -1 0 } Weight{ -2 1 0 0 0 0 0 0 } Height= 2	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{3_{Hg}}{\text{eVperC2 Mega}}$? s

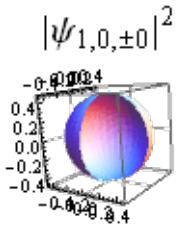
Binary{	1	1	1	0	1	0	0	1	}
E8{	0	0	0	0	1	-1	0	0	}
Physics {	0	0	0	0	1	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{2}He1s^2





Flipped

Octonion triads-fPi=7 Sign mask=1 Hex=7D L fp_sm=3

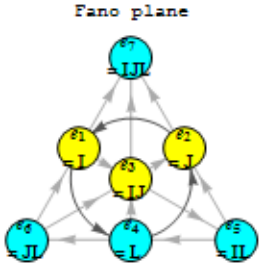
{{1, 4, 2}, {1, 3, 5}, {1, 7, 6},
{2, 6, 3}, {2, 7, 5}, {3, 7, 4}, {4, 6, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 4, 3, 5, 7, 6}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	-7	6
2	4	-1	-6	-1	-7	3	5
3	-5	6	-1	-7	1	-2	4
4	-2	1	7	-1	-6	5	-3
5	3	7	-1	6	-1	-4	-2
6	7	-3	2	-5	4	-1	-1
7	-6	-5	-4	3	2	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=1 Hex=7D L fp_sm=3

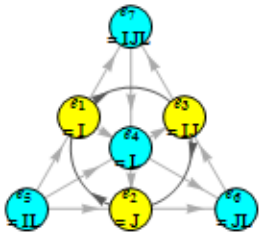
{{1, 3, 2}, {1, 4, 6}, {1, 7, 5},
{2, 7, 4}, {2, 6, 5}, {3, 5, 4}, {3, 7, 6}}

Coxeter (Cyan)

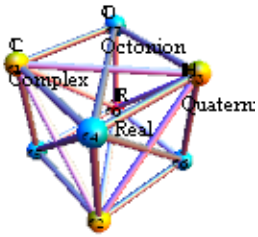
Flattened triad/mask bits

{1, 3, 2, 4, 6, 7, 5}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	6	-7	-4	5
2	3	-1	-1	-7	-6	5	4
3	-2	1	-1	-5	4	-7	6
4	-6	7	5	-1	-3	1	-2
5	7	6	-4	3	-1	-2	-1
6	4	-5	7	-1	2	-1	-3
7	-5	-4	-6	2	1	3	-1

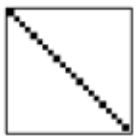
multiplication table

204 $e_S \Phi \overset{0}{\underset{r_d}{\vee}} \overset{}{\underset{L}{}}$ Ref. Symbols: 2D 3D

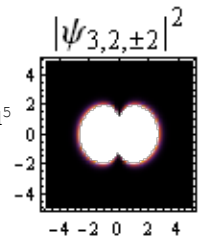
0apccssgg 001010000_2	Root{ 0 1 1 1 1 0 0 0 } Weight{ 0 −1 1 0 0 −1 0 1 } Height= 5	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{0_{Hg}}{\text{eVperC2 Mega}}$? s

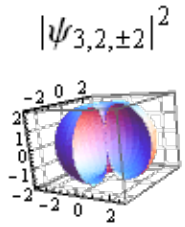
Binary{	0	1	1	1	0	0	1	1	}
E8{	0	1	0	1	0	0	0	0	}
Physics {	0	1	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8



^{25}Mn[Ar]4s^{2}3d^5





Flipped

Octonion triads-fPi=7 Sign mask=1 Hex=05 L fp_sm=3

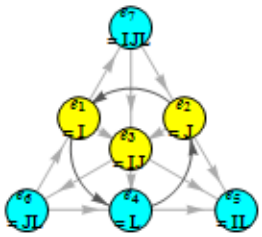
{{1, 4, 2}, {1, 3, 5}, {1, 7, 6},
{2, 3, 6}, {2, 5, 7}, {3, 4, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, **2**, **4**, 3, 5, 7, 6}
{1, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	−1	−4	5	2	−3	−7	6
2	4	−1	6	−1	7	−3	−5
3	−5	−6	−1	7	1	2	−4
4	−2	1	−7	−1	6	−5	3
5	3	−7	−1	−6	−1	4	2
6	7	3	−2	5	−4	−1	−1
7	−6	5	4	−3	−2	1	−1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=1 Hex=05 L fp_sm=3

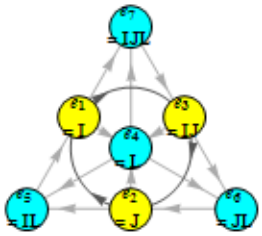
{{1, 3, 2}, {1, 4, 6}, {1, 7, 5},
{2, 4, 7}, {2, 5, 6}, {3, 4, 5}, {3, 6, 7}}

Coxeter (Cyan)

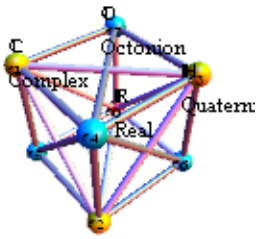
Flattened triad/mask bits

{1, 3, 2, 4, 6, 7, 5}
{1, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	−1	−3	2	6	−7	−4	5
2	3	−1	−1	7	6	−5	−4
3	−2	1	−1	5	−4	7	−6
4	−6	−7	−5	−1	3	1	2
5	7	−6	4	−3	−1	2	−1
6	4	5	−7	−1	−2	−1	3
7	−5	4	6	−2	1	−3	−1

multiplication table

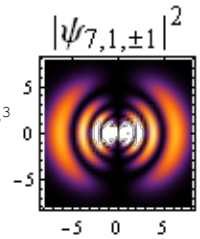
165 $\overline{x_1 \Phi}^{+\to\frac{2}{3}}_{o_1 \hat{R}}$ Ref. Symbols: 2D 3D

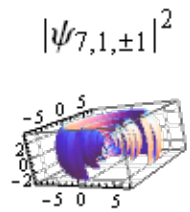
0apccssgg 010010100_2	Root{ 4 3 5 4 3 2 1 2 } Weight{ 0 0 0 0 -1 1 0 1 } Height= 25	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{2_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	1	1	1	0	1	0	0	}
E8{	0	0	0	0	0	0	1	1	}
Physics {	0	0	0	0	0	$\frac{2}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{115}Uup[Rn]$7s^2 5f^{14} 6d^{10} 7p^3$





Flipped

Octonion triads-fPi=7 Sign mask=2 Hex=63 L fp_sm=3

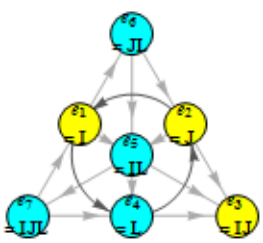
{{1, 4, 2}, {1, 5, 3}, {1, 6, 7},
{2, 3, 6}, {2, 5, 7}, {3, 7, 4}, {4, 6, 5}}

Flattened triad/mask bits

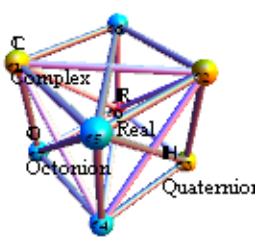
{1, 2, 4, 5, 3, 6, 7}
{1, 1, 0, 0, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	7	-6
2	4	-1	6	-1	7	-3	-5
3	5	-6	-1	-7	-1	2	4
4	-2	1	7	-1	-6	5	-3
5	-3	-7	1	6	-1	-4	2
6	-7	3	-2	-5	4	-1	1
7	6	5	-4	3	-2	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=2 Hex=63 L fp_sm=3

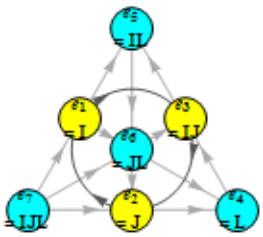
{{1, 3, 2}, {1, 6, 4}, {1, 5, 7},
{2, 4, 7}, {2, 5, 6}, {3, 5, 4}, {3, 7, 6}}

Flattened triad/mask bits

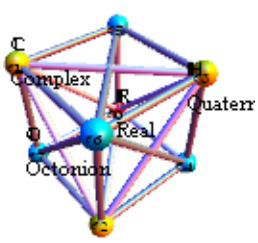
{1, 3, 2, 6, 4, 5, 7}
{1, 1, 0, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	7	4	-5
2	3	-1	-1	7	6	-5	-4
3	-2	1	-1	-5	4	-7	6
4	6	-7	5	-1	-3	-1	2
5	-7	-6	-4	3	-1	2	1
6	-4	5	7	1	-2	-1	-3
7	5	4	-6	-2	-1	3	-1

multiplication table

195 $e_S \Phi \frac{0}{\hat{R}}$ Ref. Symbols: 2D 3D

0apccssgg
001010100_2

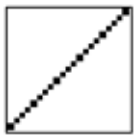
Root{ -1 0 -1 -1 -1 0 0 0 }
Weight{ 0 1 -1 0 0 -1 1 1 }
Height= 5

Exp. m
Theo. m
Exp. τ

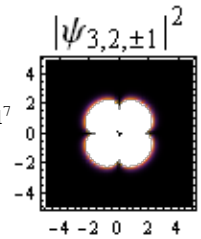
$1. \times 10^{-18}$ MeV
$\frac{1_{Hg}}{\text{eVperC2 Mega}}$
? s

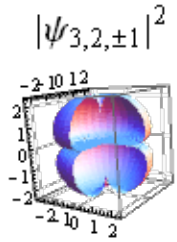
Binary{	1	0	0	1	1	1	0	1	}
E8{	0	1	0	-1	0	0	0	0	}
Physics {	0	1	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8



^{27}Co[Ar]4s^{2}3d^7





Flipped

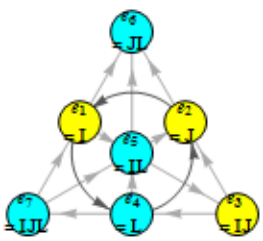
Octonion triads-fPi=7 Sign mask=2 Hex=1B fp_sm=3

{{1, 4, 2}, {1, 5, 3}, {1, 6, 7},
{2, 6, 3}, {2, 7, 5}, {3, 4, 7}, {4, 5, 6}}

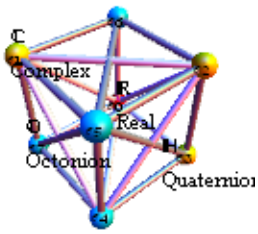
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 4, 5, 3, 6, 7}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	7	-6
2	4	-1	-6	-1	-7	3	5
3	5	6	-1	7	-1	-2	-4
4	-2	1	-7	-1	6	-5	3
5	-3	7	1	-6	-1	4	-2
6	-7	-3	2	5	-4	-1	1
7	6	-5	4	-3	2	-1	-1

multiplication table

Not Flipped

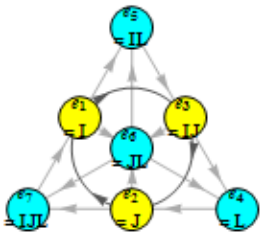
Octonion triads-fPi=4 Sign mask=2 Hex=1B fp_sm=3

{{1, 3, 2}, {1, 6, 4}, {1, 5, 7},
{2, 7, 4}, {2, 6, 5}, {3, 4, 5}, {3, 6, 7}}

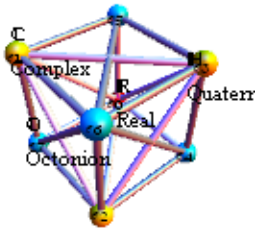
Coxeter (Cyan)

Flattened triad/mask bits
{1, 3, 2, 6, 4, 5, 7}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



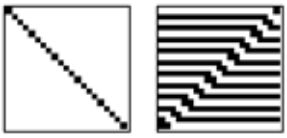
0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-6	7	4	-5
2	3	-1	-1	-7	-6	5	4
3	-2	1	-1	5	-4	7	-6
4	6	7	-5	-1	3	-1	-2
5	-7	6	4	-3	-1	-2	1
6	-4	-5	-7	1	2	-1	3
7	5	-4	6	2	-1	-3	-1

multiplication table

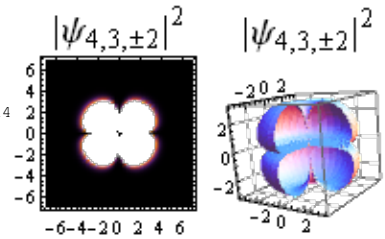
82 $\overline{x_1 \Phi}^{+\to -\frac{1}{3}}_{O_m}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-2	-2	-2	-2	-1	0 }	Exp. m	$1.\times 10^{-18}$ MeV
010011000_2	Weight{	0	-1	0	0	0	0	1	0 }	Theo. m	$\frac{1_{Hg}}{\text{eVperC2 Mega}}$
	Height=	12								Exp. τ	? s
Binary{	0	0	1	0	0	1	0	1	}		
E8{	0	0	0	0	-1	-1	0	0	}		
Physics {	0	0	0	0	-1	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}		

Bit NKS CA Pascal E8



^{70}Yb[Xe]$6s^2 4f^{14}$



Flipped

Octonion triads-fPi=7 Sign mask=3 Hex=50 L fp_sm=3

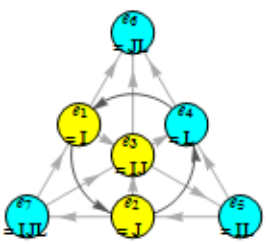
{{1, 2, 4}, {1, 3, 5}, {1, 6, 7},
{2, 3, 6}, {2, 7, 5}, {3, 4, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 4, 2, 3, 5, 6, 7}
{0, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	7	-6
2	-4	-1	6	1	-7	-3	5
3	-5	-6	-1	7	1	2	-4
4	2	-1	-7	-1	-6	5	3
5	3	7	-1	6	-1	-4	-2
6	-7	3	-2	-5	4	-1	1
7	6	-5	4	-3	2	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=3 Hex=50 L fp_sm=3

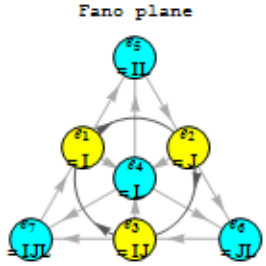
{{1, 2, 3}, {1, 4, 6}, {1, 5, 7},
{2, 4, 7}, {2, 6, 5}, {3, 4, 5}, {3, 7, 6}}

Coxeter (Cyan)

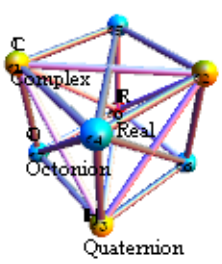
Flattened triad/mask bits

{1, 2, 3, 4, 6, 5, 7}
{0, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	7	-4	-5
2	-3	-1	1	7	-6	5	-4
3	2	-1	-1	5	-4	-7	6
4	-6	-7	-5	-1	3	1	2
5	-7	6	4	-3	-1	-2	1
6	4	-5	7	-1	2	-1	-3
7	5	4	-6	-2	-1	3	-1

multiplication table

218 $e_S \Phi_{r_m}^{\hat{L}}{}^{0\to 1}$ Ref. Symbols: 2D 3D

0apccssgg
001011000_2

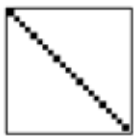
Root{ 1 1 2 1 0 0 0 0 }
Weight{ 0 0 -1 0 1 0 -1 0 }
Height= 6

Exp. m
Theo. m
Exp. τ

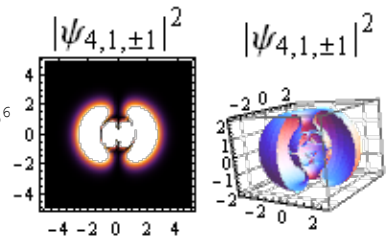
$1.\times 10^{-18}$ MeV
$\frac{2_{Hg}}{\text{eVperC2 Mega}}$
? s

Binary{	0	0	1	0	1	1	1	1 }
E8{	1	0	1	0	0	0	0	0 }
Physics {	1	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0 }

Bit NKS CA Pascal E8



^{36}Kr[Ar]$4s^2 3d^{10} 4p^6$

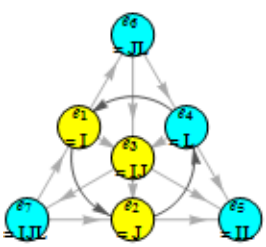


Flipped

Octonion triads-fPi=7 Sign mask=3 Hex=28 L fp_sm=3
{{1, 2, 4}, {1, 3, 5}, {1, 6, 7},
{2, 6, 3}, {2, 5, 7}, {3, 7, 4}, {4, 5, 6}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, **4**, **2**, 3, 5, 6, 7}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	7	-6
2	-4	-1	-6	1	7	3	-5
3	-5	6	-1	-7	1	-2	4
4	2	-1	7	-1	6	-5	-3
5	3	-7	-1	-6	-1	4	2
6	-7	-3	2	5	-4	-1	1
7	6	5	-4	3	-2	-1	-1

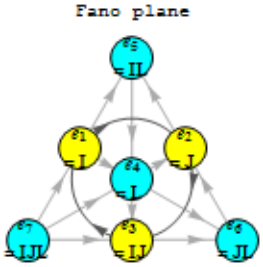
multiplication table

Not Flipped

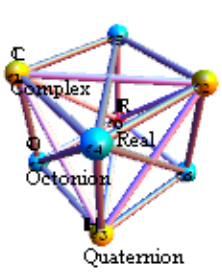
Octonion triads-fPi=4 Sign mask=3 Hex=28 L fp_sm=3
{{1, 2, 3}, {1, 4, 6}, {1, 5, 7},
{2, 7, 4}, {2, 5, 6}, {3, 5, 4}, {3, 6, 7}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 3, 4, 6, 5, 7}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	6	7	-4	-5
2	-3	-1	1	-7	6	-5	4
3	2	-1	-1	-5	4	7	-6
4	-6	7	5	-1	-3	1	-2
5	-7	-6	-4	3	-1	2	1
6	4	5	-7	-1	-2	-1	3
7	5	-4	6	2	-1	-3	-1

multiplication table

167 $\overline{g^{g\bar{b}}_{O_m}}$ $\overset{+\to 0}{\underset{R}{\vee}}$ Ref. Symbols: 2D 3D

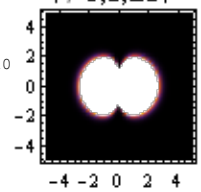
0apccssgg 010011100_2	Root{ 0 0 1 1 1 1 1 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 1 0 0 0 1 -1 0 -1 }	Theo. m	2.9674×10^{-18}
	Height= 6	Exp. τ	? s

Binary{	1	1	1	1	0	0	0	1 }
E8{	0	0	0	0	0	1	0	-1 }
Physics {	0	0	0	0	0	0	$-\frac{1}{\sqrt{2}}$	$-\sqrt{\frac{3}{2}}$ }

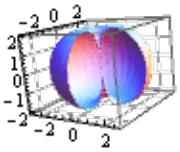
Bit NKS CA Pascal E8

^{30}Zn[Ar]$4s^2 3d^{10}$

$|\psi_{3,2,\pm 2}|^2$



$|\psi_{3,2,\pm 2}|^2$



Flipped

Octonion triads-fPi=7 Sign mask=4 Hex=4E L fp_sm=3

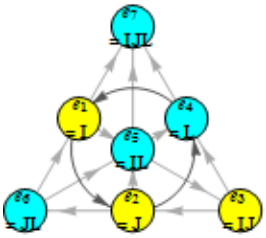
{{1, 2, 4}, {1, 5, 3}, {1, 7, 6},
{2, 6, 3}, {2, 5, 7}, {3, 4, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

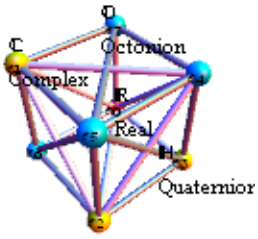
Flattened triad/mask bits

{1, **4**, **2**, 5, 3, 7, 6}
{0, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	-7	6
2	-4	-1	-6	1	7	3	-5
3	5	6	-1	7	-1	-2	-4
4	2	-1	-7	-1	-6	5	3
5	-3	-7	1	6	-1	-4	2
6	7	-3	2	-5	4	-1	-1
7	-6	5	4	-3	-2	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=4 Hex=4E L fp_sm=3

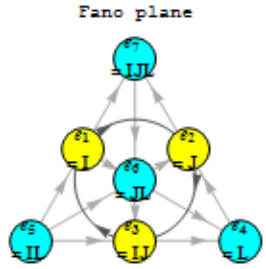
{{1, 2, 3}, {1, 6, 4}, {1, 7, 5},
{2, 7, 4}, {2, 5, 6}, {3, 4, 5}, {3, 7, 6}}

Coxeter (Cyan)

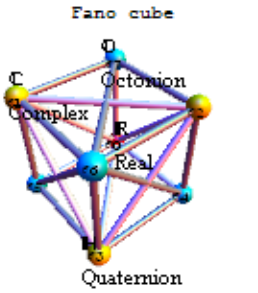
Flattened triad/mask bits

{1, 2, 3, 6, 4, 7, 5}
{0, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	-7	4	5
2	-3	-1	1	-7	6	-5	4
3	2	-1	-1	5	-4	-7	6
4	6	7	-5	-1	3	-1	-2
5	7	-6	4	-3	-1	2	-1
6	-4	5	7	1	-2	-1	-3
7	-5	-4	-6	2	1	3	-1

multiplication table

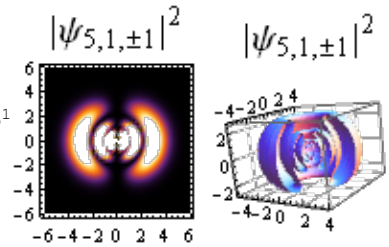
193 $\omega_{L\,r_m}^{0\to 1}$ Ref. Symbols: 2D 3D

0apccssgg 001011100_2	Root{ 1 1 2 2 1 0 0 0 } Weight{ 0 -1 0 1 0 0 -1 0 } Height= 8	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV 2.9674×10^{-18} ? s

Binary{	1	0	1	0	0	1	1	1 }
E8{	0	0	1	1	0	0	0	0 }
Physics {	0	0	0	$\sqrt{2}$	0	0	0	0 }

Bit NKS CA Pascal E8

^{49}In[Kr]5s^{2}4d^{10}5p^1



Flipped

Octonion triads-fPi=7 Sign mask=4 Hex=36 L fp_sm=3

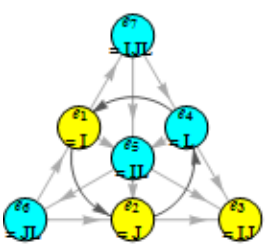
{{1, 2, 4}, {1, 5, 3}, {1, 7, 6},
{2, 3, 6}, {2, 7, 5}, {3, 7, 4}, {4, 5, 6}}

HoffmanSingleton (Yellow)

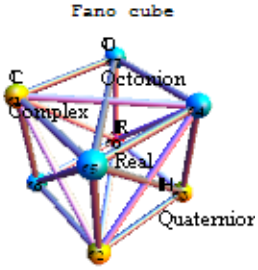
Flattened triad/mask bits

{1, **4**, **2**, 5, 3, 7, 6}
{0, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	-7	6
2	-4	-1	6	1	-7	-3	5
3	5	-6	-1	-7	-1	2	4
4	2	-1	7	-1	6	-5	-3
5	-3	7	1	-6	-1	4	-2
6	7	3	-2	5	-4	-1	-1
7	-6	-5	-4	3	2	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=4 Sign mask=4 Hex=36 L fp_sm=3

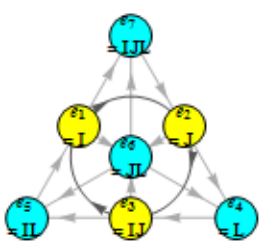
{{1, 2, 3}, {1, 6, 4}, {1, 7, 5},
{2, 4, 7}, {2, 6, 5}, {3, 5, 4}, {3, 6, 7}}

Coxeter (Cyan)

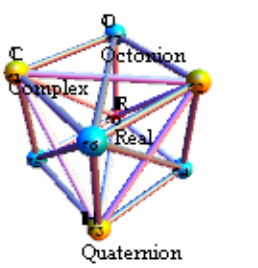
Flattened triad/mask bits

{1, 2, 3, 6, 4, 7, 5}
{0, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



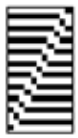
0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-6	-7	4	5
2	-3	-1	1	7	-6	5	-4
3	2	-1	-1	-5	4	7	-6
4	6	-7	5	-1	-3	-1	2
5	7	6	-4	3	-1	-2	-1
6	-4	-5	-7	1	2	-1	3
7	-5	4	6	-2	1	-3	-1

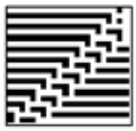
multiplication table

66 $d_{\substack{\circ_d \\ L}}^{-\frac{1}{3}\to-\frac{4}{3}}$ Ref. Symbols: 2D 3D

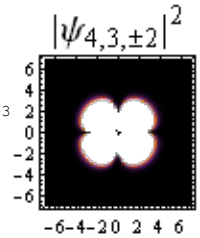
0apccssgg	Root{	-1	-1	-2	-2	-1	-1	-1	0 }	Exp. m				5. MeV		
000010001_2	Weight{	-1	0	1	-1	0	0	1	0 }	Theo. m				3.2107		
	Height=	10								Exp. τ				? s		
Binary{	0		1		0		1		0	0		1		0		}
E8{	0		0		-1		0		0	-1		0		0		}
Physics {	0		0		$-\frac{1}{\sqrt{2}}$		$-\frac{1}{\sqrt{2}}$		0	$-\frac{1}{\sqrt{3}}$		$\frac{1}{\sqrt{2}}$		$\frac{1}{\sqrt{6}}$		}

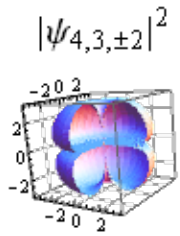
Bit NKS CA Pascal E8





^{59}Pr[Xe]$6s^2 4f^3$





Flipped

Octonion triads-fPi=8 Sign mask=1 Hex=01 L fp_sm=2

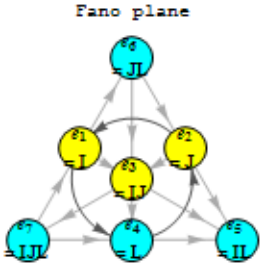
{{1, 4, 2}, {1, 3, 5}, {1, 6, 7},
{2, 3, 7}, {2, 5, 6}, {3, 4, 6}, {4, 5, 7}}

Coxeter (Cyan)

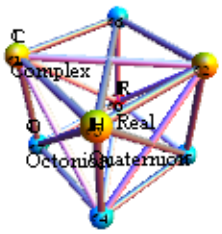
Flattened triad/mask bits

{1, **2**, **4**, 3, 5, 6, 7}
{1, 0, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	7	-6
2	4	-1	7	-1	6	-5	-3
3	-5	-7	-1	6	1	-4	2
4	-2	1	-6	-1	7	3	-5
5	3	-6	-1	-7	-1	2	4
6	-7	5	4	-3	-2	-1	1
7	6	3	-2	5	-4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=1 Hex=08 L fp_sm=5

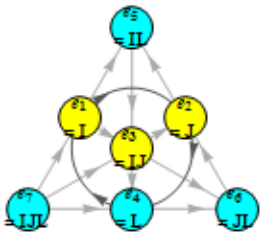
{{1, 2, 4}, {1, 3, 6}, {1, 5, 7},
{2, 7, 3}, {2, 5, 6}, {3, 4, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

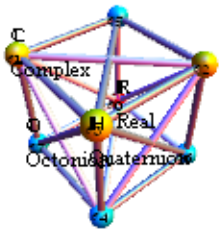
Flattened triad/mask bits

{1, 2, 4, 3, 6, 5, 7}
{0, 0, 0, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	7	-3	-5
2	-4	-1	-7	1	6	-5	3
3	-6	7	-1	5	-4	1	-2
4	2	-1	-5	-1	3	7	-6
5	-7	-6	4	-3	-1	2	1
6	3	5	-1	-7	-2	-1	4
7	5	-3	2	6	-1	-4	-1

multiplication table

80 $\overline{u}_{r_d}\,\overset{\vee}{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

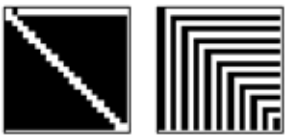
0apccssgg
011010001_2

Root{	0	0	0	0	0	1	1	0	}
Weight{	1	1	-1	0	0	0	0	0	}
Height=	3								

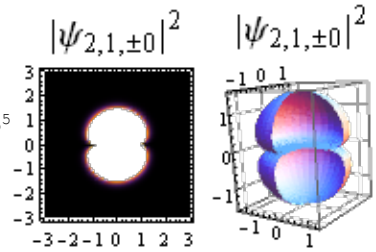
Exp. m 2.2 MeV
Theo. m 1.60535
Exp. τ ? s

Binary{	0	0	1	0	1	0	0	1	}
E8{	0	0	0	-1	0	1	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{9}F[He]$2s^2 2p^5$



Flipped

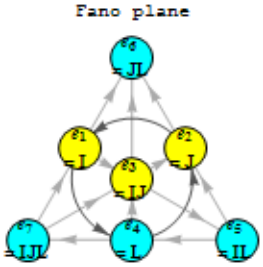
Octonion triads-fPi=8 Sign mask=1 Hex=79 L fp_sm=2

{{1, 4, 2}, {1, 3, 5}, {1, 6, 7},
{2, 7, 3}, {2, 6, 5}, {3, 6, 4}, {4, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 4, 3, 5, 6, 7}
{1, 0, 0, 1, 1, 1, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	7	-6
2	4	-1	-7	-1	-6	5	3
3	-5	7	-1	-6	1	4	-2
4	-2	1	6	-1	-7	-3	5
5	3	6	-1	7	-1	-2	-4
6	-7	-5	-4	3	2	-1	1
7	6	-3	2	-5	4	-1	-1

multiplication table

Not Flipped

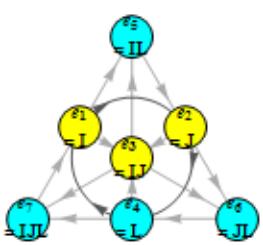
Octonion triads-fPi=10 Sign mask=1 Hex=70 L fp_sm=5

{{1, 2, 4}, {1, 3, 6}, {1, 5, 7},
{2, 3, 7}, {2, 6, 5}, {3, 5, 4}, {4, 7, 6}}

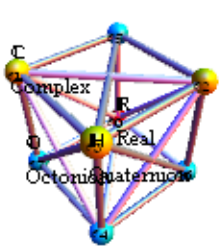
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 4, 3, 6, 5, 7}
{0, 0, 0, 0, 1, 1, 1}

Fano plane



Fano cube



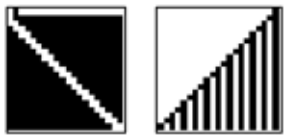
0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	7	-3	-5
2	-4	-1	7	1	-6	5	-3
3	-6	-7	-1	-5	4	1	2
4	2	-1	5	-1	-3	-7	6
5	-7	6	-4	3	-1	-2	1
6	3	-5	-1	7	2	-1	-4
7	5	3	-2	-6	-1	4	-1

multiplication table

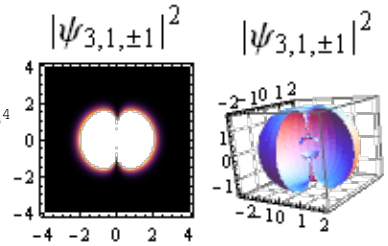
71 $\overline{u}_{r_1}\hat{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	0	0	1	1	1	0 }	Exp. m 2.2 MeV
011010101_2	Weight{	1	0	1	-1	0	0	0	0 }	Theo. m 1.60535
	Height= 4									Exp. τ ? s
Binary{	0	1	0	0	0	1	1	0	}	
E8{	0	0	-1	0	0	1	0	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



$^{16}S[Ne]3s^2 3p^4$



Flipped

Octonion triads-fPi=8 Sign mask=2 Hex=67 L fp_sm=2

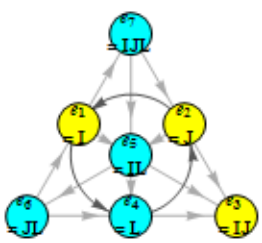
{{1, 4, 2}, {1, 5, 3}, {1, 7, 6},
{2, 3, 7}, {2, 5, 6}, {3, 6, 4}, {4, 7, 5}}

Coxeter (Cyan)

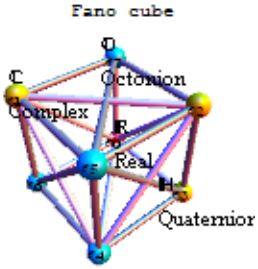
Flattened triad/mask bits

{1, 2, 4, 5, 3, 7, 6}
{1, 1, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	-7	6
2	4	-1	7	-1	6	-5	-3
3	5	-7	-1	-6	-1	4	2
4	-2	1	6	-1	-7	-3	5
5	-3	-6	1	7	-1	2	-4
6	7	5	-4	3	-2	-1	-1
7	-6	3	-2	-5	4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=2 Hex=6E L fp_sm=5

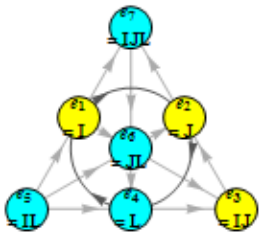
{{1, 2, 4}, {1, 6, 3}, {1, 7, 5},
{2, 7, 3}, {2, 5, 6}, {3, 5, 4}, {4, 7, 6}}

HoffmanSingleton (Yellow)

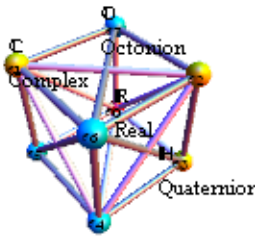
Flattened triad/mask bits

{1, 2, 4, 6, 3, 7, 5}
{0, 1, 1, 1, 0, 1, 1}

Fano plane



Fano cube



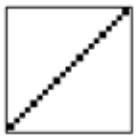
0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	-7	3	5
2	-4	-1	-7	1	6	-5	3
3	6	7	-1	-5	4	-1	-2
4	2	-1	5	-1	-3	-7	6
5	7	-6	-4	3	-1	2	-1
6	-3	5	1	7	-2	-1	-4
7	-5	-3	2	-6	1	4	-1

multiplication table

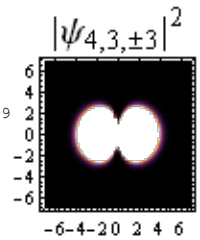
75 $d_{o_1 \hat{R}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

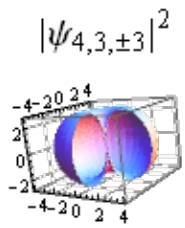
0apccssgg	Root{	-1	-1	-2	-2	-2	-1	-1	0 }	Exp. m	5. MeV					
000010101_2	Weight{	-1	1	-1	0	0	0	1	0 }	Theo. m	3.2107					
	Height=	11								Exp. τ	? s					
Binary{	0	0	1	1	0	1	0	0	}							
E8{	0	0	0	-1	0	-1	0	0	}							
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}							

Bit NKS CA Pascal E8



^{65}Tb[Xe]6s^{2}4f^9





Flipped

Octonion triads-fPi=8 Sign mask=2 Hex=1F L fp_sm=2

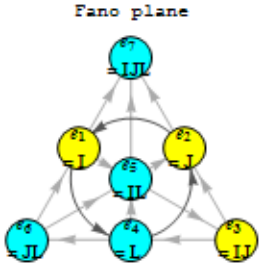
{{1, 4, 2}, {1, 5, 3}, {1, 7, 6},
{2, 7, 3}, {2, 6, 5}, {3, 4, 6}, {4, 5, 7}}

Coxeter (Cyan)

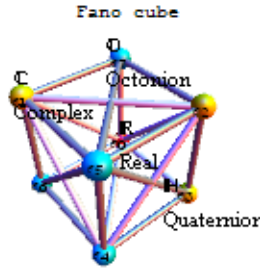
Flattened triad/mask bits

{1, 2, 4, 5, 3, 7, 6}
{1, 1, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	-7	6
2	4	-1	-7	-1	-6	5	3
3	5	7	-1	6	-1	-4	-2
4	-2	1	-6	-1	7	3	-5
5	-3	6	1	-7	-1	-2	4
6	7	-5	4	-3	2	-1	-1
7	-6	-3	2	5	-4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=2 Hex=16 L fp_sm=5

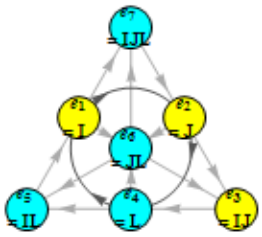
{{1, 2, 4}, {1, 6, 3}, {1, 7, 5},
{2, 3, 7}, {2, 6, 5}, {3, 4, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

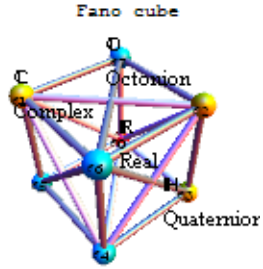
Flattened triad/mask bits

{1, 2, 4, 6, 3, 7, 5}
{0, 1, 1, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	-7	3	5
2	-4	-1	7	1	-6	5	-3
3	6	-7	-1	5	-4	-1	2
4	2	-1	-5	-1	3	7	-6
5	7	6	4	-3	-1	-2	-1
6	-3	-5	1	-7	2	-1	4
7	-5	3	-2	6	1	-4	-1

multiplication table

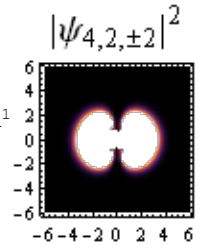
60 $\overline{u}_{r_m \hat{L}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

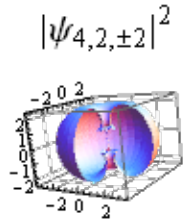
0apccssgg	Root{ 1 0 1 1 1 1 1 0 }	Exp. m	2.2 MeV
011011001_2	Weight{ 1 0 0 0 0 1 -1 -1 }	Theo. m	1.60535
	Height= 7	Exp. τ	? s

Binary{	0	1	1	0	1	0	0	0 }
E8{	0	-1	0	0	0	1	0	0 }
Physics {	0	-1	0	0	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{39}Y[Kr]5s^{2}4d^1





Flipped

Octonion triads-fPi=8 Sign mask=3 Hex=54 L fp_sm=2

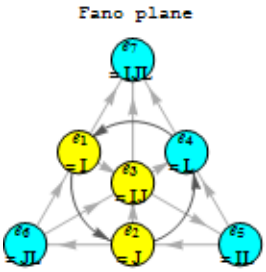
{{1, 2, 4}, {1, 3, 5}, {1, 7, 6},
{2, 3, 7}, {2, 6, 5}, {3, 4, 6}, {4, 7, 5}}

Coxeter (Cyan)

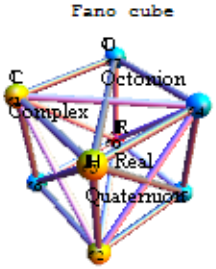
Flattened triad/mask bits

{1, **4**, **2**, 3, 5, 7, 6}
{0, 0, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	-7	6
2	-4	-1	7	1	-6	5	-3
3	-5	-7	-1	6	1	-4	2
4	2	-1	-6	-1	-7	3	5
5	3	6	-1	7	-1	-2	-4
6	7	-5	4	-3	2	-1	-1
7	-6	3	-2	-5	4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=3 Hex=5D L fp_sm=5

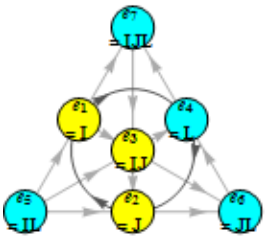
{{1, 4, 2}, {1, 3, 6}, {1, 7, 5},
{2, 7, 3}, {2, 6, 5}, {3, 4, 5}, {4, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 4, 2, 3, 6, 7, 5}
{1, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	-7	-3	5
2	4	-1	-7	-1	-6	5	3
3	-6	7	-1	5	-4	1	-2
4	-2	1	-5	-1	3	-7	6
5	7	6	4	-3	-1	-2	-1
6	3	-5	-1	7	2	-1	-4
7	-5	-3	2	-6	1	4	-1

multiplication table

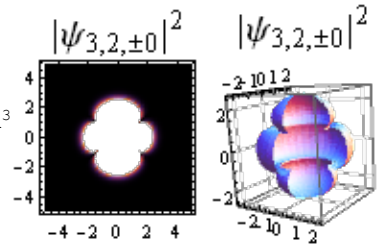
210 $d_{\substack{\circ m \\ \hat{L}}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	0	-1	-1	-1	-1	0 }	Exp. m	5. MeV
000011001_2	Weight{	-1	0	0	-1	1	0	0	0 }	Theo. m	3.2107
	Height=	5								Exp. τ	? s

Binary{	0	1	0	1	1	1	0	1	}
E8{	1	0	0	0	0	-1	0	0	}
Physics {	1	0	0	0	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

$^{23}V[Ar]4s^2 3d^3$



Flipped

Octonion triads-fPi=8 Sign mask=3 Hex=2C L fp_sm=2

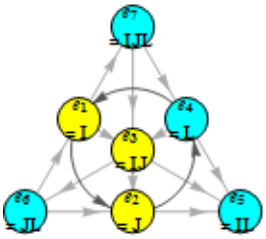
{{1, 2, 4}, {1, 3, 5}, {1, 7, 6},
{2, 7, 3}, {2, 5, 6}, {3, 6, 4}, {4, 5, 7}}

Coxeter (Cyan)

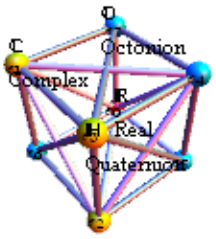
Flattened triad/mask bits

{1, **4**, **2**, 3, 5, 7, 6}
{0, 0, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	-7	6
2	-4	-1	-7	1	6	-5	3
3	-5	7	-1	-6	1	4	-2
4	2	-1	6	-1	7	-3	-5
5	3	-6	-1	-7	-1	2	4
6	7	5	-4	3	-2	-1	-1
7	-6	-3	2	5	-4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=3 Hex=25 L fp_sm=5

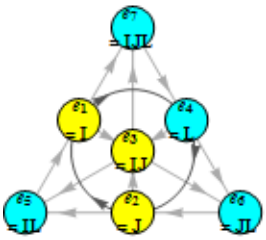
{{1, 4, 2}, {1, 3, 6}, {1, 7, 5},
{2, 3, 7}, {2, 5, 6}, {3, 5, 4}, {4, 6, 7}}

HoffmanSingleton (Yellow)

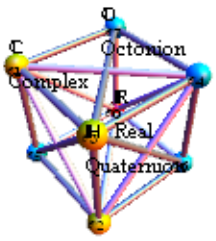
Flattened triad/mask bits

{1, 4, 2, 3, 6, 7, 5}
{1, 0, 1, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	-7	-3	5
2	4	-1	7	-1	6	-5	-3
3	-6	-7	-1	-5	4	1	2
4	-2	1	5	-1	-3	7	-6
5	7	-6	-4	3	-1	2	-1
6	3	5	-1	-7	-2	-1	4
7	-5	3	-2	6	1	-4	-1

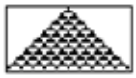
multiplication table

55 $d_{\substack{\circ m \\ \vee \\ R}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

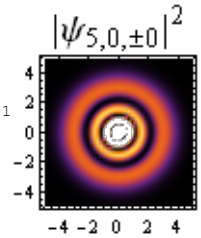
0apccssgg	Root{	0	-1	-1	-1	-1	-1	-1	0 }	Exp. m	5. MeV
000011101_2	Weight{	-1	0	0	0	0	1	0	-1 }	Theo. m	3.2107
	Height=	7								Exp. τ	? s

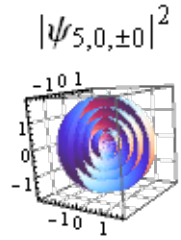
Binary{	1	0	0	0	1	0	0	1	}
E8{	0	-1	0	0	0	-1	0	0	}
Physics {	0	-1	0	0	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{37}Rb[Kr]5s^1





Flipped

Octonion triads-fPi=8 Sign mask=4 Hex=32 L fp_sm=2

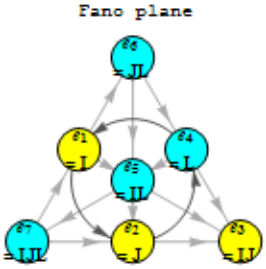
{{1, 2, 4}, {1, 5, 3}, {1, 6, 7},
{2, 3, 7}, {2, 6, 5}, {3, 6, 4}, {4, 5, 7}}

Coxeter (Cyan)

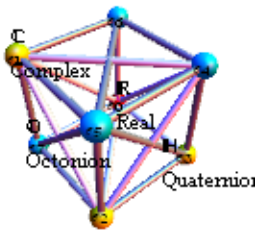
Flattened triad/mask bits

{1, **4**, **2**, 5, 3, 6, 7}
{0, 1, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	7	-6
2	-4	-1	7	1	-6	5	-3
3	5	-7	-1	-6	-1	4	2
4	2	-1	6	-1	7	-3	-5
5	-3	6	1	-7	-1	-2	4
6	-7	-5	-4	3	2	-1	1
7	6	3	-2	5	-4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=4 Hex=3B L fp_sm=5

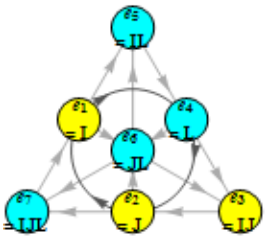
{{1, 4, 2}, {1, 6, 3}, {1, 5, 7},
{2, 7, 3}, {2, 6, 5}, {3, 5, 4}, {4, 6, 7}}

HoffmanSingleton (Yellow)

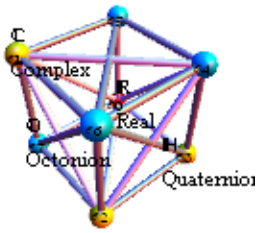
Flattened triad/mask bits

{1, 4, 2, 6, 3, 5, 7}
{1, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	7	3	-5
2	4	-1	-7	-1	-6	5	3
3	6	7	-1	-5	4	-1	-2
4	-2	1	5	-1	-3	7	-6
5	-7	6	-4	3	-1	-2	1
6	-3	-5	1	-7	2	-1	4
7	5	-3	2	6	-1	-4	-1

multiplication table

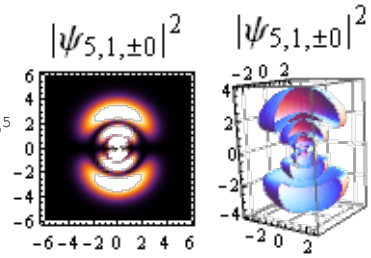
215 $\overline{u}_{r_m}^{\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 1 2 1 1 1 1 0 }	Exp. m	2.2 MeV
011011101_2	Weight{ 1 0 0 -1 1 0 -1 0 }	Theo. m	1.60535
	Height= 9	Exp. τ	? s

Binary{	0	0	1	1	1	1	0	1 }
E8{	1	0	0	0	0	1	0	0 }
Physics {	1	0	0	0	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

$^{53}I[Kr]5s^2 4d^{10} 5p^5$



Flipped

Octonion triads-fPi=8 Sign mask=4 Hex=4A L fp_sm=2

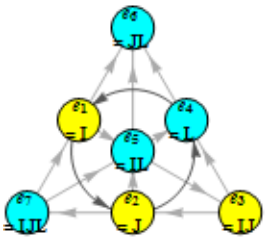
{{1, 2, 4}, {1, 5, 3}, {1, 6, 7},
{2, 7, 3}, {2, 5, 6}, {3, 4, 6}, {4, 7, 5}}

Flattened triad/mask bits

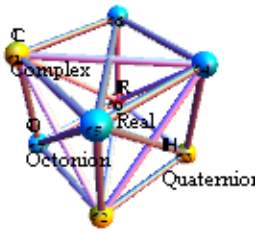
{1, **4**, **2**, 5, 3, 6, 7}
{0, 1, 0, 1, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	7	-6
2	-4	-1	-7	1	6	-5	3
3	5	7	-1	6	-1	-4	-2
4	2	-1	-6	-1	-7	3	5
5	-3	-6	1	7	-1	2	-4
6	-7	5	4	-3	-2	-1	1
7	6	-3	2	-5	4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=10 Sign mask=4 Hex=43 L fp_sm=5

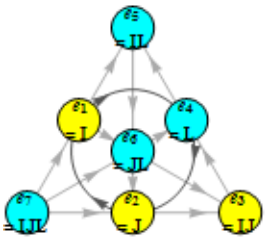
{{1, 4, 2}, {1, 6, 3}, {1, 5, 7},
{2, 3, 7}, {2, 5, 6}, {3, 4, 5}, {4, 7, 6}}

Flattened triad/mask bits

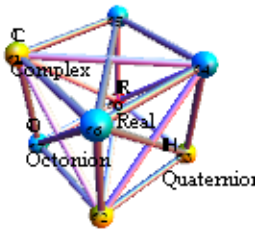
{1, 4, 2, 6, 3, 5, 7}
{1, 1, 0, 0, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	7	3	-5
2	4	-1	7	-1	6	-5	-3
3	6	-7	-1	5	-4	-1	2
4	-2	1	-5	-1	3	-7	6
5	-7	-6	4	-3	-1	2	1
6	-3	5	1	7	-2	-1	-4
7	5	3	-2	-6	-1	4	-1

multiplication table

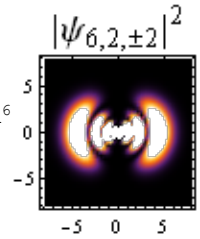
10 $\nu_\tau \overset{0\to-1}{\underset{w_d}{\vee}} L$ Ref. Symbols: 2D ▲ 3D ▲

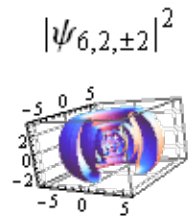
0apccssgg	Root{	-3	-2	-4	-4	-3	-2	-1	-1 }	Exp. m	$1.\times10^{-18}$ MeV
001000011_2	Weight{	0	0	0	-1	1	-1	1	0 }	Theo. m	4.89396×10^{-11}
	Height=	21								Exp. τ	? s

Binary{	1	1	0	0	0	0	0	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{108}Hs[Rn]$7s^2 5f^{14} 6d^6$





Flipped

Octonion triads-fPi=9 Sign mask=1 Hex=0E R fp_sm=6

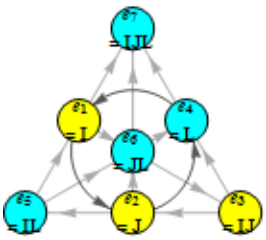
{{1, 2, 4}, {1, 6, 3}, {1, 7, 5},
{2, 5, 3}, {2, 6, 7}, {3, 4, 7}, {4, 5, 6}}

Coxeter (Cyan)

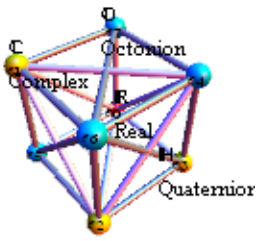
Flattened triad/mask bits

{1, **4**, **2**, 6, 3, 7, 5}
{0, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	-7	3	5
2	-4	-1	-5	1	3	7	-6
3	6	5	-1	7	-2	-1	-4
4	2	-1	-7	-1	6	-5	3
5	7	-3	2	-6	-1	4	-1
6	-3	-7	1	5	-4	-1	2
7	-5	6	4	-3	1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=1 Hex=0E R fp_sm=6

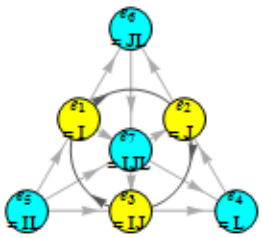
{{1, 2, 3}, {1, 7, 4}, {1, 6, 5},
{2, 6, 4}, {2, 5, 7}, {3, 4, 5}, {3, 6, 7}}

HoffmanSingleton (Yellow)

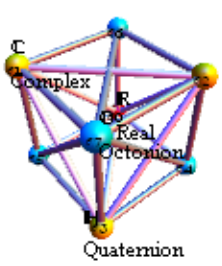
Flattened triad/mask bits

{1, 2, 3, 7, 4, 6, 5}
{0, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	-6	5	4
2	-3	-1	1	-6	7	4	-5
3	2	-1	-1	5	-4	7	-6
4	7	6	-5	-1	3	-2	-1
5	6	-7	4	-3	-1	-1	2
6	-5	-4	-7	2	1	-1	3
7	-4	5	6	1	-2	-3	-1

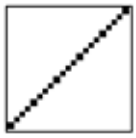
multiplication table

163 $\overline{\tau}_{y_d}^{\overset{+\to 0}{\vee}}{}_{L}$ Ref. Symbols: 2D 3D

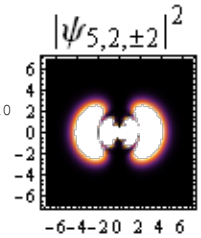
0apccssgg	Root{ 2 1 2 2 2 2 1 1 }	Exp. m	1776.99 MeV
010000011_2	Weight{ 0 1 0 0 -1 1 0 0 }	Theo. m	1799.25
	Height= 14	Exp. τ	2.90601×10^{-13} s

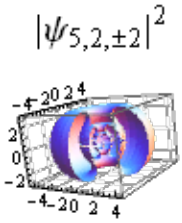
Binary{	0	0	0	0	1	1	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{80}Hg[Xe]$6s^2 4f^{14} 5d^{10}$





Flipped

Octonion triads-fPi=9 Sign mask=1 Hex=76 ℝ fp_sm=6

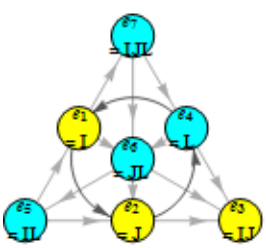
{{1, 2, 4}, {1, 6, 3}, {1, 7, 5},
{2, 3, 5}, {2, 7, 6}, {3, 7, 4}, {4, 6, 5}}

Flattened triad/mask bits

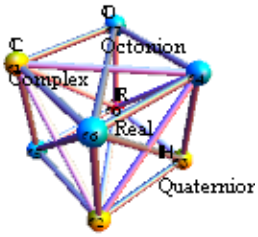
{1, 4, 2, 6, 3, 7, 5}
{0, 1, 1, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	-7	3	5
2	-4	-1	5	1	-3	-7	6
3	6	-5	-1	-7	2	-1	4
4	2	-1	7	-1	-6	5	-3
5	7	3	-2	6	-1	-4	-1
6	-3	7	1	-5	4	-1	-2
7	-5	-6	-4	3	1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=1 Hex=76 ℝ fp_sm=6

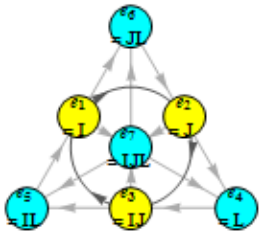
{{1, 2, 3}, {1, 7, 4}, {1, 6, 5},
{2, 4, 6}, {2, 7, 5}, {3, 5, 4}, {3, 7, 6}}

Flattened triad/mask bits

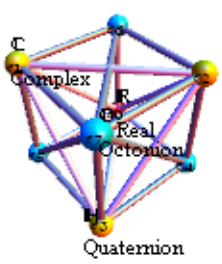
{1, 2, 3, 7, 4, 6, 5}
{0, 1, 1, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	-7	-6	5	4
2	-3	-1	1	6	-7	-4	5
3	2	-1	-1	-5	4	-7	6
4	7	-6	5	-1	-3	2	-1
5	6	7	-4	3	-1	-1	-2
6	-5	4	7	-2	1	-1	-3
7	-4	-5	-6	1	2	3	-1

multiplication table

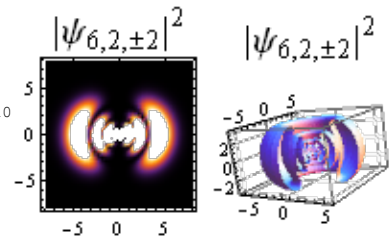
1 $\nu_\tau \overset{0\to-1}{\underset{w_1}{\underset{R}{}}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-3	-5	-4	-3	-2	-1	-1 }	Exp. m	$1.\times10^{-18}$ MeV
001000111_2	Weight{	0	0	0	0	0	0	1	-1 }	Theo. m	4.89396×10^{-11}
	Height=	23								Exp. τ	? s

Binary{	0	0	0	0	0	0	0	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{112}Cn[Rn]$7s^2 5f^{14} 6d^{10}$



Flipped

Octonion triads-fPi=9 Sign mask=2 Hex=10 ℝ fp_sm=6

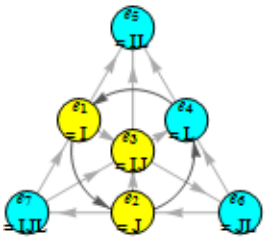
{{1, 2, 4}, {1, 3, 6}, {1, 5, 7},
{2, 3, 5}, {2, 7, 6}, {3, 4, 7}, {4, 5, 6}}

Coxeter (Cyan)

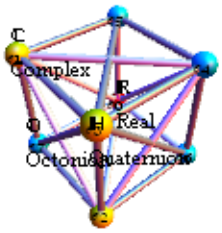
Flattened triad/mask bits

{1, **4**, **2**, 3, 6, 5, 7}
{0, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	7	-3	-5
2	-4	-1	5	1	-3	-7	6
3	-6	-5	-1	7	2	1	-4
4	2	-1	-7	-1	6	-5	3
5	-7	3	-2	-6	-1	4	1
6	3	7	-1	5	-4	-1	-2
7	5	-6	4	-3	-1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=2 Hex=10 ℝ fp_sm=6

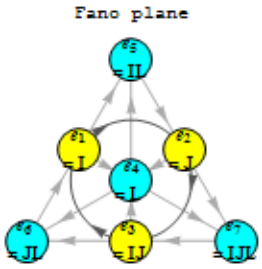
{{1, 2, 3}, {1, 4, 7}, {1, 5, 6},
{2, 4, 6}, {2, 7, 5}, {3, 4, 5}, {3, 6, 7}}

HoffmanSingleton (Yellow)

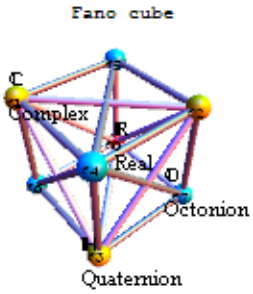
Flattened triad/mask bits

{1, 2, 3, 4, 7, 5, 6}
{0, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	6	-5	-4
2	-3	-1	1	6	-7	-4	5
3	2	-1	-1	5	-4	7	-6
4	-7	-6	-5	-1	3	2	1
5	-6	7	4	-3	-1	1	-2
6	5	4	-7	-2	-1	-1	3
7	4	-5	6	-1	2	-3	-1

multiplication table

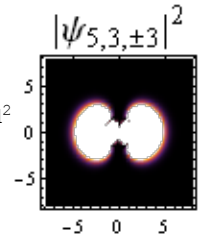
234 $\overline{\tau}_{y_1}^{+\to 0}$ $\hat{R}$ Ref. Symbols: 2D 3D

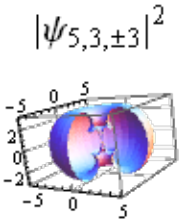
0apccssgg	Root{	2	2	3	2	2	2	1	1 }	Exp. m 1776.99 MeV
010000111_2	Weight{	0	1	0	-1	0	0	0	1 }	Theo. m 1799.25
	Height= 16									Exp. τ 2.90601×10^{-13} s

Binary{	1	1	0	0	1	1	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{90}Th[Rn]$7s^2 6d^2$





Flipped

Octonion triads-fPi=9 Sign mask=2 Hex=68 R fp_sm=6

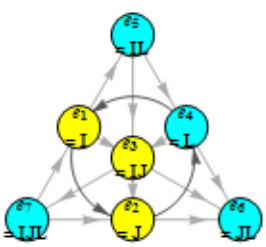
{{1, 2, 4}, {1, 3, 6}, {1, 5, 7},
{2, 5, 3}, {2, 6, 7}, {3, 7, 4}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, **4**, **2**, 3, 6, 5, 7}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	7	-3	-5
2	-4	-1	-5	1	3	7	-6
3	-6	5	-1	-7	-2	1	4
4	2	-1	7	-1	-6	5	-3
5	-7	-3	2	6	-1	-4	1
6	3	-7	-1	-5	4	-1	2
7	5	6	-4	3	-1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=2 Hex=68 R fp_sm=6

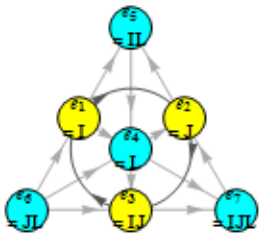
{{1, 2, 3}, {1, 4, 7}, {1, 5, 6},
{2, 6, 4}, {2, 5, 7}, {3, 5, 4}, {3, 7, 6}}

HoffmanSingleton (Yellow)

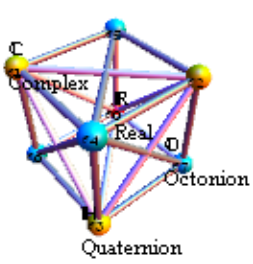
Flattened triad/mask bits

{1, 2, 3, 4, 7, 5, 6}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	3	-2	7	6	-5	-4
2	-3	-1	1	-6	7	4	-5
3	2	-1	-1	-5	4	-7	6
4	-7	6	5	-1	-3	-2	1
5	-6	-7	-4	3	-1	1	2
6	5	-4	7	2	-1	-1	-3
7	4	5	-6	-1	-2	3	-1

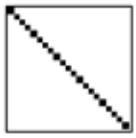
multiplication table

17 ν_τ 0 w_m L Ref. Symbols: 2D 3D

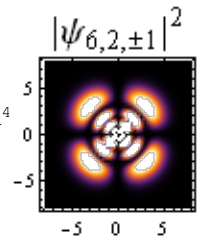
0apccssgg	Root{	-3	-2	-4	-3	-3	-2	-1	-1 }	Exp. m	$1.\times 10^{-18}$ MeV
001001011_2	Weight{	0	0	-1	1	0	-1	1	0 }	Theo. m	4.89396×10^{-11}
	Height=	20								Exp. τ	? s

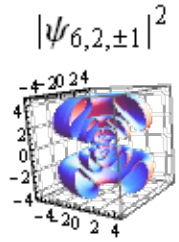
Binary{	0	1	1	0	0	0	0	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8



^{106}Sg[Rn]$7s^2 5f^{14} 6d^4$





Flipped

Octonion triads-fPi=9 Sign mask=3 Hex=23 R fp_sm=6

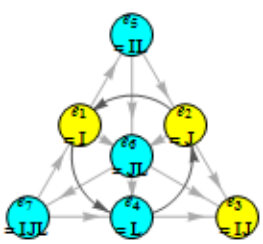
{{1, 4, 2}, {1, 6, 3}, {1, 5, 7},
{2, 3, 5}, {2, 6, 7}, {3, 7, 4}, {4, 5, 6}}

Flattened triad/mask bits

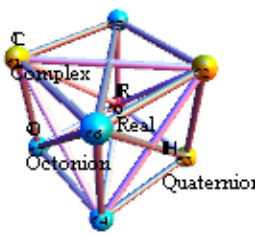
{1, 2, 4, 6, 3, 5, 7}
{1, 1, 0, 0, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	7	3	-5
2	4	-1	5	-1	-3	7	-6
3	6	-5	-1	-7	2	-1	4
4	-2	1	7	-1	6	-5	-3
5	-7	3	-2	-6	-1	4	1
6	-3	-7	1	5	-4	-1	2
7	5	6	-4	3	-1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=3 Hex=23 R fp_sm=6

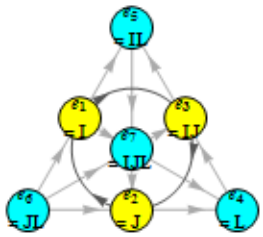
{{1, 3, 2}, {1, 7, 4}, {1, 5, 6},
{2, 4, 6}, {2, 5, 7}, {3, 5, 4}, {3, 6, 7}}

Flattened triad/mask bits

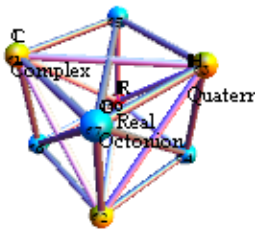
{1, 3, 2, 7, 4, 5, 6}
{1, 1, 0, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	6	-5	4
2	3	-1	-1	6	7	-4	-5
3	-2	1	-1	-5	4	7	-6
4	7	-6	5	-1	-3	2	-1
5	-6	-7	-4	3	-1	1	2
6	5	4	-7	-2	-1	-1	3
7	-4	5	6	1	-2	-3	-1

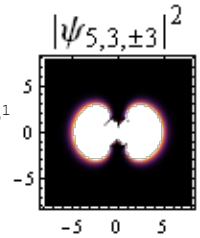
multiplication table

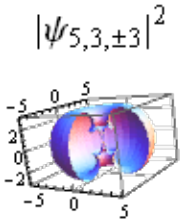
239 $\overline{\tau}^{+}_{y_m \hat{L}}$ Ref. Symbols: 2D 3D

0apccssgg 010001011_2	Root{	3	2	4	3	2	2	1	1 }	Exp. m 1776.99 MeV
	Weight{	0	1	-1	0	0	1	-1	0 }	Theo. m 1799.25
	Height= 19									Exp. τ 2.90601×10^{-13} s
Binary{	1	0	1	0	1	1	1	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}	

Bit NKS CA Pascal E8

^{103}Lr[Rn]$7s^2 5f^{14} 7p^1$





Flipped

Octonion triads-fPi=9 Sign mask=3 Hex=5B R fp_sm=6

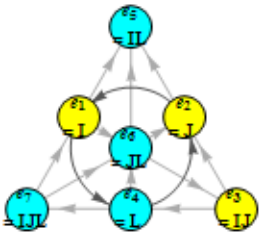
{{1, 4, 2}, {1, 6, 3}, {1, 5, 7},
{2, 5, 3}, {2, 7, 6}, {3, 4, 7}, {4, 6, 5}}

Coxeter (Cyan)

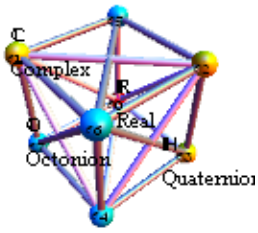
Flattened triad/mask bits

{1, 2, 4, 6, 3, 5, 7}
{1, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	7	3	-5
2	4	-1	-5	-1	3	-7	6
3	6	5	-1	7	-2	-1	-4
4	-2	1	-7	-1	-6	5	3
5	-7	-3	2	6	-1	-4	1
6	-3	7	1	-5	4	-1	-2
7	5	-6	4	-3	-1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=3 Hex=5B R fp_sm=6

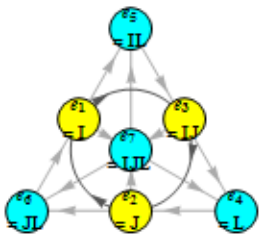
{{1, 3, 2}, {1, 7, 4}, {1, 5, 6},
{2, 6, 4}, {2, 7, 5}, {3, 4, 5}, {3, 7, 6}}

HoffmanSingleton (Yellow)

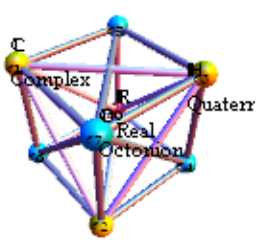
Flattened triad/mask bits

{1, 3, 2, 7, 4, 5, 6}
{1, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	-7	6	-5	4
2	3	-1	-1	-6	-7	4	5
3	-2	1	-1	5	-4	-7	6
4	7	6	-5	-1	3	-2	-1
5	-6	7	4	-3	-1	1	-2
6	5	-4	7	2	-1	-1	-3
7	-4	-5	-6	1	2	3	-1

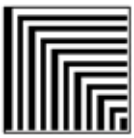
multiplication table

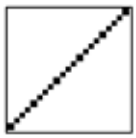
11 ν_τ 0 R w_m Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-2	-3	-3	-3	-2	-1	-1 }	Exp. m $1.\times 10^{-18}$ MeV
001001111_2	Weight{	0	0	-1	0	1	0	0	-1 }	Theo. m 4.89396×10^{-11}
	Height= 18									Exp. τ ? s

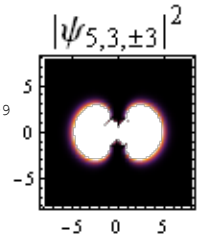
Binary{	1	0	1	0	0	0	0	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	0	0	}

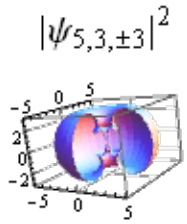
Bit NKS CA Pascal E8





^{97}Bk[Rn]7s^{2}5f^9





Flipped

Octonion triads-fPi=9 Sign mask=4 Hex=3D R fp_sm=6

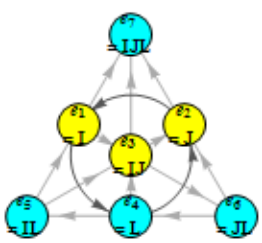
{{1, 4, 2}, {1, 3, 6}, {1, 7, 5},
{2, 5, 3}, {2, 7, 6}, {3, 7, 4}, {4, 5, 6}}

Coxeter (Cyan)

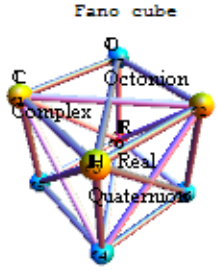
Flattened triad/mask bits

{1, 2, 4, 3, 6, 7, 5}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	-7	-3	5
2	4	-1	-5	-1	3	-7	6
3	-6	5	-1	-7	-2	1	4
4	-2	1	7	-1	6	-5	-3
5	7	-3	2	-6	-1	4	-1
6	3	7	-1	5	-4	-1	-2
7	-5	-6	-4	3	1	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=4 Hex=3D R fp_sm=6

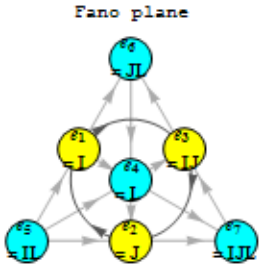
{{1, 3, 2}, {1, 4, 7}, {1, 6, 5},
{2, 6, 4}, {2, 7, 5}, {3, 5, 4}, {3, 6, 7}}

HoffmanSingleton (Yellow)

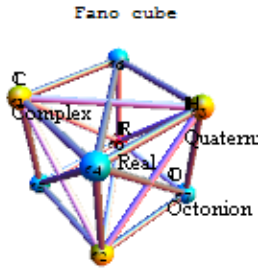
Flattened triad/mask bits

{1, 3, 2, 4, 7, 6, 5}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	-6	5	-4
2	3	-1	-1	-6	-7	4	5
3	-2	1	-1	-5	4	7	-6
4	-7	6	5	-1	-3	-2	1
5	6	7	-4	3	-1	-1	-2
6	-5	-4	-7	2	1	-1	3
7	4	-5	6	-1	2	-3	-1

multiplication table

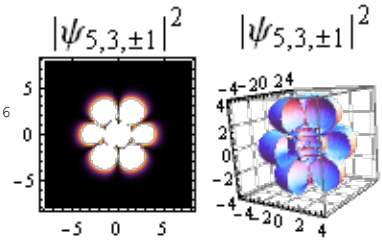
245 $\overline{\tau}^{+}_{y_m\ R}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	3	3	2	2	1	1 }	Exp. m 1776.99 MeV
010001111_2	Weight{	0	1	-1	1	-1	0	0	1 }	Theo. m 1799.25
	Height= 17									Exp. τ 2.90601×10^{-13} s

Binary{	0	1	1	0	1	1	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	0	0	}

Bit NKS CA Pascal E8

^{94}Pu[Rn]7s^{2}5f^6



Flipped

Octonion triads-fPi=9 Sign mask=4 Hex=45 R fp_sm=6

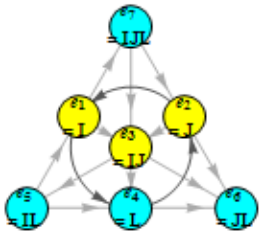
{{1, 4, 2}, {1, 3, 6}, {1, 7, 5},
{2, 3, 5}, {2, 6, 7}, {3, 4, 7}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 4, 3, 6, 7, 5}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	-7	-3	5
2	4	-1	5	-1	-3	7	-6
3	-6	-5	-1	7	2	1	-4
4	-2	1	-7	-1	-6	5	3
5	7	3	-2	6	-1	-4	-1
6	3	-7	-1	-5	4	-1	2
7	-5	6	4	-3	1	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=6 Sign mask=4 Hex=45 R fp_sm=6

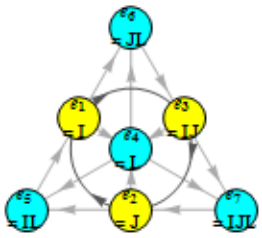
{{1, 3, 2}, {1, 4, 7}, {1, 6, 5},
{2, 4, 6}, {2, 5, 7}, {3, 4, 5}, {3, 7, 6}}

HoffmanSingleton (Yellow)

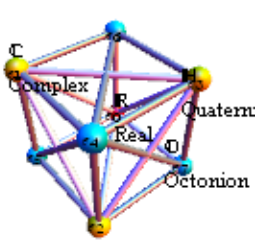
Flattened triad/mask bits

{1, 3, 2, 4, 7, 6, 5}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube



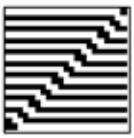
0↦1	1	2	3	4	5	6	7
1	-1	-3	2	7	-6	5	-4
2	3	-1	-1	6	7	-4	-5
3	-2	1	-1	5	-4	-7	6
4	-7	-6	-5	-1	3	2	1
5	6	-7	4	-3	-1	-1	2
6	-5	4	7	-2	1	-1	-3
7	4	5	-6	-1	-2	3	-1

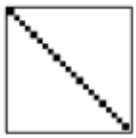
multiplication table

177 $u_{r_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

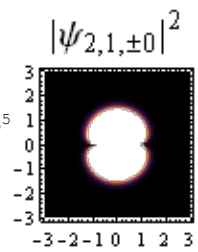
0apccssgg	Root{	0	0	0	0	0	-1	-1	0 }	Exp. m 2.2 MeV
001010001_2	Weight{	-1	-1	1	0	0	0	0	0 }	Theo. m 1.60535
	Height=	3								Exp. τ ? s
Binary{	1	1	0	1	0	1	1	0	}	
E8{	0	0	0	1	0	-1	0	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

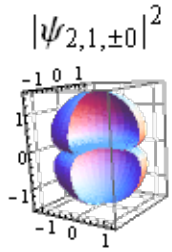
Bit NKS CA Pascal E8





^{9}F[He]2s^{2}2p^5





Flipped

Octonion triads-fPi=10 Sign mask=1 Hex=0F L fp_sm=5

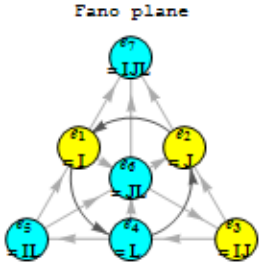
{{1, 4, 2}, {1, 6, 3}, {1, 7, 5},
{2, 7, 3}, {2, 5, 6}, {3, 4, 5}, {4, 6, 7}}

Flattened triad/mask bits

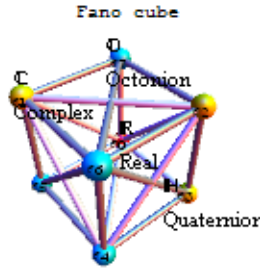
{1, 2, 4, 6, 3, 7, 5}
{1, 1, 1, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	-7	3	5
2	4	-1	-7	-1	6	-5	3
3	6	7	-1	5	-4	-1	-2
4	-2	1	-5	-1	3	7	-6
5	7	-6	4	-3	-1	2	-1
6	-3	5	1	-7	-2	-1	4
7	-5	-3	2	6	1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=1 Hex=06 L fp_sm=2

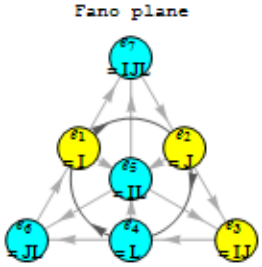
{{1, 2, 4}, {1, 5, 3}, {1, 7, 6},
{2, 3, 7}, {2, 5, 6}, {3, 4, 6}, {4, 5, 7}}

Flattened triad/mask bits

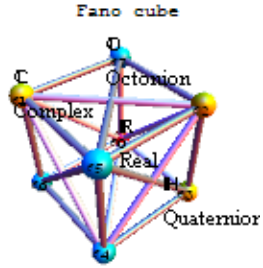
{1, 2, 4, 5, 3, 7, 6}
{0, 1, 1, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	-7	6
2	-4	-1	7	1	6	-5	-3
3	5	-7	-1	6	-1	-4	2
4	2	-1	-6	-1	7	3	-5
5	-3	-6	1	-7	-1	2	4
6	7	5	4	-3	-2	-1	-1
7	-6	3	-2	5	-4	1	-1

multiplication table

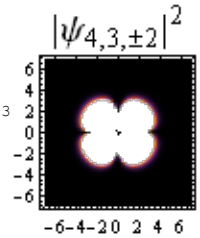
191 $\overline{d}_{\substack{\circ_d \\ L}}^{\frac{1}{3}\to\frac{4}{3}}$ Ref. Symbols: 2D 3D

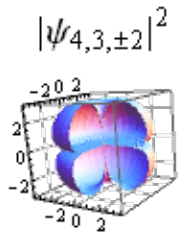
0apccssgg	Root{	1	1	2	2	1	1	1	0 }	Exp. m 5. MeV
010010001_2	Weight{	1	0	-1	1	0	0	-1	0 }	Theo. m 3.2107
	Height= 10									Exp. τ ? s

Binary{	1	0	1	0	1	1	0	1	}
E8{	0	0	1	0	0	1	0	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{59}Pr[Xe]$6s^2 4f^3$





Flipped

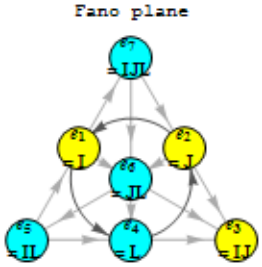
Octonion triads-fPi=10 Sign mask=1 Hex=77 L fp_sm=5

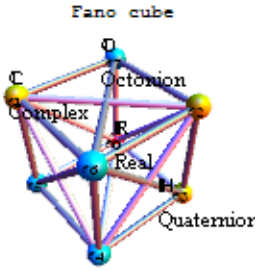
{{1, 4, 2}, {1, 6, 3}, {1, 7, 5},
{2, 3, 7}, {2, 6, 5}, {3, 5, 4}, {4, 7, 6}}

Flattened triad/mask bits

{1, **2**, **4**, 6, 3, 7, 5}
{1, 1, 1, 0, 1, 1, 1}

HoffmanSingleton (Yellow)





0↦1	1	2	3	4	5	6	7
1	-1	-4	-6	2	-7	3	5
2	4	-1	7	-1	-6	5	-3
3	6	-7	-1	-5	4	-1	2
4	-2	1	5	-1	-3	-7	6
5	7	6	-4	3	-1	-2	-1
6	-3	-5	1	7	2	-1	-4
7	-5	3	-2	-6	1	4	-1

multiplication table

Not Flipped

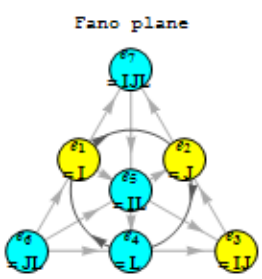
Octonion triads-fPi=8 Sign mask=1 Hex=7E L fp_sm=2

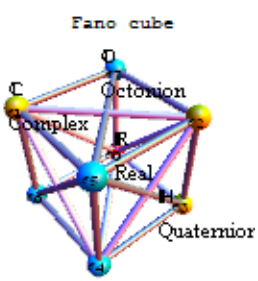
{{1, 2, 4}, {1, 5, 3}, {1, 7, 6},
{2, 7, 3}, {2, 6, 5}, {3, 6, 4}, {4, 7, 5}}

Flattened triad/mask bits

{1, 2, 4, 5, 3, 7, 6}
{0, 1, 1, 1, 1, 1, 1}

Coxeter (Cyan)





0↦1	1	2	3	4	5	6	7
1	-1	4	-5	-2	3	-7	6
2	-4	-1	-7	1	-6	5	3
3	5	7	-1	-6	-1	4	-2
4	2	-1	6	-1	-7	-3	5
5	-3	6	1	7	-1	-2	-4
6	7	-5	-4	3	2	-1	-1
7	-6	-3	2	-5	4	1	-1

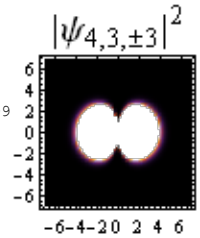
multiplication table

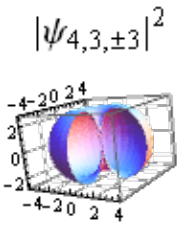
182 $\overline{d}_{o_1}^{\frac{1}{3}}\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg 010010101_2	Root{	1	1	2	2	2	1	1	0 }	Exp. m 5. MeV
	Weight{	1	-1	1	0	0	0	-1	0 }	Theo. m 3.2107
	Height= 11									Exp. τ ? s
Binary{	1	1	0	0	1	0	1	1	}	
E8{	0	0	0	1	0	1	0	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

^{65}Tb[Xe]6s^{2}4f^9





Flipped

Octonion triads-fPi=10 Sign mask=2 Hex=69 L fp_sm=5

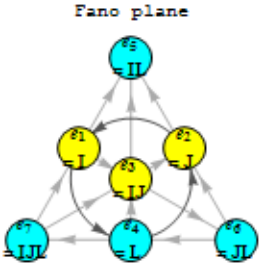
{{1, 4, 2}, {1, 3, 6}, {1, 5, 7},
{2, 7, 3}, {2, 5, 6}, {3, 5, 4}, {4, 7, 6}}

Flattened triad/mask bits

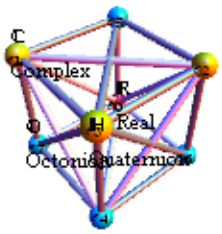
{1, **2**, **4**, 3, 6, 5, 7}
{1, 0, 0, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	7	-3	-5
2	4	-1	-7	-1	6	-5	3
3	-6	7	-1	-5	4	1	-2
4	-2	1	5	-1	-3	-7	6
5	-7	-6	-4	3	-1	2	1
6	3	5	-1	7	-2	-1	-4
7	5	-3	2	-6	-1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=2 Hex=60 L fp_sm=2

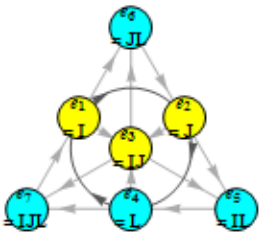
{{1, 2, 4}, {1, 3, 5}, {1, 6, 7},
{2, 3, 7}, {2, 5, 6}, {3, 6, 4}, {4, 7, 5}}

Flattened triad/mask bits

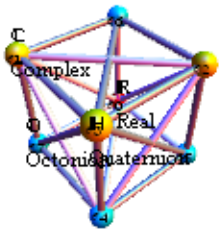
{1, 2, 4, 3, 5, 6, 7}
{0, 0, 0, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	7	-6
2	-4	-1	7	1	6	-5	-3
3	-5	-7	-1	-6	1	4	2
4	2	-1	6	-1	-7	-3	5
5	3	-6	-1	7	-1	2	-4
6	-7	5	-4	3	-2	-1	1
7	6	3	-2	-5	4	-1	-1

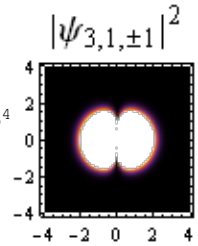
multiplication table

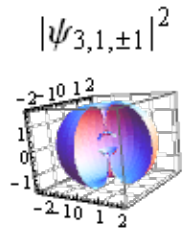
186 $u_{r_1}^{\frac{2}{3}}\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg 001010101_2	Root{	0	0	0	0	-1	-1	-1	0 }	Exp. m 2.2 MeV
	Weight{	-1	0	-1	1	0	0	0	0 }	Theo. m 1.60535
	Height=	4								Exp. τ ? s
Binary{	1	0	1	1	1	0	0	1	}	
E8{	0	0	1	0	0	-1	0	0	}	
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

$^{16}S[Ne]3s^2 3p^4$





Flipped

Octonion triads-fPi=10 Sign mask=2 Hex=11 L fp_sm=5

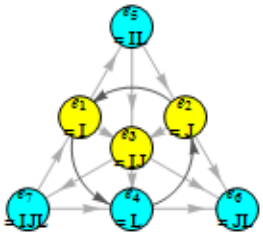
{{1, 4, 2}, {1, 3, 6}, {1, 5, 7},
{2, 3, 7}, {2, 6, 5}, {3, 4, 5}, {4, 6, 7}}

Flattened triad/mask bits

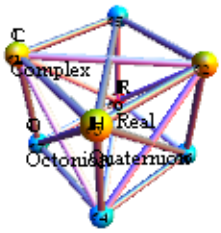
{1, **2**, **4**, 3, 6, 5, 7}
{1, 0, 0, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	6	2	7	-3	-5
2	4	-1	7	-1	-6	5	-3
3	-6	-7	-1	5	-4	1	2
4	-2	1	-5	-1	3	7	-6
5	-7	6	4	-3	-1	-2	1
6	3	-5	-1	-7	2	-1	4
7	5	3	-2	6	-1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=2 Hex=18 L fp_sm=2

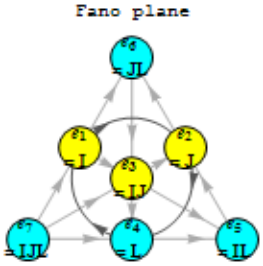
{{1, 2, 4}, {1, 3, 5}, {1, 6, 7},
{2, 7, 3}, {2, 6, 5}, {3, 4, 6}, {4, 5, 7}}

Flattened triad/mask bits

{1, 2, 4, 3, 5, 6, 7}
{0, 0, 0, 1, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	4	5	-2	-3	7	-6
2	-4	-1	-7	1	-6	5	3
3	-5	7	-1	6	1	-4	-2
4	2	-1	-6	-1	7	3	-5
5	3	6	-1	-7	-1	-2	4
6	-7	-5	4	-3	2	-1	1
7	6	-3	2	5	-4	-1	-1

multiplication table

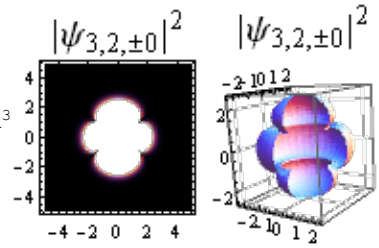
47 $\overline{d}_{o_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 0 0 0 1 1 1 1 0 }	Exp. m	5. MeV
010011001_2	Weight{ 1 0 0 1 -1 0 0 0 }	Theo. m	3.2107
	Height= 5	Exp. τ	? s

Binary{	1	0	1	0	0	0	1	0 }
E8{	-1	0	0	0	0	1	0	0 }
Physics {	-1	0	0	0	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

$^{23}V[Ar]4s^2 3d^3$



Flipped

Octonion triads-fPi=10 Sign mask=3 Hex=5A L fp_sm=5

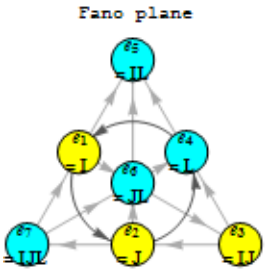
{{1, 2, 4}, {1, 6, 3}, {1, 5, 7},
{2, 7, 3}, {2, 6, 5}, {3, 4, 5}, {4, 7, 6}}

HoffmanSingleton (Yellow)

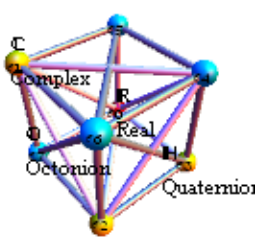
Flattened triad/mask bits

{1, **4**, **2**, 6, 3, 5, 7}
{0, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	7	3	-5
2	-4	-1	-7	1	-6	5	3
3	6	7	-1	5	-4	-1	-2
4	2	-1	-5	-1	3	-7	6
5	-7	6	4	-3	-1	-2	1
6	-3	-5	1	7	2	-1	-4
7	5	-3	2	-6	-1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=3 Hex=53 L fp_sm=2

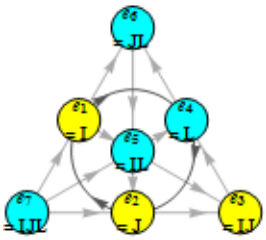
{{1, 4, 2}, {1, 5, 3}, {1, 6, 7},
{2, 3, 7}, {2, 6, 5}, {3, 4, 6}, {4, 7, 5}}

Coxeter (Cyan)

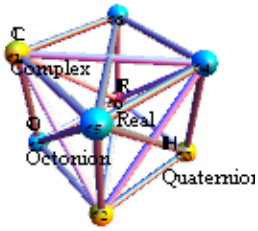
Flattened triad/mask bits

{1, 4, 2, 5, 3, 6, 7}
{1, 1, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	7	-6
2	4	-1	7	-1	-6	5	-3
3	5	-7	-1	6	-1	-4	2
4	-2	1	-6	-1	-7	3	5
5	-3	6	1	7	-1	-2	-4
6	-7	-5	4	-3	2	-1	1
7	6	3	-2	-5	4	-1	-1

multiplication table

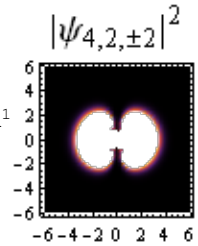
197 $u_{r_m \hat{L}}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

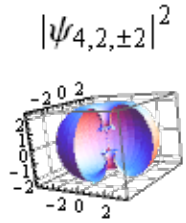
0apccssgg 001011001_2	Root{ -1 0 -1 -1 -1 -1 -1 0 } Weight{ -1 0 0 0 0 -1 1 1 } Height= 7	Exp. m Theo. m Exp. τ	2.2 MeV 1.60535 ? s

Binary{	1	0	0	1	0	1	1	1 }
E8{	0	1	0	0	0	-1	0	0 }
Physics {	0	1	0	0	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{39}Y[Kr]5s^{2}4d^1





Flipped

Octonion triads-fPi=10 Sign mask=3 Hex=22 L fp_sm=5

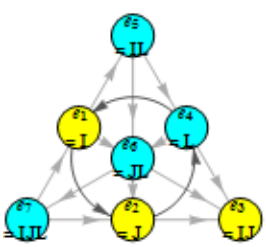
{{1, 2, 4}, {1, 6, 3}, {1, 5, 7},
{2, 3, 7}, {2, 5, 6}, {3, 5, 4}, {4, 6, 7}}

Flattened triad/mask bits

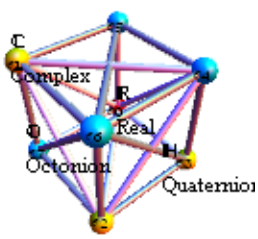
{1, **4**, **2**, 6, 3, 5, 7}
{0, 1, 0, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-6	-2	7	3	-5
2	-4	-1	7	1	6	-5	-3
3	6	-7	-1	-5	4	-1	2
4	2	-1	5	-1	-3	7	-6
5	-7	-6	-4	3	-1	2	1
6	-3	5	1	-7	-2	-1	4
7	5	3	-2	6	-1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=3 Hex=2B L fp_sm=2

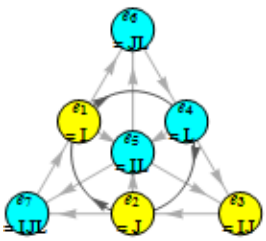
{{1, 4, 2}, {1, 5, 3}, {1, 6, 7},
{2, 7, 3}, {2, 5, 6}, {3, 6, 4}, {4, 5, 7}}

Flattened triad/mask bits

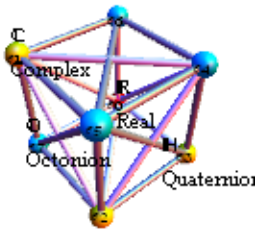
{1, 4, 2, 5, 3, 6, 7}
{1, 1, 0, 1, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-5	2	3	7	-6
2	4	-1	-7	-1	6	-5	3
3	5	7	-1	-6	-1	4	-2
4	-2	1	6	-1	7	-3	-5
5	-3	-6	1	-7	-1	2	4
6	-7	5	-4	3	-2	-1	1
7	6	-3	2	5	-4	-1	-1

multiplication table

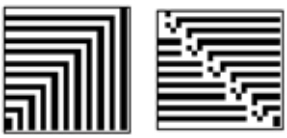
42 $u_{r_m}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg
001011101_2

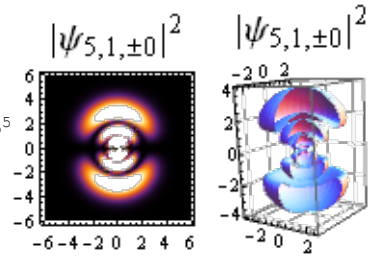
Root{	-1	-1	-2	-1	-1	-1	-1	0 }	Exp. m	2.2 MeV
Weight{	-1	0	0	1	-1	0	1	0 }	Theo. m	1.60535
Height=	9								Exp. τ	? s

Binary{	1	1	0	0	0	0	1	0 }
E8{	-1	0	0	0	0	-1	0	0 }
Physics {	-1	0	0	0	0	$-\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



$^{53}I[Kr]5s^2 4d^{10} 5p^5$



Flipped

Octonion triads-fPi=10 Sign mask=4 Hex=3C L fp_sm=5

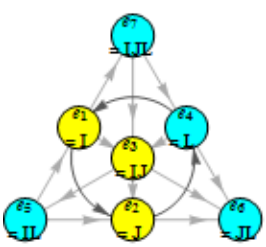
{{1, 2, 4}, {1, 3, 6}, {1, 7, 5},
{2, 7, 3}, {2, 6, 5}, {3, 5, 4}, {4, 6, 7}}

HoffmanSingleton (Yellow)

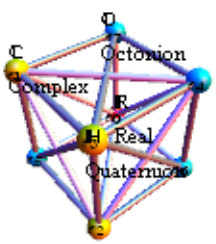
Flattened triad/mask bits

{1, **4**, **2**, 3, 6, 7, 5}
{0, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	-7	-3	5
2	-4	-1	-7	1	-6	5	3
3	-6	7	-1	-5	4	1	-2
4	2	-1	5	-1	-3	7	-6
5	7	6	-4	3	-1	-2	-1
6	3	-5	-1	-7	2	-1	4
7	-5	-3	2	6	1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=8 Sign mask=4 Hex=35 L fp_sm=2

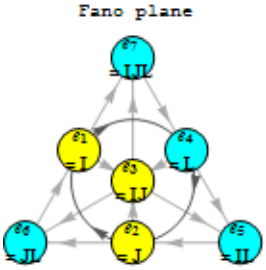
{{1, 4, 2}, {1, 3, 5}, {1, 7, 6},
{2, 3, 7}, {2, 6, 5}, {3, 6, 4}, {4, 5, 7}}

Coxeter (Cyan)

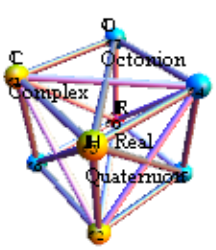
Flattened triad/mask bits

{1, 4, 2, 3, 5, 7, 6}
{1, 0, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	-7	6
2	4	-1	7	-1	-6	5	-3
3	-5	-7	-1	-6	1	4	2
4	-2	1	6	-1	7	-3	-5
5	3	6	-1	-7	-1	-2	4
6	7	-5	-4	3	2	-1	-1
7	-6	3	-2	5	-4	1	-1

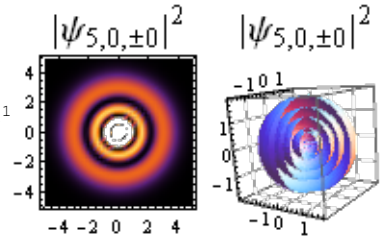
multiplication table

202 $\overline{d}_{\substack{1\\3\\m}}\sqrt[3]{R}$ Ref. Symbols: 2D 3D

0apccssgg 010011101_2	Root{	0	1	1	1	1	1	1	0 }	Exp. m 5. MeV
	Weight{	1	0	0	0	0	-1	0	1 }	Theo. m 3.2107
	Height= 7									Exp. τ ? s
Binary{	0	1	1	1	0	1	1	0	}	
E8{	0	1	0	0	0	1	0	0	}	
Physics {	0	1	0	0	0	$\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

^{37}Rb[Kr]5s^1



Flipped

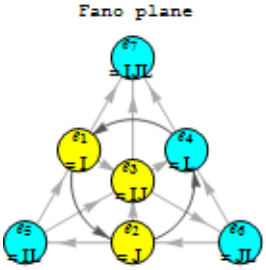
Octonion triads-fPi=10 Sign mask=4 Hex=44 L fp_sm=5

{{1, 2, 4}, {1, 3, 6}, {1, 7, 5},
{2, 3, 7}, {2, 5, 6}, {3, 4, 5}, {4, 7, 6}}

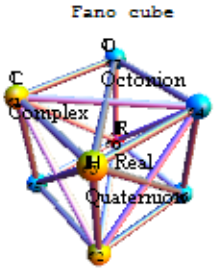
Flattened triad/mask bits
{1, **4**, **2**, 3, 6, 7, 5}
{0, 0, 1, 0, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	6	-2	-7	-3	5
2	-4	-1	7	1	6	-5	-3
3	-6	-7	-1	5	-4	1	2
4	2	-1	-5	-1	3	-7	6
5	7	-6	4	-3	-1	2	-1
6	3	5	-1	7	-2	-1	-4
7	-5	3	-2	-6	1	4	-1

multiplication table

Not Flipped

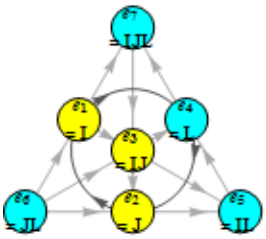
Octonion triads-fPi=8 Sign mask=4 Hex=4D L fp_sm=2

{{1, 4, 2}, {1, 3, 5}, {1, 7, 6},
{2, 7, 3}, {2, 5, 6}, {3, 4, 6}, {4, 7, 5}}

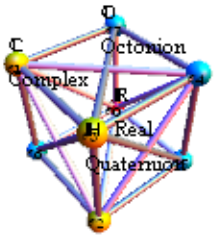
Flattened triad/mask bits
{1, 4, 2, 3, 5, 7, 6}
{1, 0, 1, 1, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	5	2	-3	-7	6
2	4	-1	-7	-1	6	-5	3
3	-5	7	-1	6	1	-4	-2
4	-2	1	-6	-1	-7	3	5
5	3	-6	-1	7	-1	2	-4
6	7	5	4	-3	-2	-1	-1
7	-6	-3	2	-5	4	1	-1

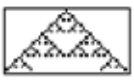
multiplication table

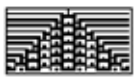
110 $\overline{\underset{r_d}{C}}\ \overset{-\frac{2}{3}\to\frac{1}{3}}{\check{L}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-1	-1	-1	-1	0	-1 }	Exp. m 1250. MeV
011010010_2	Weight{	1	-1	0	0	1	0	-1	-1 }	Theo. m 1319.95
	Height=	8								Exp. τ ? s

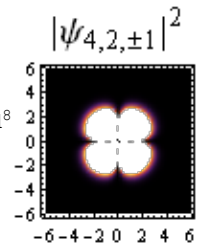
Binary{	1	0	1	1	0	1	0	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

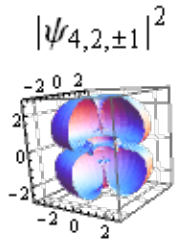
Bit NKS CA Pascal E8





^{45}Rh[Kr]5s^{1}4d^8





Flipped

Octonion triads-fPi=11 Sign mask=1 Hex=78 R fp_sm=1

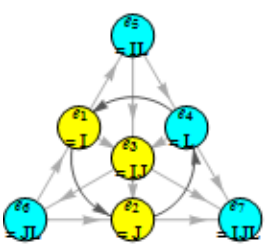
{{1, 2, 4}, {1, 3, 7}, {1, 5, 6},
{2, 5, 3}, {2, 7, 6}, {3, 6, 4}, {4, 7, 5}}

HoffmanSingleton (Yellow)

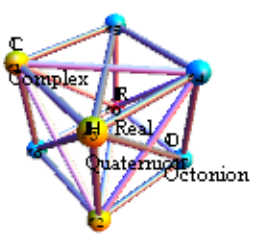
Flattened triad/mask bits

{1, 4, 2, 3, 7, 5, 6}
{0, 0, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	6	-5	-3
2	-4	-1	-5	1	3	-7	6
3	-7	5	-1	-6	-2	4	1
4	2	-1	6	-1	-7	-3	5
5	-6	-3	2	7	-1	1	-4
6	5	7	-4	3	-1	-1	-2
7	3	-6	-1	-5	4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=1 Hex=7B R fp_sm=4

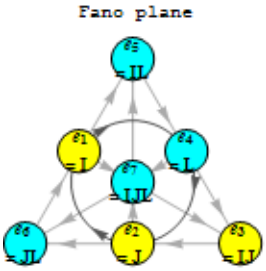
{{1, 4, 2}, {1, 7, 3}, {1, 5, 6},
{2, 6, 3}, {2, 7, 5}, {3, 5, 4}, {4, 7, 6}}

Coxeter (Cyan)

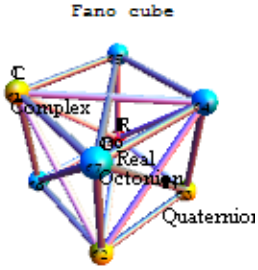
Flattened triad/mask bits

{1, 4, 2, 7, 3, 5, 6}
{1, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	6	-5	3
2	4	-1	-6	-1	-7	3	5
3	7	6	-1	-5	4	-2	-1
4	-2	1	5	-1	-3	-7	6
5	-6	7	-4	3	-1	1	-2
6	5	-3	2	7	-1	-1	-4
7	-3	-5	1	-6	2	4	-1

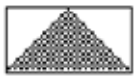
multiplication table

243 $s_{\substack{\circ_d \\ L}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

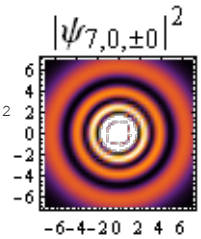
0apccssgg	Root{ 2 2 3 3 2 1 0 1 }	Exp. m	95. MeV
000010010_2	Weight{ -1 0 0 1 -1 0 0 1 }	Theo. m	98.1056
	Height= 15	Exp. τ	? s

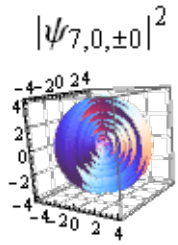
Binary{	0	1	1	1	1	0	1	1 }
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$ }
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



^{88}Ra[Rn]7s^2





Flipped

Octonion triads-fPi=11 Sign mask=1 Hex=00 R fp_sm=1

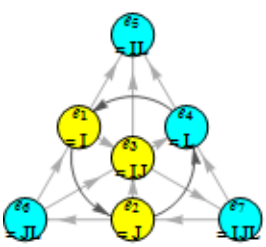
{{1, 2, 4}, {1, 3, 7}, {1, 5, 6},
{2, 3, 5}, {2, 6, 7}, {3, 4, 6}, {4, 5, 7}}

HoffmanSingleton (Yellow)

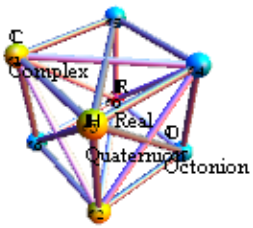
Flattened triad/mask bits

{1, 4, 2, 3, 7, 5, 6}
{0, 0, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	6	-5	-3
2	-4	-1	5	1	-3	7	-6
3	-7	-5	-1	6	2	-4	1
4	2	-1	-6	-1	7	3	-5
5	-6	3	-2	-7	-1	1	4
6	5	-7	4	-3	-1	-1	2
7	3	6	-1	5	-4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=1 Hex=03 R fp_sm=4

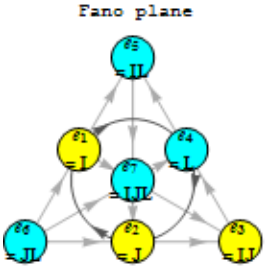
{{1, 4, 2}, {1, 7, 3}, {1, 5, 6},
{2, 3, 6}, {2, 5, 7}, {3, 4, 5}, {4, 6, 7}}

Coxeter (Cyan)

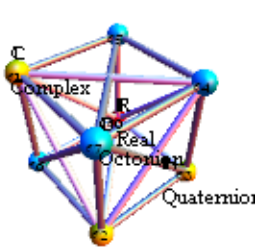
Flattened triad/mask bits

{1, 4, 2, 7, 3, 5, 6}
{1, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	6	-5	3
2	4	-1	6	-1	7	-3	-5
3	7	-6	-1	5	-4	2	-1
4	-2	1	-5	-1	3	7	-6
5	-6	-7	4	-3	-1	1	2
6	5	3	-2	-7	-1	-1	4
7	-3	5	1	6	-2	-4	-1

multiplication table

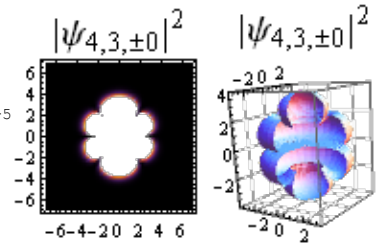
130 $\overline{C}_{r_1}\hat{R}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ -2 -1 -2 -1 -1 -1 0 -1 }	Exp. m	1250. MeV
011010110_2	Weight{ 1 -1 0 1 0 -1 0 0 }	Theo. m	1319.95
	Height= 10	Exp. τ	? s

Binary{	0	1	1	1	0	1	0	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{61}Pm[Xe]$6s^2 4f^5$



Flipped

Octonion triads-fPi=11 Sign mask=2 Hex=66 R fp_sm=1

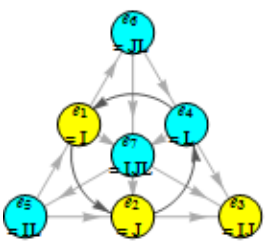
{{1, 2, 4}, {1, 7, 3}, {1, 6, 5},
{2, 3, 5}, {2, 6, 7}, {3, 6, 4}, {4, 7, 5}}

Flattened triad/mask bits

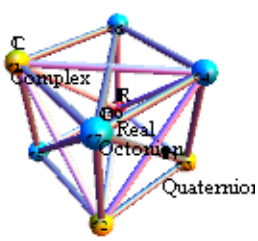
{1, 4, 2, 7, 3, 6, 5}
{0, 1, 1, 0, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	-6	5	3
2	-4	-1	5	1	-3	7	-6
3	7	-5	-1	-6	2	4	-1
4	2	-1	6	-1	-7	-3	5
5	6	3	-2	7	-1	-1	-4
6	-5	-7	-4	3	1	-1	2
7	-3	6	1	-5	4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=2 Hex=65 R fp_sm=4

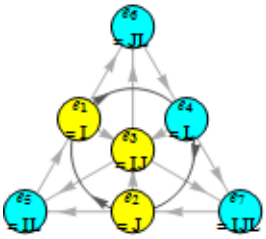
{{1, 4, 2}, {1, 3, 7}, {1, 6, 5},
{2, 3, 6}, {2, 5, 7}, {3, 5, 4}, {4, 7, 6}}

Flattened triad/mask bits

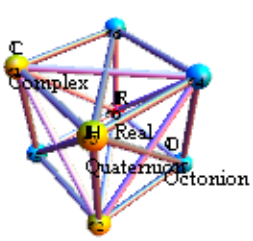
{1, 4, 2, 3, 7, 6, 5}
{1, 0, 1, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	-6	5	-3
2	4	-1	6	-1	7	-3	-5
3	-7	-6	-1	-5	4	2	1
4	-2	1	5	-1	-3	-7	6
5	6	-7	-4	3	-1	-1	2
6	-5	3	-2	7	1	-1	-4
7	3	5	-1	-6	-2	4	-1

multiplication table

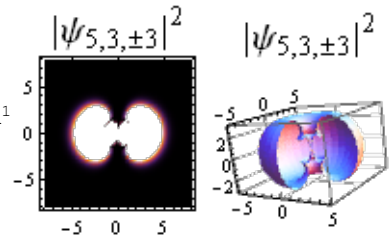
237 $s_{\substack{\circ_1 \\ R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	3	2	4	3	2	1	0	1 }	Exp. m 95. MeV
000010110_2	Weight{	-1	0	0	0	0	1	-1	0 }	Theo. m 98.1056
	Height= 17									Exp. τ ? s

Binary{	1	0	1	1	1	0	1	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{96}Cm[Rn]$7s^2 5f^7 6d^1$



Flipped

Octonion triads-fPi=11 Sign mask=2 Hex=1E R fp_sm=1

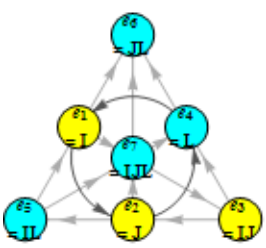
{{1, 2, 4}, {1, 7, 3}, {1, 6, 5},
{2, 5, 3}, {2, 7, 6}, {3, 4, 6}, {4, 5, 7}}

HoffmanSingleton (Yellow)

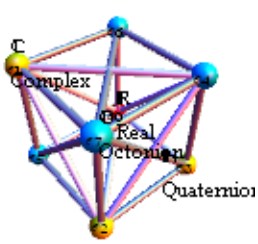
Flattened triad/mask bits

{1, **4**, **2**, 7, 3, 6, 5}
{0, 1, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	-6	5	3
2	-4	-1	-5	1	3	-7	6
3	7	5	-1	6	-2	-4	-1
4	2	-1	-6	-1	7	3	-5
5	6	-3	2	-7	-1	-1	4
6	-5	7	4	-3	1	-1	-2
7	-3	-6	1	5	-4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=2 Hex=1D R fp_sm=4

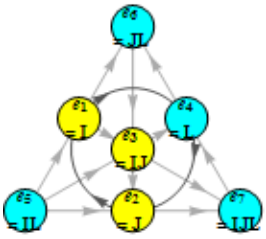
{{1, 4, 2}, {1, 3, 7}, {1, 6, 5},
{2, 6, 3}, {2, 7, 5}, {3, 4, 5}, {4, 6, 7}}

Coxeter (Cyan)

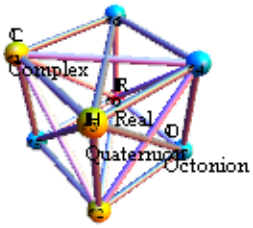
Flattened triad/mask bits

{1, 4, 2, 3, 7, 6, 5}
{1, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	-6	5	-3
2	4	-1	-6	-1	-7	3	5
3	-7	6	-1	5	-4	-2	1
4	-2	1	-5	-1	3	7	-6
5	6	7	4	-3	-1	-1	-2
6	-5	-3	2	-7	1	-1	4
7	3	-5	-1	6	2	-4	-1

multiplication table

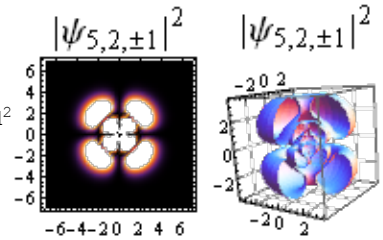
96 $\overline{C}_{r_m}\hat{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-1	-2	-2	-2	-1	0	-1 }	Exp. m 1250. MeV
011011010_2	Weight{	1	0	-1	0	1	-1	0	0 }	Theo. m 1319.95
	Height= 12									Exp. τ ? s

Binary{	1	1	1	0	0	1	0	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{72}Hf[Xe]6s^{2}4f^{14}5d^2



Flipped

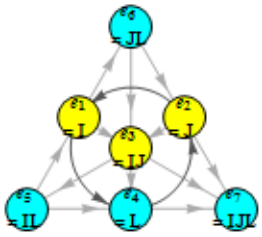
Octonion triads-fPi=11 Sign mask=3 Hex=55 R fp_sm=1

{{1, 4, 2}, {1, 3, 7}, {1, 6, 5},
{2, 3, 5}, {2, 7, 6}, {3, 4, 6}, {4, 7, 5}}

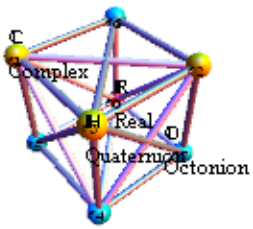
Flattened triad/mask bits
{1, 2, 4, 3, 7, 6, 5}
{1, 0, 1, 0, 1, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	-6	5	-3
2	4	-1	5	-1	-3	-7	6
3	-7	-5	-1	6	2	-4	1
4	-2	1	-6	-1	-7	3	5
5	6	3	-2	7	-1	-1	-4
6	-5	7	4	-3	1	-1	-2
7	3	-6	-1	-5	4	2	-1

multiplication table

Not Flipped

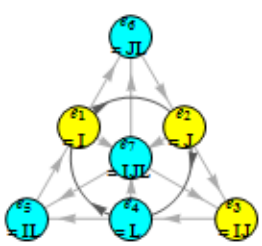
Octonion triads-fPi=12 Sign mask=3 Hex=56 R fp_sm=4

{{1, 2, 4}, {1, 7, 3}, {1, 6, 5},
{2, 3, 6}, {2, 7, 5}, {3, 4, 5}, {4, 7, 6}}

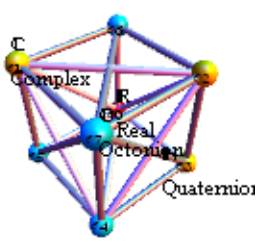
Flattened triad/mask bits
{1, 2, 4, 7, 3, 6, 5}
{0, 1, 1, 0, 1, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	-6	5	3
2	-4	-1	6	1	-7	-3	5
3	7	-6	-1	5	-4	2	-1
4	2	-1	-5	-1	3	-7	6
5	6	7	4	-3	-1	-1	-2
6	-5	3	-2	7	1	-1	-4
7	-3	-5	1	-6	2	4	-1

multiplication table

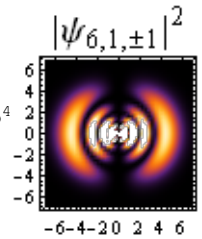
232 $s_{\mathrm{Om}}^{-\frac{1}{3}}$ $\hat{L}$ Ref. Symbols: 2D 3D

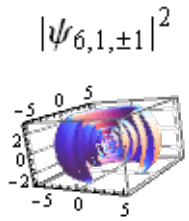
0apccssgg	Root{	2	2	3	2	2	1	0	1 }	Exp. m 95. MeV
000011010_2	Weight{	-1	0	1	-1	0	0	0	1 }	Theo. m 98.1056
	Height= 14									Exp. τ ? s

Binary{	1	1	0	1	1	0	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{84}Po[Xe]$6s^2 4f^{14} 5d^{10} 6p^4$





Flipped

Octonion triads-fPi=11 Sign mask=3 Hex=2D R fp_sm=1

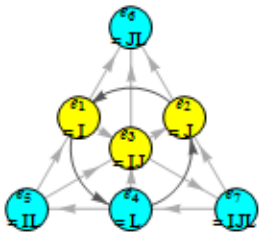
{{1, 4, 2}, {1, 3, 7}, {1, 6, 5},
{2, 5, 3}, {2, 6, 7}, {3, 6, 4}, {4, 5, 7}}

Flattened triad/mask bits

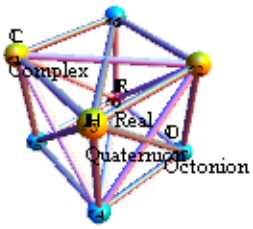
{1, 2, 4, 3, 7, 6, 5}
{1, 0, 1, 1, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	-6	5	-3
2	4	-1	-5	-1	3	7	-6
3	-7	5	-1	-6	-2	4	1
4	-2	1	6	-1	7	-3	-5
5	6	-3	2	-7	-1	-1	4
6	-5	-7	-4	3	1	-1	2
7	3	6	-1	5	-4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=3 Hex=2E R fp_sm=4

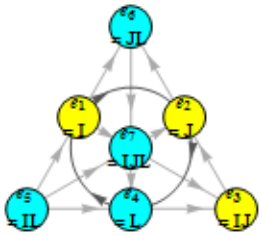
{{1, 2, 4}, {1, 7, 3}, {1, 6, 5},
{2, 6, 3}, {2, 5, 7}, {3, 5, 4}, {4, 6, 7}}

Flattened triad/mask bits

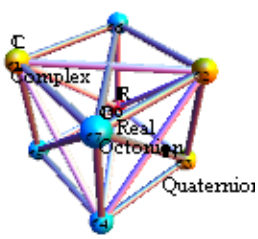
{1, 2, 4, 7, 3, 6, 5}
{0, 1, 1, 1, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	-6	5	3
2	-4	-1	-6	1	7	3	-5
3	7	6	-1	-5	4	-2	-1
4	2	-1	5	-1	-3	7	-6
5	6	-7	-4	3	-1	-1	2
6	-5	-3	2	-7	1	-1	4
7	-3	5	1	6	-2	-4	-1

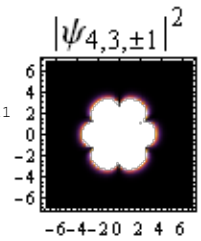
multiplication table

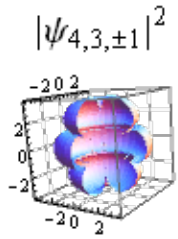
100 $\frac{C}{r_m}\sqrt{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-1	-2	-2	-1	-1	0	-1 }	Exp. m 1250. MeV
011011110_2	Weight{	1	-1	1	-1	1	-1	0	0 }	Theo. m 1319.95
	Height= 11									Exp. τ ? s
Binary{	1	1	0	1	0	1	0	0	}	
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

^{67}Ho[Xe]$6s^2 4f^{11}$





Flipped

Octonion triads-fPi=11 Sign mask=4 Hex=4B R fp_sm=1

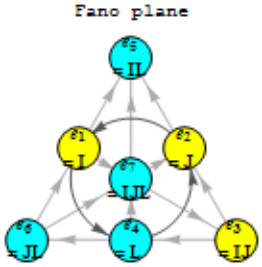
{{1, 4, 2}, {1, 7, 3}, {1, 5, 6},
{2, 5, 3}, {2, 6, 7}, {3, 4, 6}, {4, 7, 5}}

Flattened triad/mask bits

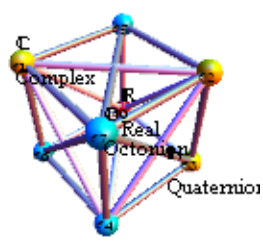
{1, 2, 4, 7, 3, 5, 6}
{1, 1, 0, 1, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	6	-5	3
2	4	-1	-5	-1	3	7	-6
3	7	5	-1	6	-2	-4	-1
4	-2	1	-6	-1	-7	3	5
5	-6	-3	2	7	-1	1	-4
6	5	-7	4	-3	-1	-1	2
7	-3	6	1	-5	4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=12 Sign mask=4 Hex=48 R fp_sm=4

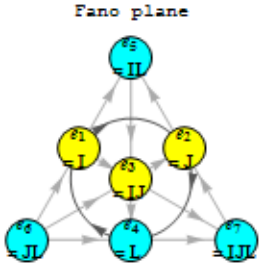
{{1, 2, 4}, {1, 3, 7}, {1, 5, 6},
{2, 6, 3}, {2, 5, 7}, {3, 4, 5}, {4, 7, 6}}

Flattened triad/mask bits

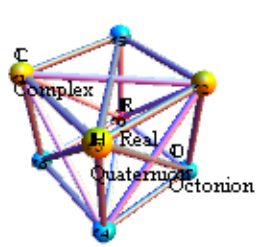
{1, 2, 4, 3, 7, 5, 6}
{0, 0, 0, 1, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	6	-5	-3
2	-4	-1	-6	1	7	3	-5
3	-7	6	-1	5	-4	-2	1
4	2	-1	-5	-1	3	-7	6
5	-6	-7	4	-3	-1	1	2
6	5	-3	2	7	-1	-1	-4
7	3	5	-1	-6	-2	4	-1

multiplication table

228 $s_{\substack{\circ_m \\ R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

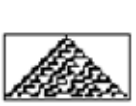
0apccssgg
000011110_2

Root{	2	2	3	2	1	1	0	1	}
Weight{	-1	1	-1	0	0	0	0	1	}
Height=	13								

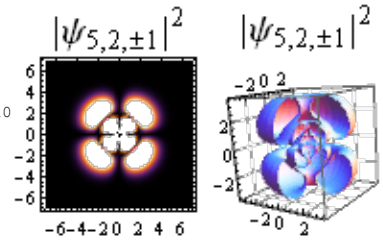
Exp. m 95. MeV
Theo. m 98.1056
Exp. τ ? s

Binary{	1	1	1	0	1	0	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



$^{79}Au[Xe]6s^1 4f^{14} 5d^{10}$



Flipped

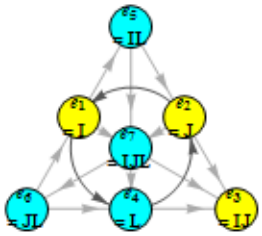
Octonion triads-fPi=11 Sign mask=4 Hex=33 R fp_sm=1

{{1, 4, 2}, {1, 7, 3}, {1, 5, 6},
{2, 3, 5}, {2, 7, 6}, {3, 6, 4}, {4, 5, 7}}

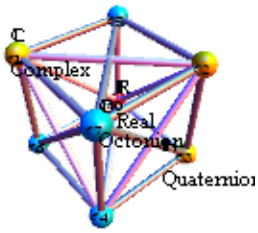
Flattened triad/mask bits
{1, 2, 4, 7, 3, 5, 6}
{1, 1, 0, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	6	-5	3
2	4	-1	5	-1	-3	-7	6
3	7	-5	-1	-6	2	4	-1
4	-2	1	6	-1	7	-3	-5
5	-6	3	-2	-7	-1	1	4
6	5	7	-4	3	-1	-1	-2
7	-3	-6	1	5	-4	2	-1

multiplication table

Not Flipped

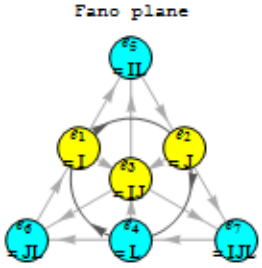
Octonion triads-fPi=12 Sign mask=4 Hex=30 R fp_sm=4

{{1, 2, 4}, {1, 3, 7}, {1, 5, 6},
{2, 3, 6}, {2, 7, 5}, {3, 5, 4}, {4, 6, 7}}

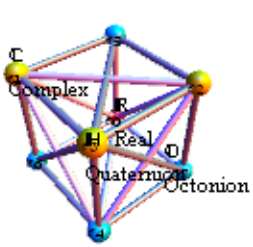
Flattened triad/mask bits
{1, 2, 4, 3, 7, 5, 6}
{0, 0, 0, 0, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	6	-5	-3
2	-4	-1	6	1	-7	-3	5
3	-7	-6	-1	-5	4	2	1
4	2	-1	5	-1	-3	7	-6
5	-6	7	-4	3	-1	1	-2
6	5	3	-2	-7	-1	-1	4
7	3	-5	-1	6	2	-4	-1

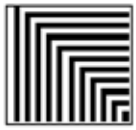
multiplication table

14 $\overline{s}_{\substack{\circ_d \\ L}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

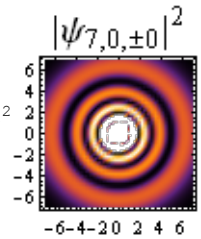
0apccssgg	Root{	-2	-2	-3	-3	-2	-1	0	-1 }	Exp. m 95. MeV
010010010_2	Weight{	1	0	0	-1	1	0	0	-1 }	Theo. m 98.1056
	Height= 15									Exp. τ ? s

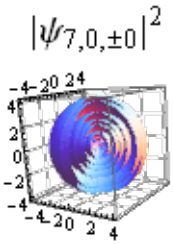
Binary{	1	0	0	0	0	1	0	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{88}Ra[Rn]7s^2





Flipped

Octonion triads-fPi=12 Sign mask=1 Hex=7C R fp_sm=4

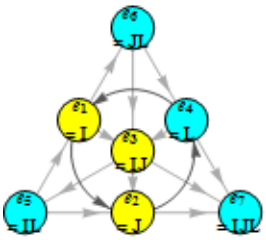
{{1, 2, 4}, {1, 3, 7}, {1, 6, 5},
{2, 6, 3}, {2, 7, 5}, {3, 5, 4}, {4, 7, 6}}

Coxeter (Cyan)

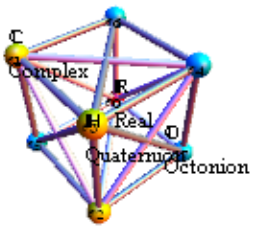
Flattened triad/mask bits

{1, 4, 2, 3, 7, 6, 5}
{0, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	-6	5	-3
2	-4	-1	-6	1	-7	3	5
3	-7	6	-1	-5	4	-2	1
4	2	-1	5	-1	-3	-7	6
5	6	7	-4	3	-1	-1	-2
6	-5	-3	2	7	1	-1	-4
7	3	-5	-1	-6	2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=1 Hex=7F R fp_sm=1

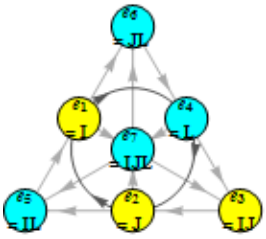
{{1, 4, 2}, {1, 7, 3}, {1, 6, 5},
{2, 5, 3}, {2, 7, 6}, {3, 6, 4}, {4, 7, 5}}

HoffmanSingleton (Yellow)

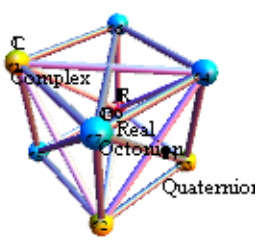
Flattened triad/mask bits

{1, 4, 2, 7, 3, 6, 5}
{1, 1, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	-6	5	3
2	4	-1	-5	-1	3	-7	6
3	7	5	-1	-6	-2	4	-1
4	-2	1	6	-1	-7	-3	5
5	6	-3	2	7	-1	-1	-4
6	-5	7	-4	3	1	-1	-2
7	-3	-6	1	-5	4	2	-1

multiplication table

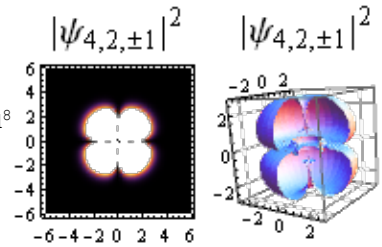
147 $c_{r_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 1 1 1 1 1 0 1 }	Exp. m	1250. MeV
001010010_2	Weight{ -1 1 0 0 -1 0 1 1 }	Theo. m	1319.95
	Height= 8	Exp. τ	? s

Binary{	0	1	0	0	1	0	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{45}Rh[Kr]5s^{1}4d^8



Flipped

Octonion triads-fPi=12 Sign mask=1 Hex=04 R fp_sm=4

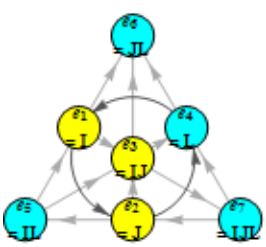
{{1, 2, 4}, {1, 3, 7}, {1, 6, 5},
{2, 3, 6}, {2, 5, 7}, {3, 4, 5}, {4, 6, 7}}

Flattened triad/mask bits

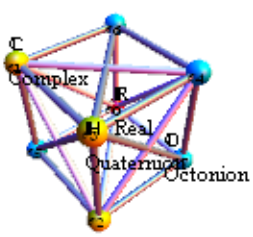
{1, 4, 2, 3, 7, 6, 5}
{0, 0, 1, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	-6	5	-3
2	-4	-1	6	1	7	-3	-5
3	-7	-6	-1	5	-4	2	1
4	2	-1	-5	-1	3	7	-6
5	6	-7	4	-3	-1	-1	2
6	-5	3	-2	-7	1	-1	4
7	3	5	-1	6	-2	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=1 Hex=07 R fp_sm=1

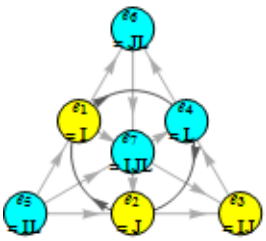
{{1, 4, 2}, {1, 7, 3}, {1, 6, 5},
{2, 3, 5}, {2, 6, 7}, {3, 4, 6}, {4, 5, 7}}

Flattened triad/mask bits

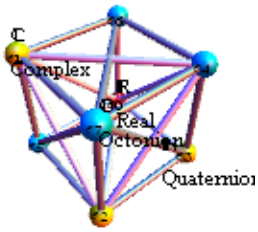
{1, 4, 2, 7, 3, 6, 5}
{1, 1, 1, 0, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



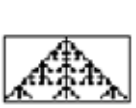
0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	-6	5	3
2	4	-1	5	-1	-3	7	-6
3	7	-5	-1	6	2	-4	-1
4	-2	1	-6	-1	7	3	-5
5	6	3	-2	-7	-1	-1	4
6	-5	-7	4	-3	1	-1	2
7	-3	6	1	5	-4	-2	-1

multiplication table

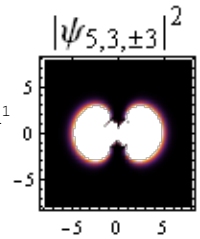
20 $\overline{\underset{o_1}{S}}\ \overset{\frac{1}{3}\to-\frac{2}{3}}{\hat{R}}$ Ref. Symbols: 2D 3D

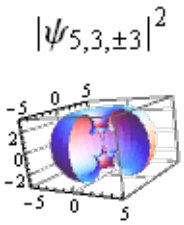
0apccssgg	Root{	-3	-2	-4	-3	-2	-1	0	-1 }	Exp. m 95. MeV
010010110_2	Weight{	1	0	0	0	0	-1	1	0 }	Theo. m 98.1056
	Height= 17									Exp. τ ? s
Binary{	0	1	0	0	0	1	0	0	}	
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



^{96}Cm[Rn]$7s^2 5f^7 6d^1$





Flipped

Octonion triads-fPi=12 Sign mask=2 Hex=62 R fp_sm=4

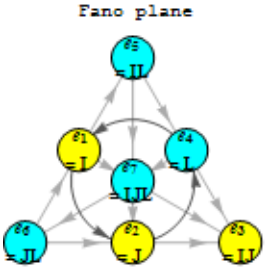
{{1, 2, 4}, {1, 7, 3}, {1, 5, 6},
{2, 3, 6}, {2, 5, 7}, {3, 5, 4}, {4, 7, 6}}

Coxeter (Cyan)

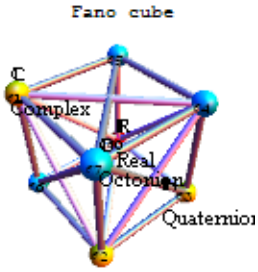
Flattened triad/mask bits

{1, 4, 2, 7, 3, 5, 6}
{0, 1, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	6	-5	3
2	-4	-1	6	1	7	-3	-5
3	7	-6	-1	-5	4	2	-1
4	2	-1	5	-1	-3	-7	6
5	-6	-7	-4	3	-1	1	2
6	5	3	-2	7	-1	-1	-4
7	-3	5	1	-6	-2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=2 Hex=61 R fp_sm=1

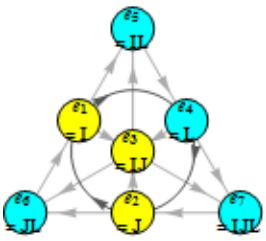
{{1, 4, 2}, {1, 3, 7}, {1, 5, 6},
{2, 3, 5}, {2, 6, 7}, {3, 6, 4}, {4, 7, 5}}

HoffmanSingleton (Yellow)

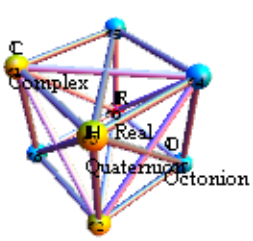
Flattened triad/mask bits

{1, 4, 2, 3, 7, 5, 6}
{1, 0, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	6	-5	-3
2	4	-1	5	-1	-3	7	-6
3	-7	-5	-1	-6	2	4	1
4	-2	1	6	-1	-7	-3	5
5	-6	3	-2	7	-1	1	-4
6	5	-7	-4	3	-1	-1	2
7	3	6	-1	-5	4	-2	-1

multiplication table

127 $c_{r_1}^{\frac{2}{3}\to-\frac{1}{3}}\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg
001010110_2

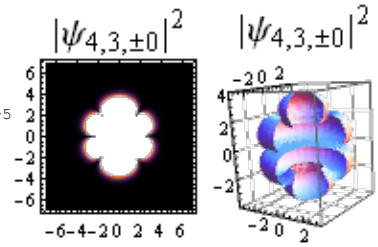
Root{	2	1	2	1	1	1	0	1	}
Weight{	-1	1	0	-1	0	1	0	0	}
Height=	10								

Exp. m 1250. MeV
Theo. m 1319.95
Exp. τ ? s

Binary{	1	0	0	0	1	0	1	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{61}Pm[Xe]$6s^2 4f^5$



Flipped

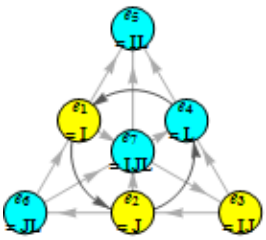
Octonion triads-fPi=12 Sign mask=2 Hex=1A R fp_sm=4

{{1, 2, 4}, {1, 7, 3}, {1, 5, 6},
{2, 6, 3}, {2, 7, 5}, {3, 4, 5}, {4, 6, 7}}

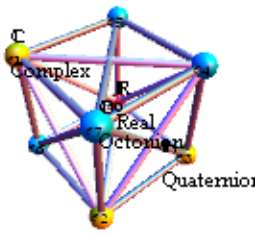
Coxeter (Cyan)

Flattened triad/mask bits
{1, 4, 2, 7, 3, 5, 6}
{0, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	6	-5	3
2	-4	-1	-6	1	-7	3	5
3	7	6	-1	5	-4	-2	-1
4	2	-1	-5	-1	3	7	-6
5	-6	7	4	-3	-1	1	-2
6	5	-3	2	-7	-1	-1	4
7	-3	-5	1	6	2	-4	-1

multiplication table

Not Flipped

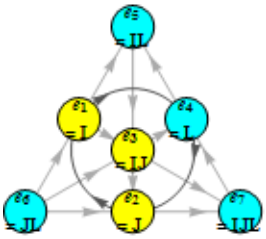
Octonion triads-fPi=11 Sign mask=2 Hex=19 R fp_sm=1

{{1, 4, 2}, {1, 3, 7}, {1, 5, 6},
{2, 5, 3}, {2, 7, 6}, {3, 4, 6}, {4, 5, 7}}

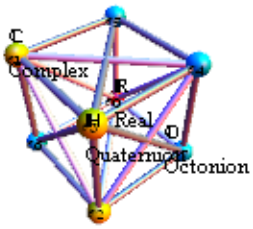
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 4, 2, 3, 7, 5, 6}
{1, 0, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	6	-5	-3
2	4	-1	-5	-1	3	-7	6
3	-7	5	-1	6	-2	-4	1
4	-2	1	-6	-1	7	3	-5
5	-6	-3	2	-7	-1	1	4
6	5	7	4	-3	-1	-1	-2
7	3	-6	-1	5	-4	2	-1

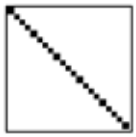
multiplication table

25 $\overline{S}_{O_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

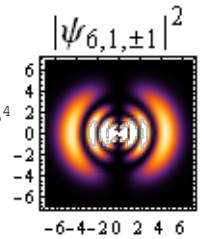
0apccssgg	Root{	-2	-2	-3	-2	-2	-1	0	-1 }	Exp. m	95. MeV
010011010_2	Weight{	1	0	-1	1	0	0	0	-1 }	Theo. m	98.1056
	Height=	14								Exp. τ	? s

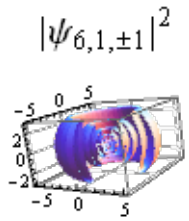
Binary{	0	0	1	0	0	1	0	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{84}Po[Xe]$6s^2 4f^{14} 5d^{10} 6p^4$





Flipped

Octonion triads-fPi=12 Sign mask=3 Hex=51 R fp_sm=4

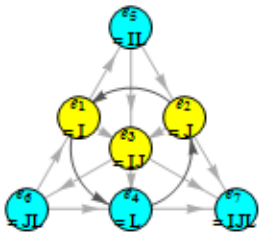
{{1, 4, 2}, {1, 3, 7}, {1, 5, 6},
{2, 3, 6}, {2, 7, 5}, {3, 4, 5}, {4, 7, 6}}

Coxeter (Cyan)

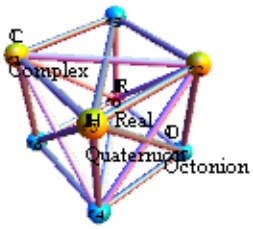
Flattened triad/mask bits

{1, 2, 4, 3, 7, 5, 6}
{1, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	6	-5	-3
2	4	-1	6	-1	-7	-3	5
3	-7	-6	-1	5	-4	2	1
4	-2	1	-5	-1	3	-7	6
5	-6	7	4	-3	-1	1	-2
6	5	3	-2	7	-1	-1	-4
7	3	-5	-1	-6	2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=3 Hex=52 R fp_sm=1

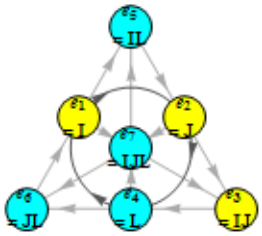
{{1, 2, 4}, {1, 7, 3}, {1, 5, 6},
{2, 3, 5}, {2, 7, 6}, {3, 4, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

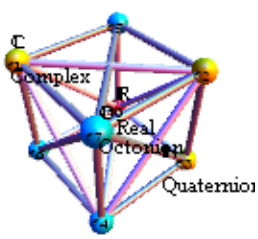
Flattened triad/mask bits

{1, 2, 4, 7, 3, 5, 6}
{0, 1, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	6	-5	3
2	-4	-1	5	1	-3	-7	6
3	7	-5	-1	6	2	-4	-1
4	2	-1	-6	-1	-7	3	5
5	-6	3	-2	7	-1	1	-4
6	5	7	4	-3	-1	-1	-2
7	-3	-6	1	-5	4	2	-1

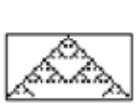
multiplication table

161 $c_{r_m \hat{L}}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

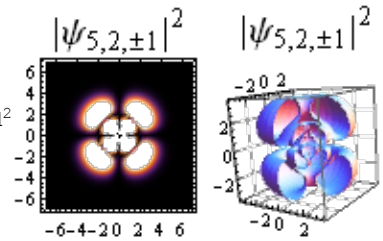
0apccssgg	Root{ 2 1 2 2 2 1 0 1 }	Exp. m	1250. MeV
001011010_2	Weight{ -1 0 1 0 -1 1 0 0 }	Theo. m	1319.95
	Height= 12	Exp. τ	? s

Binary{	0	0	0	1	1	0	1	1 }
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$ }
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



^{72}Hf[Xe]$6s^2 4f^{14} 5d^2$



Flipped

Octonion triads-fPi=12 Sign mask=3 Hex=29 R fp_sm=4

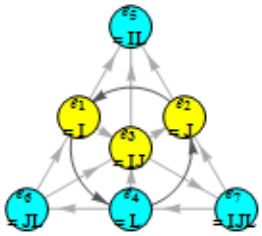
{{1, 4, 2}, {1, 3, 7}, {1, 5, 6},
{2, 6, 3}, {2, 5, 7}, {3, 5, 4}, {4, 6, 7}}

Flattened triad/mask bits

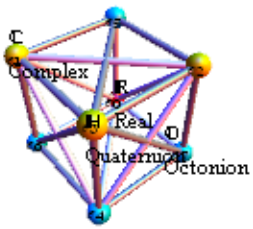
{1, 2, 4, 3, 7, 5, 6}
{1, 0, 0, 1, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	7	2	6	-5	-3
2	4	-1	-6	-1	7	3	-5
3	-7	6	-1	-5	4	-2	1
4	-2	1	5	-1	-3	7	-6
5	-6	-7	-4	3	-1	1	2
6	5	-3	2	-7	-1	-1	4
7	3	5	-1	6	-2	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=3 Hex=2A R fp_sm=1

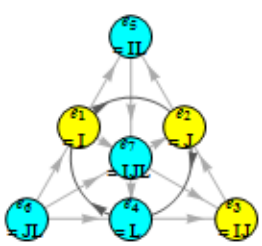
{{1, 2, 4}, {1, 7, 3}, {1, 5, 6},
{2, 5, 3}, {2, 6, 7}, {3, 6, 4}, {4, 5, 7}}

Flattened triad/mask bits

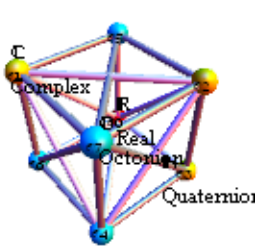
{1, 2, 4, 7, 3, 5, 6}
{0, 1, 0, 1, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	-7	-2	6	-5	3
2	-4	-1	-5	1	3	7	-6
3	7	5	-1	-6	-2	4	-1
4	2	-1	6	-1	7	-3	-5
5	-6	-3	2	-7	-1	1	4
6	5	-7	-4	3	-1	-1	2
7	-3	6	1	5	-4	-2	-1

multiplication table

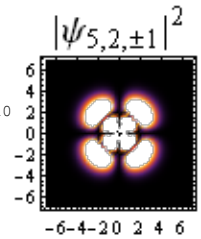
29 $\overline{S}_{O_m}^{\frac{1}{3}\to-\frac{2}{3}}$ R Ref. Symbols: 2D 3D

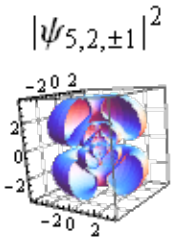
0apccssgg	Root{	-2	-2	-3	-2	-1	-1	0	-1 }	Exp. m 95. MeV
010011110_2	Weight{	1	-1	1	0	0	0	0	-1 }	Theo. m 98.1056
	Height= 13									Exp. τ ? s

Binary{	0	0	0	1	0	1	0	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

$^{79}Au[Xe]6s^1 4f^{14} 5d^{10}$





Flipped

Octonion triads-fPi=12 Sign mask=4 Hex=4F R fp_sm=4

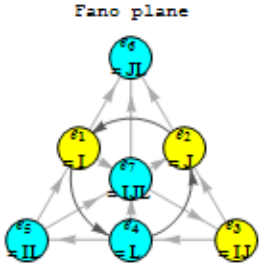
{{1, 4, 2}, {1, 7, 3}, {1, 6, 5},
{2, 6, 3}, {2, 5, 7}, {3, 4, 5}, {4, 7, 6}}

Coxeter (Cyan)

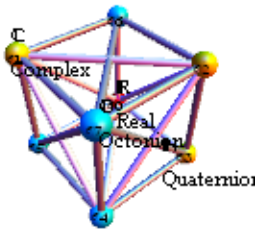
Flattened triad/mask bits

{1, 2, 4, 7, 3, 6, 5}
{1, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	-6	5	3
2	4	-1	-6	-1	7	3	-5
3	7	6	-1	5	-4	-2	-1
4	-2	1	-5	-1	3	-7	6
5	6	-7	4	-3	-1	-1	2
6	-5	-3	2	7	1	-1	-4
7	-3	5	1	-6	-2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=4 Hex=4C R fp_sm=1

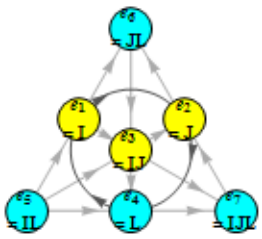
{{1, 2, 4}, {1, 3, 7}, {1, 6, 5},
{2, 5, 3}, {2, 6, 7}, {3, 4, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

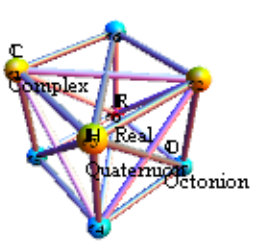
Flattened triad/mask bits

{1, 2, 4, 3, 7, 6, 5}
{0, 0, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	-6	5	-3
2	-4	-1	-5	1	3	7	-6
3	-7	5	-1	6	-2	-4	1
4	2	-1	-6	-1	-7	3	5
5	6	-3	2	7	-1	-1	-4
6	-5	-7	4	-3	1	-1	2
7	3	6	-1	-5	4	-2	-1

multiplication table

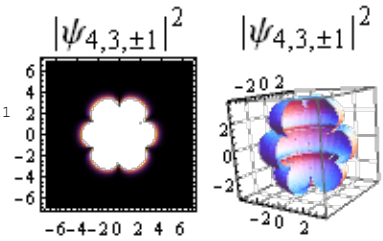
157 $c_{r_m}^{\frac{2}{3}} \sqrt{R}$ Ref. Symbols: 2D 3D

0apccssgg 001011110_2	Root{	2	1	2	2	1	1	0	1 }	Exp. m	1250. MeV
	Weight{	-1	1	-1	1	-1	1	0	0 }	Theo. m	1319.95
	Height=	11								Exp. τ	? s

Binary{	0	0	1	0	1	0	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{67}Ho[Xe]$6s^2 4f^{11}$



Flipped

Octonion triads-fPi=12 Sign mask=4 Hex=37 R fp_sm=4

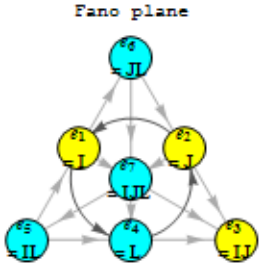
{{1, 4, 2}, {1, 7, 3}, {1, 6, 5},
{2, 3, 6}, {2, 7, 5}, {3, 5, 4}, {4, 6, 7}}

Flattened triad/mask bits

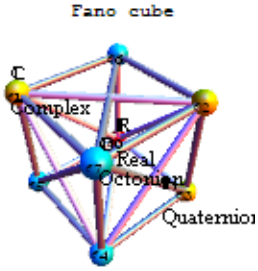
{1, 2, 4, 7, 3, 6, 5}
{1, 1, 1, 0, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-4	-7	2	-6	5	3
2	4	-1	6	-1	-7	-3	5
3	7	-6	-1	-5	4	2	-1
4	-2	1	5	-1	-3	7	-6
5	6	7	-4	3	-1	-1	-2
6	-5	3	-2	-7	1	-1	4
7	-3	-5	1	6	2	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=11 Sign mask=4 Hex=34 R fp_sm=1

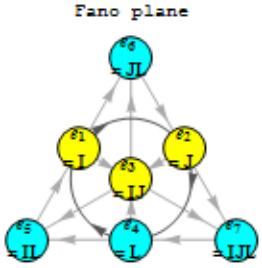
{{1, 2, 4}, {1, 3, 7}, {1, 6, 5},
{2, 3, 5}, {2, 7, 6}, {3, 6, 4}, {4, 5, 7}}

Flattened triad/mask bits

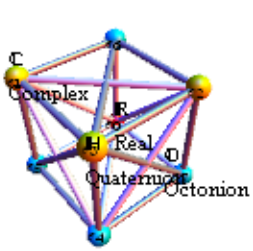
{1, 2, 4, 3, 7, 6, 5}
{0, 0, 1, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	4	7	-2	-6	5	-3
2	-4	-1	5	1	-3	-7	6
3	-7	-5	-1	-6	2	4	1
4	2	-1	6	-1	7	-3	-5
5	6	3	-2	-7	-1	-1	4
6	-5	7	-4	3	1	-1	-2
7	3	-6	-1	5	-4	2	-1

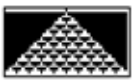
multiplication table

32 $\overline{b}_{\substack{\circ_d \\ L}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

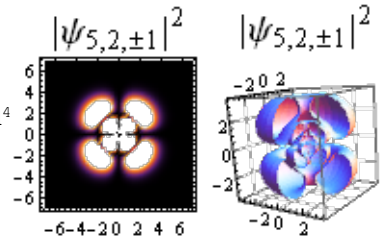
0apccssgg	Root{ -2 -2 -3 -2 -1 0 0 -1 }	Exp. m	4200. MeV
010010011_2	Weight{ 0 1 0 0 0 0 0 -1 }	Theo. m	3270.13
	Height= 12	Exp. τ	? s

Binary{	0	0	0	0	1	1	0	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{74}W[Xe]$6s^2 4f^{14} 5d^4$



Flipped

Octonion triads-fPi=13 Sign mask=1 Hex=76 R fp_sm=6

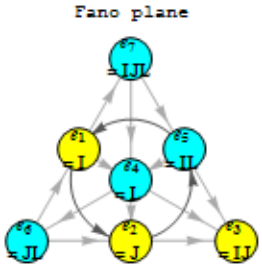
{{1, 2, 5}, {1, 4, 3}, {1, 7, 6},
{2, 3, 6}, {2, 7, 4}, {3, 7, 5}, {4, 6, 5}}

Coxeter (Cyan)

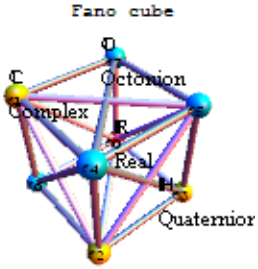
Flattened triad/mask bits

{1, 5, 2, 4, 3, 7, 6}
{0, 1, 1, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	-7	6
2	-5	-1	6	-7	1	-3	4
3	4	-6	-1	-1	-7	2	5
4	-3	7	1	-1	-6	5	-2
5	2	-1	7	6	-1	-4	-3
6	7	3	-2	-5	4	-1	-1
7	-6	-4	-5	2	3	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=1 Hex=75 R fp_sm=7

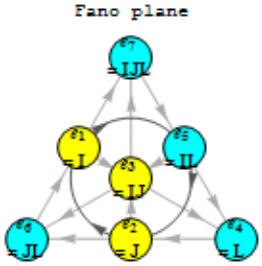
{{1, 5, 2}, {1, 3, 4}, {1, 7, 6},
{2, 3, 7}, {2, 6, 4}, {3, 6, 5}, {4, 7, 5}}

HoffmanSingleton (Yellow)

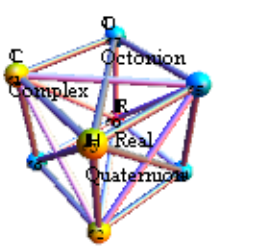
Flattened triad/mask bits

{1, 5, 2, 3, 4, 7, 6}
{1, 0, 1, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	-7	6
2	5	-1	7	-6	-1	4	-3
3	-4	-7	-1	1	-6	5	2
4	3	6	-1	-1	-7	-2	5
5	-2	1	6	7	-1	-3	-4
6	7	-4	-5	2	3	-1	-1
7	-6	3	-2	-5	4	1	-1

multiplication table

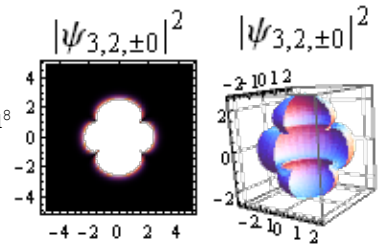
108 $t_{r_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 1 1 0 0 0 0 1 }	Exp. m	174200. MeV
001010011_2	Weight{ 0 0 0 -1 0 0 1 1 }	Theo. m	175 990.
	Height= 5	Exp. τ	? s

Binary{	1	1	0	0	0	0	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{28}Ni[Ar]4s^{2}3d^8



Flipped

Octonion triads-fPi=13 Sign mask=1 Hex=0E R fp_sm=6

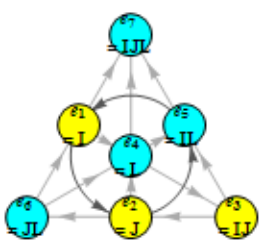
{{1, 2, 5}, {1, 4, 3}, {1, 7, 6},
{2, 6, 3}, {2, 4, 7}, {3, 5, 7}, {4, 5, 6}}

Flattened triad/mask bits

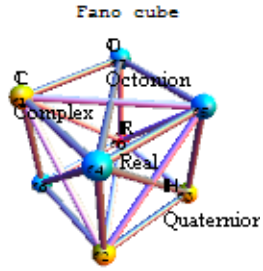
{1, 5, 2, 4, 3, 7, 6}
{0, 1, 1, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	-7	6
2	-5	-1	-6	7	1	3	-4
3	4	6	-1	-1	7	-2	-5
4	-3	-7	1	-1	6	-5	2
5	2	-1	-7	-6	-1	4	3
6	7	-3	2	5	-4	-1	-1
7	-6	4	5	-2	-3	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=1 Hex=0D R fp_sm=7

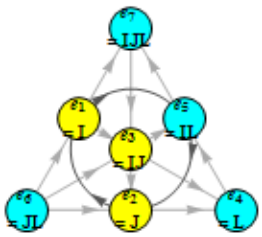
{{1, 5, 2}, {1, 3, 4}, {1, 7, 6},
{2, 7, 3}, {2, 4, 6}, {3, 5, 6}, {4, 5, 7}}

Flattened triad/mask bits

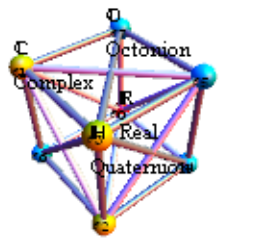
{1, 5, 2, 3, 4, 7, 6}
{1, 0, 1, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	-7	6
2	5	-1	-7	6	-1	-4	3
3	-4	7	-1	1	6	-5	-2
4	3	-6	-1	-1	7	2	-5
5	-2	1	-6	-7	-1	3	4
6	7	4	5	-2	-3	-1	-1
7	-6	-3	2	5	-4	1	-1

multiplication table

37 $t_{r_1 \hat{R}}^{\frac{2}{3} \to -\frac{1}{3}}$ Ref. Symbols: 2D 3D

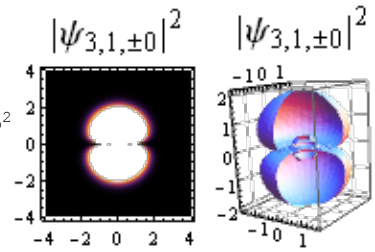
0apccssgg
001010111_2

Root{	1 0 0 0 0 0 0 1 }	Exp. m	174200. MeV
Weight{	0 0 0 0 -1 1 1 0 }	Theo. m	175990.
Height=	3	Exp. τ	? s

Binary{	0	0	0	0	0	0	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{14}Si[Ne]$3s^2 3p^2$



Flipped

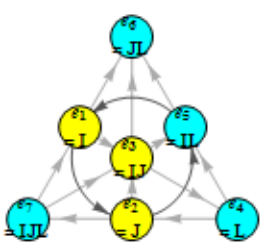
Octonion triads-fPi=13 Sign mask=2 Hex=10 R fp_sm=6

{{1, 2, 5}, {1, 3, 4}, {1, 6, 7},
{2, 3, 6}, {2, 7, 4}, {3, 5, 7}, {4, 5, 6}}

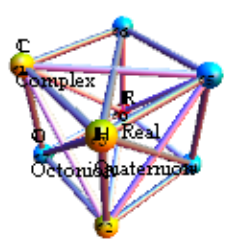
Coxeter (Cyan)

Flattened triad/mask bits
{1, 5, 2, 3, 4, 6, 7}
{0, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	7	-6
2	-5	-1	6	-7	1	-3	4
3	-4	-6	-1	1	7	2	-5
4	3	7	-1	-1	6	-5	-2
5	2	-1	-7	-6	-1	4	3
6	-7	3	-2	5	-4	-1	1
7	6	-4	5	2	-3	-1	-1

multiplication table

Not Flipped

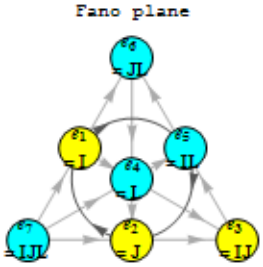
Octonion triads-fPi=14 Sign mask=2 Hex=13 R fp_sm=7

{{1, 5, 2}, {1, 4, 3}, {1, 6, 7},
{2, 3, 7}, {2, 6, 4}, {3, 5, 6}, {4, 5, 7}}

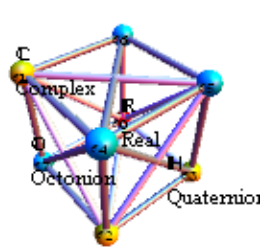
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 5, 2, 4, 3, 6, 7}
{1, 1, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	7	-6
2	5	-1	7	-6	-1	4	-3
3	4	-7	-1	-1	6	-5	2
4	-3	6	1	-1	7	-2	-5
5	-2	1	-6	-7	-1	3	4
6	-7	-4	5	2	-3	-1	1
7	6	3	-2	5	-4	-1	-1

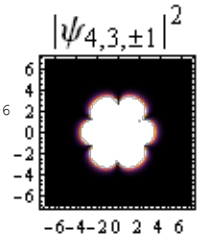
multiplication table

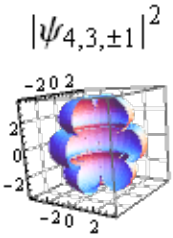
103 $\overline{b}_{o_1 \hat{R}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 010010111_2	Root{	-2	-1	-2	-2	-1	0	0	-1 }	Exp. m 4200. MeV
	Weight{	0	1	0	-1	1	-1	0	0 }	Theo. m 3270.13
	Height=	10								Exp. τ ? s
Binary{		1	1	0	0	1	1	0	0 }	
E8{		$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }	
Physics {		$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }	

Bit NKS CA Pascal E8

^{62}Sm[Xe]$6s^2 4f^6$





Flipped

Octonion triads-fPi=13 Sign mask=2 Hex=68 R fp_sm=6

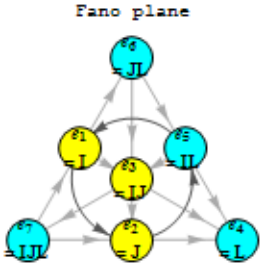
{{1, 2, 5}, {1, 3, 4}, {1, 6, 7},
{2, 6, 3}, {2, 4, 7}, {3, 7, 5}, {4, 6, 5}}

Flattened triad/mask bits

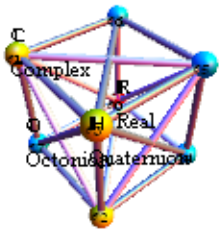
{1, 5, 2, 3, 4, 6, 7}
{0, 0, 0, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	7	-6
2	-5	-1	-6	7	1	3	-4
3	-4	6	-1	1	-7	-2	5
4	3	-7	-1	-1	-6	5	2
5	2	-1	7	6	-1	-4	-3
6	-7	-3	2	-5	4	-1	1
7	6	4	-5	-2	3	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=2 Hex=6B R fp_sm=7

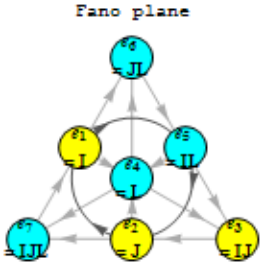
{{1, 5, 2}, {1, 4, 3}, {1, 6, 7},
{2, 7, 3}, {2, 4, 6}, {3, 6, 5}, {4, 7, 5}}

Flattened triad/mask bits

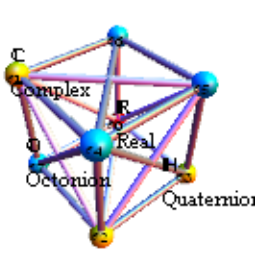
{1, 5, 2, 4, 3, 6, 7}
{1, 1, 0, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



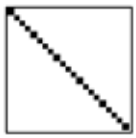
0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	7	-6
2	5	-1	-7	6	-1	-4	3
3	4	7	-1	-1	-6	5	-2
4	-3	-6	1	-1	-7	2	5
5	-2	1	6	7	-1	-3	-4
6	-7	4	-5	-2	3	-1	1
7	6	-3	2	-5	4	-1	-1

multiplication table

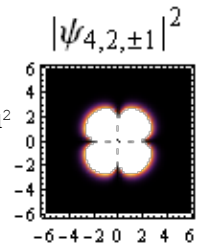
113 $\overline{b}_{O_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

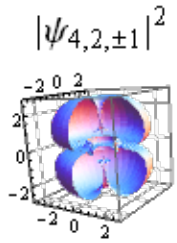
0apccssgg	Root{	-1	-1	-1	-1	-1	0	0	-1 }	Exp. m 4200. MeV
010011011_2	Weight{	0	1	-1	0	1	0	-1	-1 }	Theo. m 3270.13
	Height=	7								Exp. τ ? s
Binary{		1	0	1	0	1	1	0	0 }	
E8{		$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }	
Physics {		$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }	

Bit NKS CA Pascal E8



$^{40}Zr[Kr]5s^2 4d^2$





Flipped

Octonion triads-fPi=13 Sign mask=3 Hex=5B R fp_sm=6

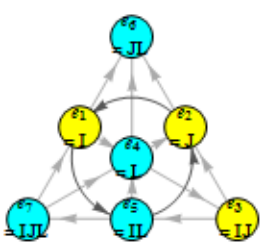
{{1, 5, 2}, {1, 4, 3}, {1, 6, 7},
{2, 6, 3}, {2, 7, 4}, {3, 5, 7}, {4, 6, 5}}

Flattened triad/mask bits

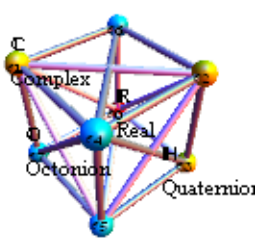
{1, 2, 5, 4, 3, 6, 7}
{1, 1, 0, 1, 1, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	7	-6
2	5	-1	-6	-7	-1	3	4
3	4	6	-1	-1	7	-2	-5
4	-3	7	1	-1	-6	5	-2
5	-2	1	-7	6	-1	-4	3
6	-7	-3	2	-5	4	-1	1
7	6	-4	5	2	-3	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=3 Hex=58 R fp_sm=7

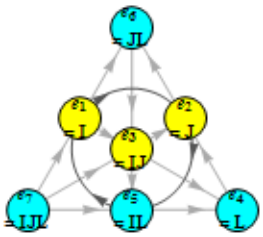
{{1, 2, 5}, {1, 3, 4}, {1, 6, 7},
{2, 7, 3}, {2, 6, 4}, {3, 5, 6}, {4, 7, 5}}

Flattened triad/mask bits

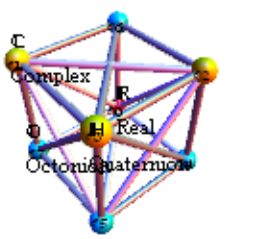
{1, 2, 5, 3, 4, 6, 7}
{0, 0, 0, 1, 1, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	7	-6
2	-5	-1	-7	-6	1	4	3
3	-4	7	-1	1	6	-5	-2
4	3	6	-1	-1	-7	-2	5
5	2	-1	-6	7	-1	3	-4
6	-7	-4	5	2	-3	-1	1
7	6	-3	2	-5	4	-1	-1

multiplication table

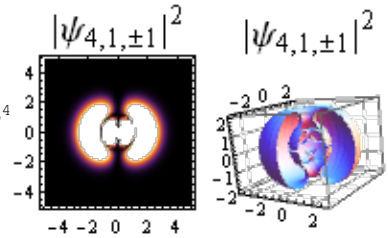
138 $t_{r_m}^{\frac{2}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	1	1	1	1	0	0	0	1 }	Exp. m	174200. MeV
001011011_2	Weight{	0	0	-1	1	-1	0	1	1 }	Theo. m	175 990.
	Height=	6								Exp. τ	? s

Binary{	0	1	1	0	0	0	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

$^{34}Se[Ar]4s^2 3d^{10} 4p^4$



Flipped

Octonion triads-fPi=13 Sign mask=3 Hex=23 R fp_sm=6

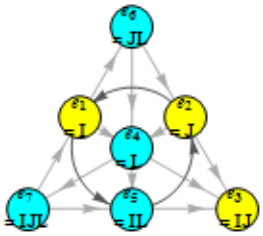
{{1, 5, 2}, {1, 4, 3}, {1, 6, 7},
{2, 3, 6}, {2, 4, 7}, {3, 7, 5}, {4, 5, 6}}

Coxeter (Cyan)

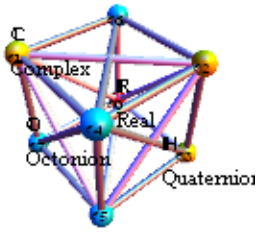
Flattened triad/mask bits

{1, 2, 5, 4, 3, 6, 7}
{1, 1, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	7	-6
2	5	-1	6	7	-1	-3	-4
3	4	-6	-1	-1	-7	2	5
4	-3	-7	1	-1	6	-5	2
5	-2	1	7	-6	-1	4	-3
6	-7	3	-2	5	-4	-1	1
7	6	4	-5	-2	3	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=3 Hex=20 R fp_sm=7

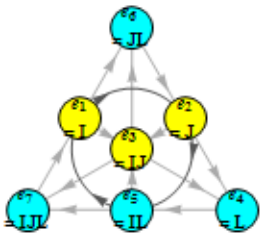
{{1, 2, 5}, {1, 3, 4}, {1, 6, 7},
{2, 3, 7}, {2, 4, 6}, {3, 6, 5}, {4, 5, 7}}

HoffmanSingleton (Yellow)

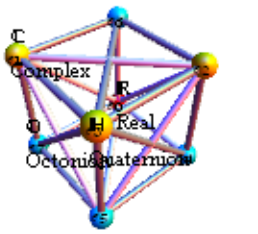
Flattened triad/mask bits

{1, 2, 5, 3, 4, 6, 7}
{0, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	7	-6
2	-5	-1	7	6	1	-4	-3
3	-4	-7	-1	1	-6	5	2
4	3	-6	-1	-1	7	2	-5
5	2	-1	6	-7	-1	-3	4
6	-7	4	-5	-2	3	-1	1
7	6	3	-2	5	-4	-1	-1

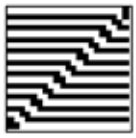
multiplication table

118 $t_{r_m}^{\frac{2}{3}}$ Ref. Symbols: 2D 3D

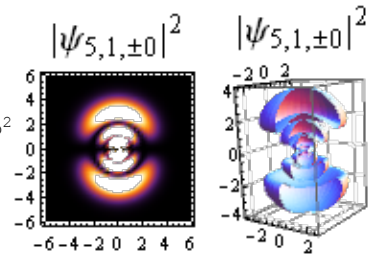
0apccssgg	Root{	2	1	2	1	0	0	0	1 }	Exp. m 174200. MeV
001011111_2	Weight{	0	0	-1	0	0	1	0	0 }	Theo. m 175990.
	Height= 8									Exp. τ ? s

Binary{	1	0	1	0	0	0	1	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



$^{50}Sn[Kr]5s^2 4d^{10} 5p^2$



Flipped

Octonion triads-fPi=13 Sign mask=4 Hex=3D R fp_sm=6

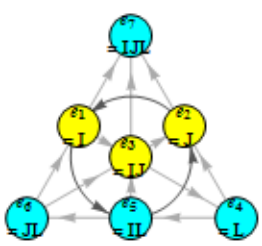
{{1, 5, 2}, {1, 3, 4}, {1, 7, 6},
{2, 6, 3}, {2, 7, 4}, {3, 7, 5}, {4, 5, 6}}

Coxeter (Cyan)

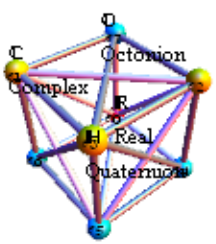
Flattened triad/mask bits

{1, 2, 5, 3, 4, 7, 6}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	-7	6
2	5	-1	-6	-7	-1	3	4
3	-4	6	-1	1	-7	-2	5
4	3	7	-1	-1	6	-5	-2
5	-2	1	7	-6	-1	4	-3
6	7	-3	2	5	-4	-1	-1
7	-6	-4	-5	2	3	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=14 Sign mask=4 Hex=3E R fp_sm=7

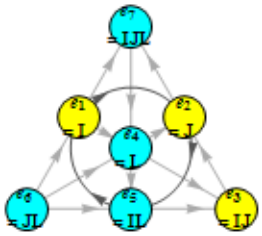
{{1, 2, 5}, {1, 4, 3}, {1, 7, 6},
{2, 7, 3}, {2, 6, 4}, {3, 6, 5}, {4, 5, 7}}

HoffmanSingleton (Yellow)

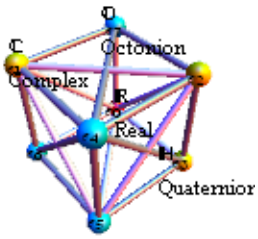
Flattened triad/mask bits

{1, 2, 5, 4, 3, 7, 6}
{0, 1, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	-7	6
2	-5	-1	-7	-6	1	4	3
3	4	7	-1	-1	-6	5	-2
4	-3	6	1	-1	7	-2	-5
5	2	-1	6	-7	-1	-3	4
6	7	-4	-5	2	3	-1	-1
7	-6	-3	2	5	-4	1	-1

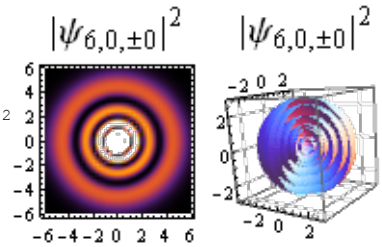
multiplication table

133 $\overline{b}_{O_m}^{\frac{1}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-1	-2	-1	-1	0	0	-1 }	Exp. m 4200. MeV
010011111_2	Weight{	0	1	-1	1	0	-1	0	0 }	Theo. m 3270.13
	Height=	9								Exp. τ ? s
Binary{		0	1	1	0	1	1	0	0 }	
E8{		$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }	

Bit NKS CA Pascal E8

^{56}Ba[Xe]6s^2



Flipped

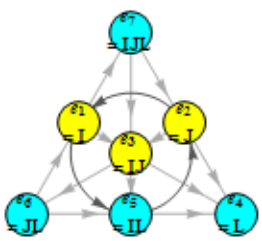
Octonion triads-fPi=13 Sign mask=4 Hex=45 R fp_sm=6

{{1, 5, 2}, {1, 3, 4}, {1, 7, 6},
{2, 3, 6}, {2, 4, 7}, {3, 5, 7}, {4, 6, 5}}

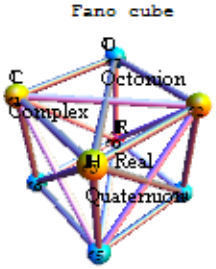
Flattened triad/mask bits
{1, 2, 5, 3, 4, 7, 6}
{1, 0, 1, 0, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	-7	6
2	5	-1	6	7	-1	-3	-4
3	-4	-6	-1	1	7	2	-5
4	3	-7	-1	-1	-6	5	2
5	-2	1	-7	6	-1	-4	3
6	7	3	-2	-5	4	-1	-1
7	-6	4	5	-2	-3	1	-1

multiplication table

Not Flipped

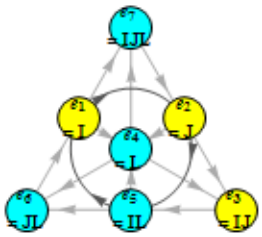
Octonion triads-fPi=14 Sign mask=4 Hex=46 R fp_sm=7

{{1, 2, 5}, {1, 4, 3}, {1, 7, 6},
{2, 3, 7}, {2, 4, 6}, {3, 5, 6}, {4, 7, 5}}

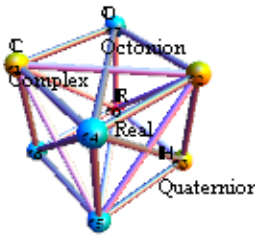
Flattened triad/mask bits
{1, 2, 5, 4, 3, 7, 6}
{0, 1, 1, 0, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	-7	6
2	-5	-1	7	6	1	-4	-3
3	4	-7	-1	-1	6	-5	2
4	-3	-6	1	-1	-7	2	5
5	2	-1	-6	7	-1	3	-4
6	7	4	5	-2	-3	-1	-1
7	-6	3	-2	-5	4	1	-1

multiplication table

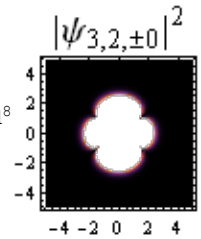
149 $\overline{t}_{r_d\,\check{L}}^{\,-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

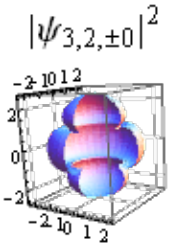
0apccssgg	Root{ -1 -1 -1 0 0 0 0 -1 }	Exp. m	174200. MeV
011010011_2	Weight{ 0 0 0 1 0 0 -1 -1 }	Theo. m	175 990.
	Height= 5	Exp. τ	? s

Binary{	0	0	1	1	1	1	0	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{28}Ni[Ar]4s^{2}3d^8





Flipped

Octonion triads-fPi=14 Sign mask=1 Hex=72 R fp_sm=7

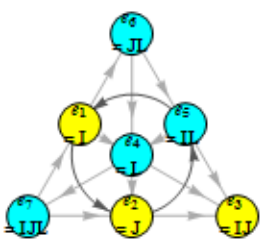
{{1, 2, 5}, {1, 4, 3}, {1, 6, 7},
{2, 3, 7}, {2, 6, 4}, {3, 6, 5}, {4, 7, 5}}

Flattened triad/mask bits

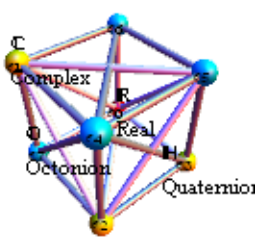
{1, 5, 2, 4, 3, 6, 7}
{0, 1, 0, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	7	-6
2	-5	-1	7	-6	1	4	-3
3	4	-7	-1	-1	-6	5	2
4	-3	6	1	-1	-7	-2	5
5	2	-1	6	7	-1	-3	-4
6	-7	-4	-5	2	3	-1	1
7	6	3	-2	-5	4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=1 Hex=71 R fp_sm=6

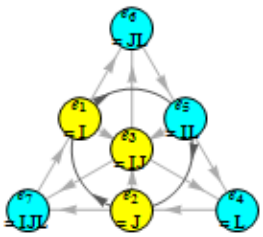
{{1, 5, 2}, {1, 3, 4}, {1, 6, 7},
{2, 3, 6}, {2, 7, 4}, {3, 7, 5}, {4, 6, 5}}

Flattened triad/mask bits

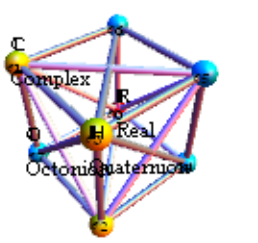
{1, 5, 2, 3, 4, 6, 7}
{1, 0, 0, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	7	-6
2	5	-1	6	-7	-1	-3	4
3	-4	-6	-1	1	-7	2	5
4	3	7	-1	-1	-6	5	-2
5	-2	1	7	6	-1	-4	-3
6	-7	3	-2	-5	4	-1	1
7	6	-4	-5	2	3	-1	-1

multiplication table

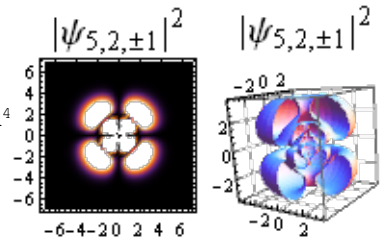
225 $b_{\substack{\circ_d \\ L}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	3	2	1	0	0	1 }	Exp. m	4200. MeV
000010011_2	Weight{	0	-1	0	0	0	0	0	1 }	Theo. m	3270.13
	Height=	12								Exp. τ	? s

Binary{	1	1	1	1	0	0	1	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{74}W[Xe]$6s^2 4f^{14} 5d^4$



Flipped

Octonion triads-fPi=14 Sign mask=1 Hex=0A R fp_sm=7

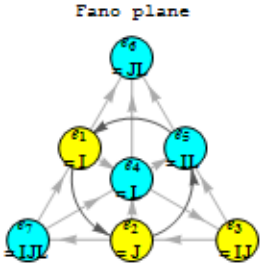
{{1, 2, 5}, {1, 4, 3}, {1, 6, 7},
{2, 7, 3}, {2, 4, 6}, {3, 5, 6}, {4, 5, 7}}

Flattened triad/mask bits

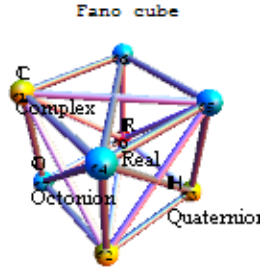
{1, 5, 2, 4, 3, 6, 7}
{0, 1, 0, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	7	-6
2	-5	-1	-7	6	1	-4	3
3	4	7	-1	-1	6	-5	-2
4	-3	-6	1	-1	7	2	-5
5	2	-1	-6	-7	-1	3	4
6	-7	4	5	-2	-3	-1	1
7	6	-3	2	5	-4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=1 Hex=09 R fp_sm=6

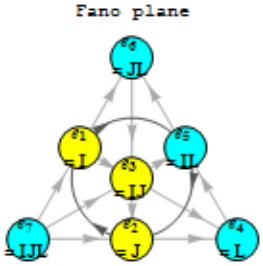
{{1, 5, 2}, {1, 3, 4}, {1, 6, 7},
{2, 6, 3}, {2, 4, 7}, {3, 5, 7}, {4, 5, 6}}

Flattened triad/mask bits

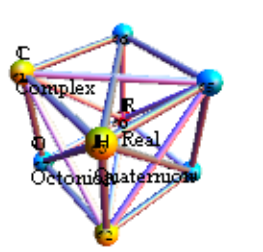
{1, 5, 2, 3, 4, 6, 7}
{1, 0, 0, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	7	-6
2	5	-1	-6	7	-1	3	-4
3	-4	6	-1	1	7	-2	-5
4	3	-7	-1	-1	6	-5	2
5	-2	1	-7	-6	-1	4	3
6	-7	-3	2	5	-4	-1	1
7	6	4	5	-2	-3	-1	-1

multiplication table

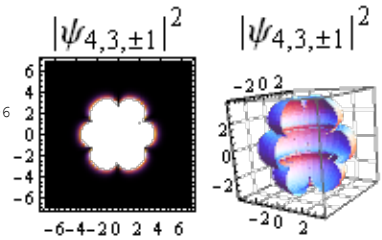
154 $b_{o_1 \hat{R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 2 1 2 2 1 0 0 1 }	Exp. m	4200. MeV
000010111_2	Weight{ 0 -1 0 1 -1 1 0 0 }	Theo. m	3270.13
	Height= 10	Exp. τ	? s

Binary{	0	0	1	1	0	0	1	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{62}Sm[Xe]$6s^2 4f^6$



Flipped

Octonion triads-fPi=14 Sign mask=2 Hex=14 R fp_sm=7

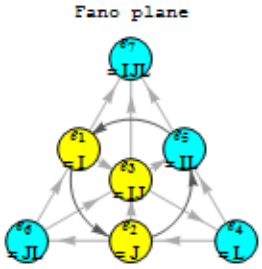
{{1, 2, 5}, {1, 3, 4}, {1, 7, 6},
{2, 3, 7}, {2, 6, 4}, {3, 5, 6}, {4, 5, 7}}

Flattened triad/mask bits

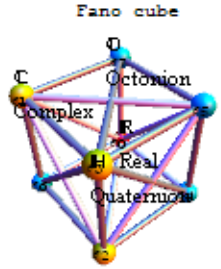
{1, 5, 2, 3, 4, 7, 6}
{0, 0, 1, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	-7	6
2	-5	-1	7	-6	1	4	-3
3	-4	-7	-1	1	6	-5	2
4	3	6	-1	-1	7	-2	-5
5	2	-1	-6	-7	-1	3	4
6	7	-4	5	2	-3	-1	-1
7	-6	3	-2	5	-4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=2 Hex=17 R fp_sm=6

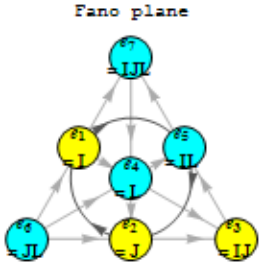
{{1, 5, 2}, {1, 4, 3}, {1, 7, 6},
{2, 3, 6}, {2, 7, 4}, {3, 5, 7}, {4, 5, 6}}

Flattened triad/mask bits

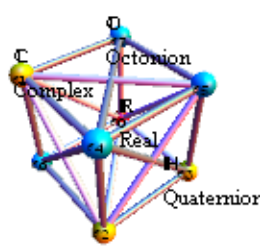
{1, 5, 2, 4, 3, 7, 6}
{1, 1, 1, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	-7	6
2	5	-1	6	-7	-1	-3	4
3	4	-6	-1	-1	7	2	-5
4	-3	7	1	-1	6	-5	-2
5	-2	1	-7	-6	-1	4	3
6	7	3	-2	5	-4	-1	-1
7	-6	-4	5	2	-3	1	-1

multiplication table

220 $\overline{t}_{r_1 \hat{R}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

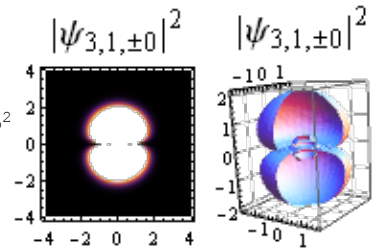
0apccssgg	Root{	-1	0	0	0	0	0	0	-1	}
011010111_2	Weight{	0	0	0	0	1	-1	-1	0	}
	Height=	3								

Exp. m 174200. MeV
Theo. m 175 990.
Exp. τ ? s

Binary{	1	1	1	1	1	1	0	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{14}Si[Ne]3s^{2}3p^2



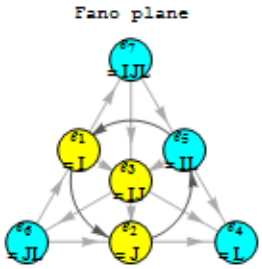
Flipped

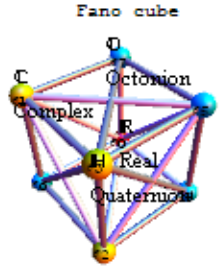
Octonion triads-fPi=14 Sign mask=2 Hex=6C R fp_sm=7

{{1, 2, 5}, {1, 3, 4}, {1, 7, 6},
{2, 7, 3}, {2, 4, 6}, {3, 6, 5}, {4, 7, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 5, 2, 3, 4, 7, 6}
{0, 0, 1, 1, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	-7	6
2	-5	-1	-7	6	1	-4	3
3	-4	7	-1	1	-6	5	-2
4	3	-6	-1	-1	-7	2	5
5	2	-1	6	7	-1	-3	-4
6	7	4	-5	-2	3	-1	-1
7	-6	-3	2	-5	4	1	-1

multiplication table

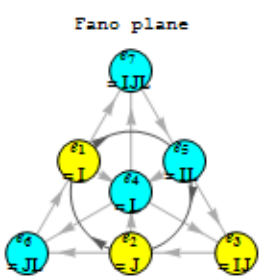
Not Flipped

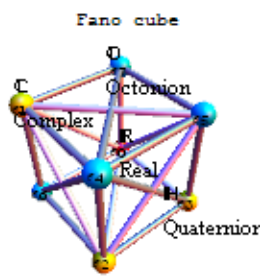
Octonion triads-fPi=13 Sign mask=2 Hex=6F R fp_sm=6

{{1, 5, 2}, {1, 4, 3}, {1, 7, 6},
{2, 6, 3}, {2, 4, 7}, {3, 7, 5}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 5, 2, 4, 3, 7, 6}
{1, 1, 1, 1, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	-7	6
2	5	-1	-6	7	-1	3	-4
3	4	6	-1	-1	-7	-2	5
4	-3	-7	1	-1	-6	5	2
5	-2	1	7	6	-1	-4	-3
6	7	-3	2	-5	4	-1	-1
7	-6	4	-5	-2	3	1	-1

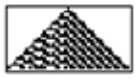
multiplication table

119 $\overline{t}_{r_m \hat{L}}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

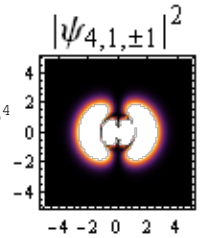
0apccssgg	Root{ -1 -1 -1 -1 0 0 0 -1 }	Exp. m	174200. MeV
011011011_2	Weight{ 0 0 1 -1 1 0 -1 -1 }	Theo. m	175 990.
	Height= 6	Exp. τ	? s

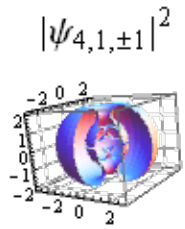
Binary{	1	0	0	1	1	1	0	0 }
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$ }
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



$^{34}Se[Ar]4s^2 3d^{10} 4p^4$





Flipped

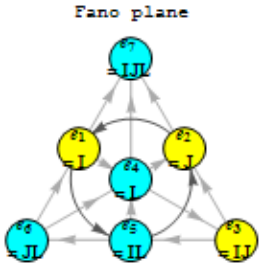
Octonion triads-fPi=14 Sign mask=3 Hex=5F R fp_sm=7

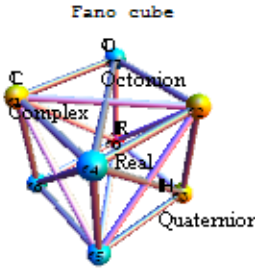
{{1, 5, 2}, {1, 4, 3}, {1, 7, 6},
{2, 7, 3}, {2, 6, 4}, {3, 5, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 5, 4, 3, 7, 6}
{1, 1, 1, 1, 1, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	-7	6
2	5	-1	-7	-6	-1	4	3
3	4	7	-1	-1	6	-5	-2
4	-3	6	1	-1	-7	-2	5
5	-2	1	-6	7	-1	3	-4
6	7	-4	5	2	-3	-1	-1
7	-6	-3	2	-5	4	1	-1

multiplication table

Not Flipped

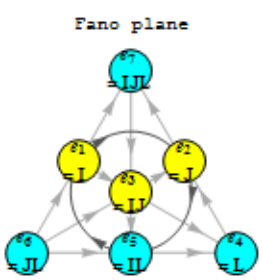
Octonion triads-fPi=13 Sign mask=3 Hex=5C R fp_sm=6

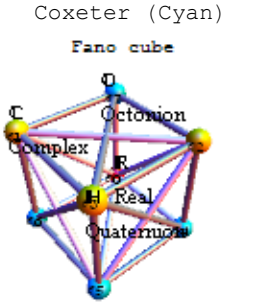
{{1, 2, 5}, {1, 3, 4}, {1, 7, 6},
{2, 6, 3}, {2, 7, 4}, {3, 5, 7}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 5, 3, 4, 7, 6}
{0, 0, 1, 1, 1, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	-7	6
2	-5	-1	-6	-7	1	3	4
3	-4	6	-1	1	7	-2	-5
4	3	7	-1	-1	-6	5	-2
5	2	-1	-7	6	-1	-4	3
6	7	-3	2	-5	4	-1	-1
7	-6	-4	5	2	-3	1	-1

multiplication table

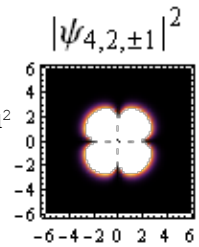
144 $b_{\hat{L}_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

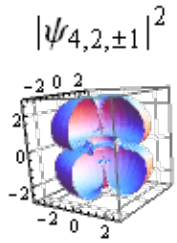
0apccssgg	Root{	1	1	1	1	1	0	0	1 }	Exp. m	4200. MeV
000011011_2	Weight{	0	-1	1	0	-1	0	1	1 }	Theo. m	3270.13
	Height=	7								Exp. τ	? s

Binary{	0	1	0	1	0	0	1	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{40}Zr[Kr]5s^{2}4d^2





Flipped

Octonion triads-fPi=14 Sign mask=3 Hex=27 R fp_sm=7

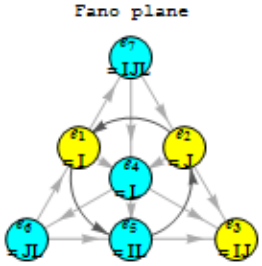
{{1, 5, 2}, {1, 4, 3}, {1, 7, 6},
{2, 3, 7}, {2, 4, 6}, {3, 6, 5}, {4, 5, 7}}

Flattened triad/mask bits

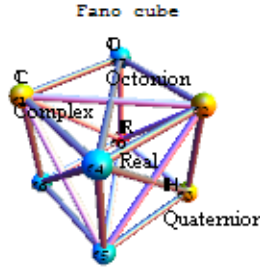
{1, 2, 5, 4, 3, 7, 6}
{1, 1, 1, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-4	3	2	-7	6
2	5	-1	7	6	-1	-4	-3
3	4	-7	-1	-1	-6	5	2
4	-3	-6	1	-1	7	2	-5
5	-2	1	6	-7	-1	-3	4
6	7	4	-5	-2	3	-1	-1
7	-6	3	-2	5	-4	1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=3 Hex=24 R fp_sm=6

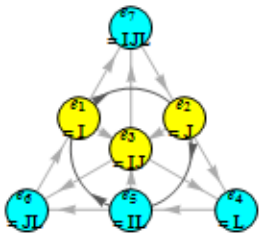
{{1, 2, 5}, {1, 3, 4}, {1, 7, 6},
{2, 3, 6}, {2, 4, 7}, {3, 7, 5}, {4, 5, 6}}

Flattened triad/mask bits

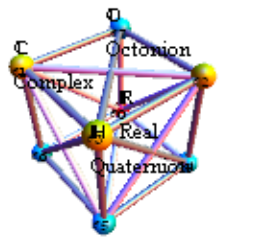
{1, 2, 5, 3, 4, 7, 6}
{0, 0, 1, 0, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	4	-3	-2	-7	6
2	-5	-1	6	7	1	-3	-4
3	-4	-6	-1	1	-7	2	5
4	3	-7	-1	-1	6	-5	2
5	2	-1	7	-6	-1	4	-3
6	7	3	-2	5	-4	-1	-1
7	-6	4	-5	-2	3	1	-1

multiplication table

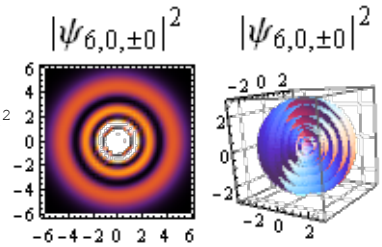
124 $b_{O_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 2 1 2 1 1 0 0 1 }	Exp. m	4200. MeV
000011111_2	Weight{ 0 -1 1 -1 0 1 0 0 }	Theo. m	3270.13
	Height= 9	Exp. τ	? s

Binary{	1	0	0	1	0	0	1	1 }
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$ }
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{56}Ba[Xe]6s^2



Flipped

Octonion triads-fPi=14 Sign mask=4 Hex=39 R fp_sm=7

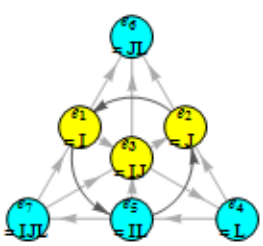
{{1, 5, 2}, {1, 3, 4}, {1, 6, 7},
{2, 7, 3}, {2, 6, 4}, {3, 6, 5}, {4, 5, 7}}

HoffmanSingleton (Yellow)

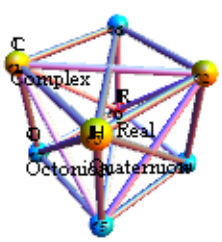
Flattened triad/mask bits

{1, 2, 5, 3, 4, 6, 7}
{1, 0, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	7	-6
2	5	-1	-7	-6	-1	4	3
3	-4	7	-1	1	-6	5	-2
4	3	6	-1	-1	7	-2	-5
5	-2	1	6	-7	-1	-3	4
6	-7	-4	-5	2	3	-1	1
7	6	-3	2	5	-4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=4 Hex=3A R fp_sm=6

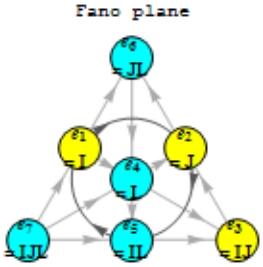
{{1, 2, 5}, {1, 4, 3}, {1, 6, 7},
{2, 6, 3}, {2, 7, 4}, {3, 7, 5}, {4, 5, 6}}

Coxeter (Cyan)

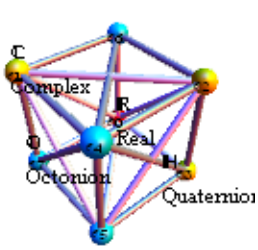
Flattened triad/mask bits

{1, 2, 5, 4, 3, 6, 7}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	7	-6
2	-5	-1	-6	-7	1	3	4
3	4	6	-1	-1	-7	-2	5
4	-3	7	1	-1	6	-5	-2
5	2	-1	7	-6	-1	4	-3
6	-7	-3	2	5	-4	-1	1
7	6	-4	-5	2	3	-1	-1

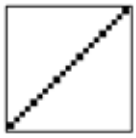
multiplication table

139 $\overline{t}_{r_m}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

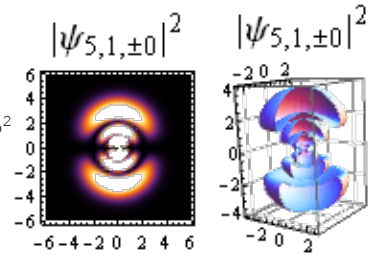
0apccssgg	Root{	-2	-1	-2	-1	0	0	0	-1 }	Exp. m 174200. MeV
011011111_2	Weight{	0	0	1	0	0	-1	0	0 }	Theo. m 175990.
	Height=	8								Exp. τ ? s

Binary{	0	1	0	1	1	1	0	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{50}Sn[Kr]5s^{2}4d^{10}5p^2



Flipped

Octonion triads-fPi=14 Sign mask=4 Hex=41 R fp_sm=7

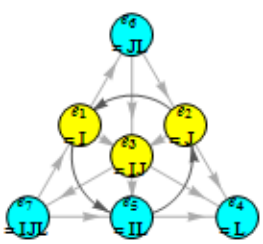
{{1, 5, 2}, {1, 3, 4}, {1, 6, 7},
{2, 3, 7}, {2, 4, 6}, {3, 5, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 5, 3, 4, 6, 7}
{1, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-5	4	-3	2	7	-6
2	5	-1	7	6	-1	-4	-3
3	-4	-7	-1	1	6	-5	2
4	3	-6	-1	-1	-7	2	5
5	-2	1	-6	7	-1	3	-4
6	-7	4	5	-2	-3	-1	1
7	6	3	-2	-5	4	-1	-1

multiplication table

Not Flipped

Octonion triads-fPi=13 Sign mask=4 Hex=42 R fp_sm=6

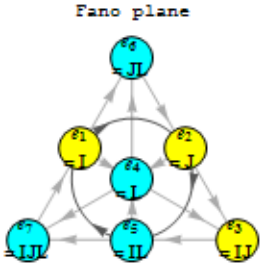
{{1, 2, 5}, {1, 4, 3}, {1, 6, 7},
{2, 3, 6}, {2, 4, 7}, {3, 5, 7}, {4, 6, 5}}

Coxeter (Cyan)

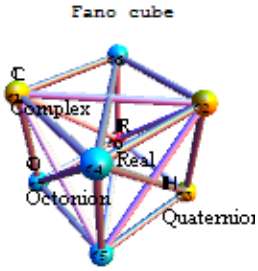
Flattened triad/mask bits

{1, 2, 5, 4, 3, 6, 7}
{0, 1, 0, 0, 0, 0, 1}

Fano plane



Fano cube



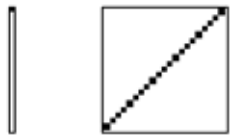
0↦1	1	2	3	4	5	6	7
1	-1	5	-4	3	-2	7	-6
2	-5	-1	6	7	1	-3	-4
3	4	-6	-1	-1	7	2	-5
4	-3	-7	1	-1	-6	5	2
5	2	-1	-7	6	-1	-4	3
6	-7	3	-2	-5	4	-1	1
7	6	4	5	-2	-3	-1	-1

multiplication table

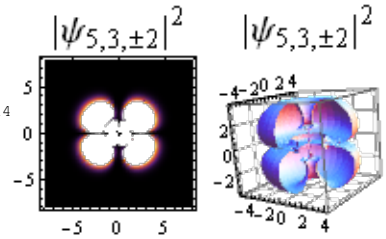
171 $\overline{x_2 \Phi}_{c_d}^{+\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-2	-4	-3	-2	-1	-1	-2 }	Exp. m	$1.\times 10^{-18}$ MeV
010100000_2	Weight{	-1	1	0	0	0	0	-1	0 }	Theo. m	$\frac{0_{Hg}}{\text{eVperC2 Mega}}$
	Height=	19								Exp. τ	? s
Binary{	1	1	1	0	0	1	1	0	}		
E8{	0	0	0	0	1	0	-1	0	}		
Physics {	0	0	0	0	1	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}		

Bit NKS CA Pascal E8



^{102}No[Rn]$7s^2 5f^{14}$



Flipped

Octonion triads-fPi=15 Sign mask=1 Hex=7D L fp_sm=3

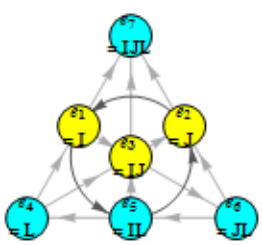
{{1, 5, 2}, {1, 3, 6}, {1, 7, 4},
{2, 4, 3}, {2, 7, 6}, {3, 7, 5}, {4, 6, 5}}

HoffmanSingleton (Yellow)

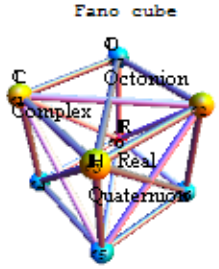
Flattened triad/mask bits

{1, 2, 5, 3, 6, 7, 4}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	-7	2	-3	4
2	5	-1	-4	3	-1	-7	6
3	-6	4	-1	-2	-7	1	5
4	7	-3	2	-1	-6	5	-1
5	-2	1	7	6	-1	-4	-3
6	3	7	-1	-5	4	-1	-2
7	-4	-6	-5	1	3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=16 Sign mask=1 Hex=7D L fp_sm=3

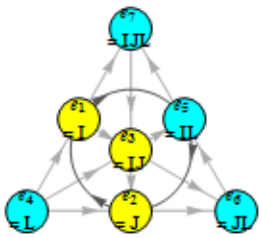
{{1, 5, 2}, {1, 3, 6}, {1, 7, 4},
{2, 7, 3}, {2, 6, 4}, {3, 5, 4}, {5, 7, 6}}

Coxeter (Cyan)

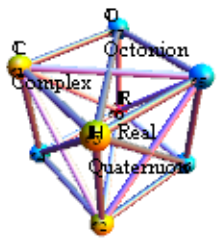
Flattened triad/mask bits

{1, 5, 2, 3, 6, 7, 4}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	-7	2	-3	4
2	5	-1	-7	-6	-1	4	3
3	-6	7	-1	-5	4	1	-2
4	7	6	5	-1	-3	-2	-1
5	-2	1	-4	3	-1	-7	6
6	3	-4	-1	2	7	-1	-5
7	-4	-3	2	1	-6	5	-1

multiplication table

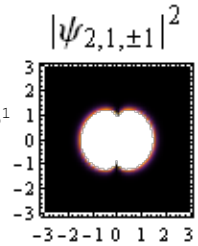
207 $e_T \Phi_{g_d}^{\substack{0\to-1 \\ \vee \\ L}}$ Ref. Symbols: 2D 3D

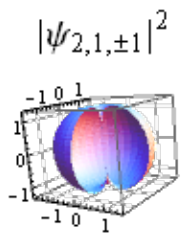
0apccssgg 001100000_2	Root{ 0 0 0 -1 0 0 0 0 } Weight{ 0 0 1 -2 1 0 0 0 } Height= 2	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{2_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	0	1	1	0	1	0	1	1	}
E8{	1	0	-1	0	0	0	0	0	}
Physics {	1	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{5}B[He]2s^{2}2p^1





Flipped

Octonion triads-fPi=15 Sign mask=1 Hex=05 L fp_sm=3

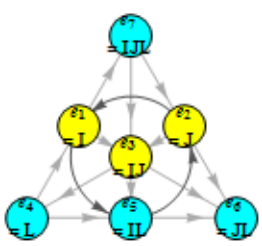
{{1, 5, 2}, {1, 3, 6}, {1, 7, 4},
{2, 3, 4}, {2, 6, 7}, {3, 5, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

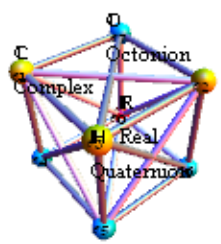
Flattened triad/mask bits

{1, **2**, **5**, 3, 6, 7, 4}
{1, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	-7	2	-3	4
2	5	-1	4	-3	-1	7	-6
3	-6	-4	-1	2	7	1	-5
4	7	3	-2	-1	6	-5	-1
5	-2	1	-7	-6	-1	4	3
6	3	-7	-1	5	-4	-1	2
7	-4	6	5	1	-3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=16 Sign mask=1 Hex=05 L fp_sm=3

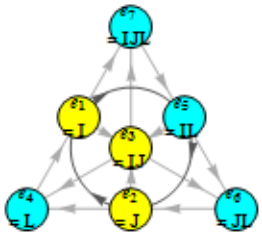
{{1, 5, 2}, {1, 3, 6}, {1, 7, 4},
{2, 3, 7}, {2, 4, 6}, {3, 4, 5}, {5, 6, 7}}

Coxeter (Cyan)

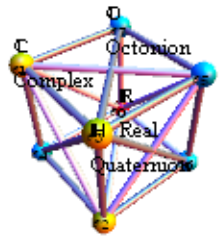
Flattened triad/mask bits

{1, 5, 2, 3, 6, 7, 4}
{1, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	-7	2	-3	4
2	5	-1	7	6	-1	-4	-3
3	-6	-7	-1	5	-4	1	2
4	7	-6	-5	-1	3	2	-1
5	-2	1	4	-3	-1	7	-6
6	3	4	-1	-2	-7	-1	5
7	-4	3	-2	1	6	-5	-1

multiplication table

168 $\overline{x_2 \Phi}_{c_1}^{\hat{R}}{}^{+\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg
010100100_2

Root{ 1 1 1 1 1 1 1 0 }
Weight{ 1 0 0 0 -1 1 -1 1 }
Height= 8

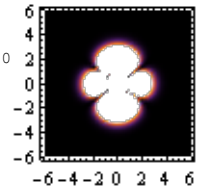
Exp. m $1.\times 10^{-18}$ MeV
Theo. m $\frac{1_{Hg}}{\text{eVperC2 Mega}}$
Exp. τ ? s

Binary{	1	1	1	0	1	1	0	0 }
E8{	0	0	0	0	0	1	0	1 }
Physics {	0	0	0	0	0	$\frac{2}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

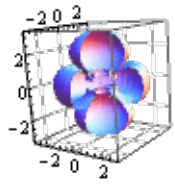
Bit NKS CA Pascal E8

^{46}Pd[Kr]4d^{10}

$|\psi_{4,2,\pm 0}|^2$



$|\psi_{4,2,\pm 0}|^2$



Flipped

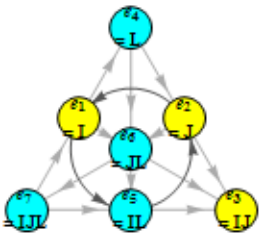
Octonion triads-fPi=15 Sign mask=2 Hex=63 L fp_sm=3

{{1, 5, 2}, {1, 6, 3}, {1, 4, 7},
{2, 3, 4}, {2, 6, 7}, {3, 7, 5}, {4, 6, 5}}

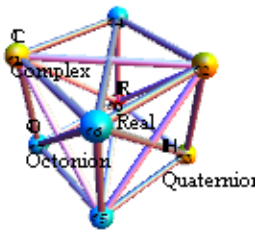
Flattened triad/mask bits
{1, 2, 5, 6, 3, 4, 7}
{1, 1, 0, 0, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	7	2	3	-4
2	5	-1	4	-3	-1	7	-6
3	6	-4	-1	2	-7	-1	5
4	-7	3	-2	-1	-6	5	1
5	-2	1	7	6	-1	-4	-3
6	-3	-7	1	-5	4	-1	2
7	4	6	-5	-1	3	-2	-1

multiplication table

Not Flipped

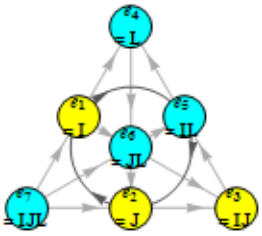
Octonion triads-fPi=16 Sign mask=2 Hex=63 L fp_sm=3

{{1, 5, 2}, {1, 6, 3}, {1, 4, 7},
{2, 3, 7}, {2, 4, 6}, {3, 5, 4}, {5, 7, 6}}

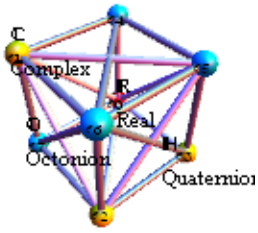
Flattened triad/mask bits
{1, 5, 2, 6, 3, 4, 7}
{1, 1, 0, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	7	2	3	-4
2	5	-1	7	6	-1	-4	-3
3	6	-7	-1	-5	4	-1	2
4	-7	-6	5	-1	-3	2	1
5	-2	1	-4	3	-1	-7	6
6	-3	4	1	-2	7	-1	-5
7	4	3	-2	-1	-6	5	-1

multiplication table

205 $e_T \Phi_{g_1}^{0\to 1}$ Ref. Symbols: 2D 3D

0apccssgg
001100100_2

Root{ 0 1 1 1 0 0 0 0 }
Weight{ 0 0 -1 1 0 -1 0 1 }
Height= 4

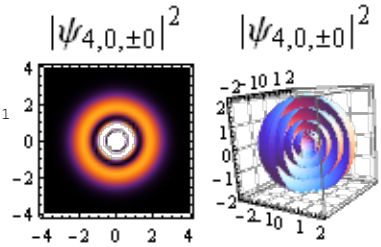
Exp. m
Theo. m
Exp. τ

$1.\times 10^{-18}$ MeV
$\frac{0_{Hg}}{\text{eVperC2 Mega}}$
? s

Binary{	0	1	1	0	1	1	1	0	}
E8{	0	1	1	0	0	0	0	0	}
Physics {	0	1	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{19}K[Ar]4s^1

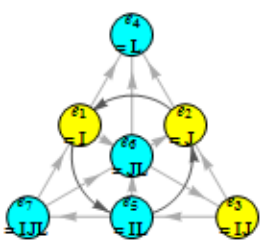


Flipped

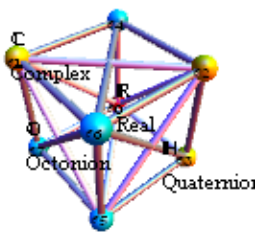
Octonion triads-fPi=15 Sign mask=2 Hex=1B L fp_sm=3
{{1, 5, 2}, {1, 6, 3}, {1, 4, 7},
{2, 4, 3}, {2, 7, 6}, {3, 5, 7}, {4, 5, 6}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 5, 6, 3, 4, 7}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	7	2	3	-4
2	5	-1	-4	3	-1	-7	6
3	6	4	-1	-2	7	-1	-5
4	-7	-3	2	-1	6	-5	1
5	-2	1	-7	-6	-1	4	3
6	-3	7	1	5	-4	-1	-2
7	4	-6	5	-1	-3	2	-1

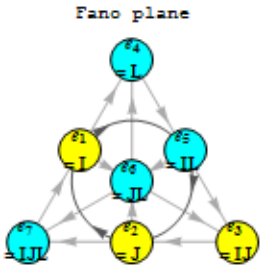
multiplication table

Not Flipped

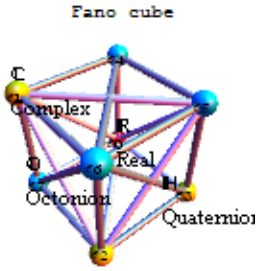
Octonion triads-fPi=16 Sign mask=2 Hex=1B L fp_sm=3
{{1, 5, 2}, {1, 6, 3}, {1, 4, 7},
{2, 7, 3}, {2, 6, 4}, {3, 4, 5}, {5, 6, 7}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 5, 2, 6, 3, 4, 7}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	7	2	3	-4
2	5	-1	-7	-6	-1	4	3
3	6	7	-1	5	-4	-1	-2
4	-7	6	-5	-1	3	-2	1
5	-2	1	4	-3	-1	7	-6
6	-3	-4	1	2	-7	-1	5
7	4	-3	2	-1	6	-5	-1

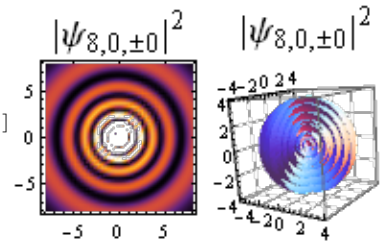
multiplication table

83 $\overline{x_2 \Phi}_{c_m}^{\hat{L}}{}^{+\to -\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-4	-3	-6	-5	-4	-3	-1	-2 }	Exp. m		$1.\times 10^{-18}$ MeV	
010101000_2	Weight{	1	-1	0	0	0	0	0	0 }	Theo. m		$\frac{0_{Hg}}{\text{eVperC2 Mega}}$	
	Height=	29								Exp. τ		? s	
Binary{	0	0	1	0	0	0	1	1	}				
E8{	0	0	0	0	-1	0	-1	0	}				
Physics {	0	0	0	0	-1	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}				

Bit NKS CA Pascal E8

Missing[Unknown] UueMissing[Unknown]



Flipped

Octonion triads-fPi=15 Sign mask=3 Hex=50 L fp_sm=3

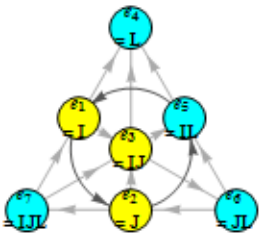
{{1, 2, 5}, {1, 3, 6}, {1, 4, 7},
{2, 3, 4}, {2, 7, 6}, {3, 5, 7}, {4, 6, 5}}

Flattened triad/mask bits

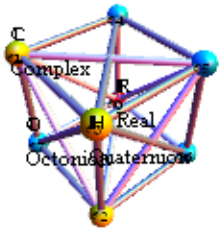
{1, 5, 2, 3, 6, 4, 7}
{0, 0, 0, 0, 1, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	7	-2	-3	-4
2	-5	-1	4	-3	1	-7	6
3	-6	-4	-1	2	7	1	-5
4	-7	3	-2	-1	-6	5	1
5	2	-1	-7	6	-1	-4	3
6	3	7	-1	-5	4	-1	-2
7	4	-6	5	-1	-3	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=16 Sign mask=3 Hex=50 L fp_sm=3

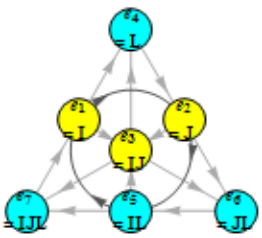
{{1, 2, 5}, {1, 3, 6}, {1, 4, 7},
{2, 3, 7}, {2, 6, 4}, {3, 4, 5}, {5, 7, 6}}

Flattened triad/mask bits

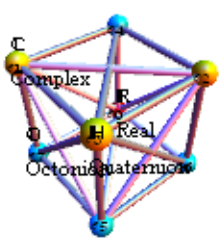
{1, 2, 5, 3, 6, 4, 7}
{0, 0, 0, 0, 1, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	7	-2	-3	-4
2	-5	-1	7	-6	1	4	-3
3	-6	-7	-1	5	-4	1	2
4	-7	6	-5	-1	3	-2	1
5	2	-1	4	-3	-1	-7	6
6	3	-4	-1	2	7	-1	-5
7	4	3	-2	-1	-6	5	-1

multiplication table

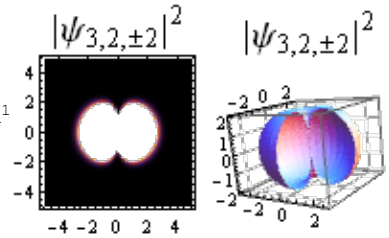
194 $e_T \Phi_{g_m}^{0\to -1}$ Ref. Symbols: 2D 3D

0apccssgg 001101000_2	Root{ -1 0 -1 -1 0 0 0 0 } Weight{ 0 0 1 -1 0 -1 1 1 } Height= 4	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{0_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	0	0	1	1	1	1	0	}
E8{	0	1	-1	0	0	0	0	0	}
Physics {	0	1	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{21}Sc[Ar]4s^{2}3d^1



Flipped

Octonion triads-fPi=15 Sign mask=3 Hex=28 L fp_sm=3

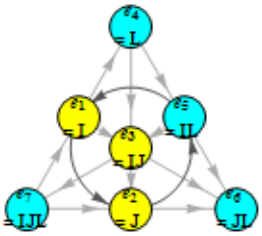
{{1, 2, 5}, {1, 3, 6}, {1, 4, 7},
{2, 4, 3}, {2, 6, 7}, {3, 7, 5}, {4, 5, 6}}

HoffmanSingleton (Yellow)

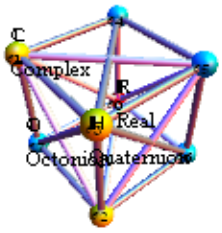
Flattened triad/mask bits

{1, 5, 2, 3, 6, 4, 7}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	7	-2	-3	-4
2	-5	-1	-4	3	1	7	-6
3	-6	4	-1	-2	-7	1	5
4	-7	-3	2	-1	6	-5	1
5	2	-1	7	-6	-1	4	-3
6	3	-7	-1	5	-4	-1	2
7	4	6	-5	-1	3	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=16 Sign mask=3 Hex=28 L fp_sm=3

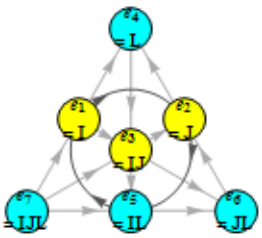
{{1, 2, 5}, {1, 3, 6}, {1, 4, 7},
{2, 7, 3}, {2, 4, 6}, {3, 5, 4}, {5, 6, 7}}

Coxeter (Cyan)

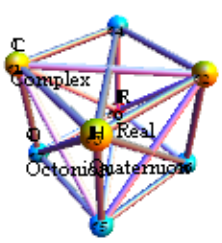
Flattened triad/mask bits

{1, 2, 5, 3, 6, 4, 7}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	7	-2	-3	-4
2	-5	-1	-7	6	1	-4	3
3	-6	7	-1	-5	4	1	-2
4	-7	-6	5	-1	-3	2	1
5	2	-1	-4	3	-1	7	-6
6	3	4	-1	-2	-7	-1	5
7	4	-3	2	-1	6	-5	-1

multiplication table

51 ω_R g_m Ref. Symbols: 2D 3D

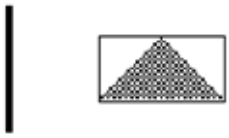
0apccssgg
001101100_2

Root{ -1 0 -1 0 0 0 0 0 }
Weight{ 0 0 0 1 -1 -1 1 1 }
Height= 3

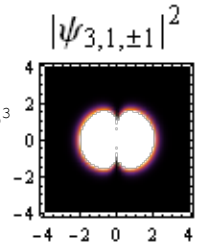
Exp. m $1.\times 10^{-18}$ MeV
Theo. m 2.9674×10^{-18}
Exp. τ ? s

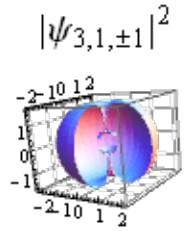
Binary{	1	0	0	1	0	0	1	0 }
E8{	-1	1	0	0	0	0	0	0 }
Physics {	-1	1	0	0	0	0	0	0 }

Bit NKS CA Pascal E8



$^{15}P[Ne]3s^2 3p^3$





Flipped

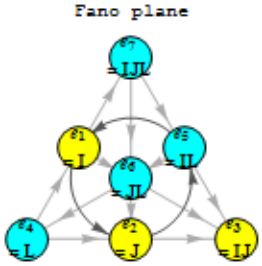
Octonion triads-fPi=15 Sign mask=4 Hex=36 L fp_sm=3

{{1, 2, 5}, {1, 6, 3}, {1, 7, 4},
{2, 3, 4}, {2, 7, 6}, {3, 7, 5}, {4, 5, 6}}

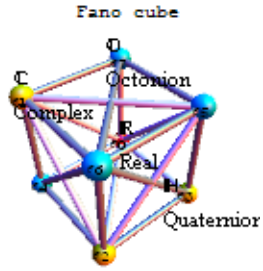
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 5, 2, 6, 3, 7, 4}
{0, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	-7	-2	3	4
2	-5	-1	4	-3	1	-7	6
3	6	-4	-1	2	-7	-1	5
4	7	3	-2	-1	6	-5	-1
5	2	-1	7	-6	-1	4	-3
6	-3	7	1	5	-4	-1	-2
7	-4	-6	-5	1	3	2	-1

multiplication table

Not Flipped

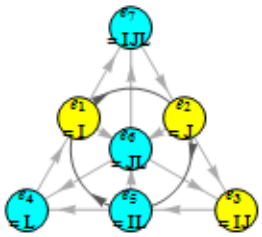
Octonion triads-fPi=16 Sign mask=4 Hex=36 L fp_sm=3

{{1, 2, 5}, {1, 6, 3}, {1, 7, 4},
{2, 3, 7}, {2, 6, 4}, {3, 5, 4}, {5, 6, 7}}

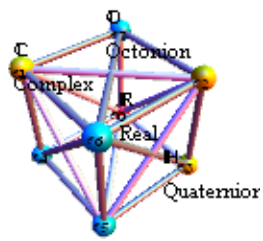
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 5, 6, 3, 7, 4}
{0, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	-7	-2	3	4
2	-5	-1	7	-6	1	4	-3
3	6	-7	-1	-5	4	-1	2
4	7	6	5	-1	-3	-2	-1
5	2	-1	-4	3	-1	7	-6
6	-3	-4	1	2	-7	-1	5
7	-4	3	-2	1	6	-5	-1

multiplication table

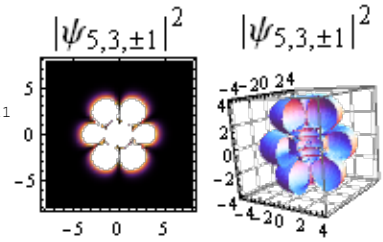
166 $\overline{g^{r\bar{b}}_{c_m}}$ $\overset{t\to 0}{\underset{R}{v}}$ Ref. Symbols: 2D 3D

0apccssgg 010101100_2	Root{ -3 -2 -4 -3 -2 -1 0 -2 } Weight{ 1 0 0 0 0 0 -1 0 } Height= 18	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV 2.9674×10^{-18} ? s

Binary{	1	1	1	0	0	1	0	}
E8{	0	0	0	0	1	-1	0	}
Physics {	0	0	0	0	0	0	$-\sqrt{2}$	0 }

Bit NKS CA Pascal E8

^{99}Es[Rn]$7s^2 5f^{11}$



Flipped

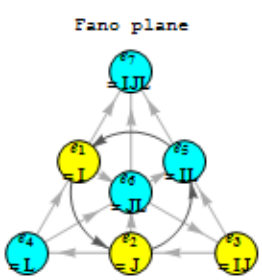
Octonion triads-fPi=15 Sign mask=4 Hex=4E L fp_sm=3

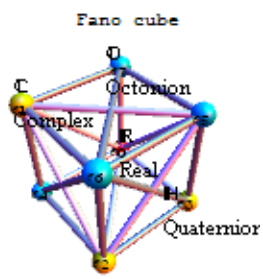
{{1, 2, 5}, {1, 6, 3}, {1, 7, 4},
{2, 4, 3}, {2, 6, 7}, {3, 5, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 5, 2, 6, 3, 7, 4}
{0, 1, 1, 1, 0, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	5	-6	-7	-2	3	4
2	-5	-1	-4	3	1	7	-6
3	6	4	-1	-2	7	-1	-5
4	7	-3	2	-1	-6	5	-1
5	2	-1	-7	6	-1	-4	3
6	-3	-7	1	-5	4	-1	2
7	-4	6	5	1	-3	-2	-1

multiplication table

Not Flipped

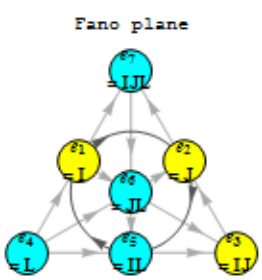
Octonion triads-fPi=16 Sign mask=4 Hex=4E L fp_sm=3

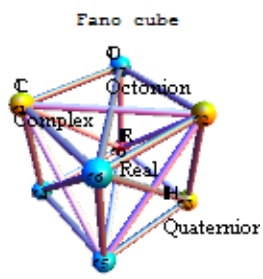
{{1, 2, 5}, {1, 6, 3}, {1, 7, 4},
{2, 7, 3}, {2, 4, 6}, {3, 4, 5}, {5, 7, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 5, 6, 3, 7, 4}
{0, 1, 1, 1, 0, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	5	-6	-7	-2	3	4
2	-5	-1	-7	6	1	-4	3
3	6	7	-1	5	-4	-1	-2
4	7	-6	-5	-1	3	2	-1
5	2	-1	4	-3	-1	-7	6
6	-3	4	1	-2	7	-1	-5
7	-4	-3	2	1	-6	5	-1

multiplication table

50 $\overline{e_T \Phi}_{g_d}$ $\overset{0\to 1}{\underset{L}{\vee}}$ Ref. Symbols: 2D 3D

0apccssgg
011100000_2

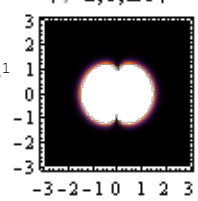
Root{ 0 0 0 1 0 0 0 0 }
Weight{ 0 0 -1 2 -1 0 0 0 }
Height= 2

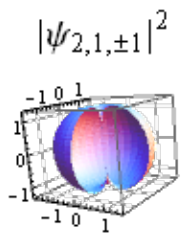
Exp. m $1.\times 10^{-18}$ MeV
Theo. m $\frac{1_{Hg}}{\text{eVperC2 Mega}}$
Exp. τ ? s

Binary{	1	0	0	1	0	1	0	0 }
E8{	-1	0	1	0	0	0	0	0 }
Physics {	-1	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0 }

Bit NKS CA Pascal E8

$^5B[He]2s^2 2p^1$





Flipped

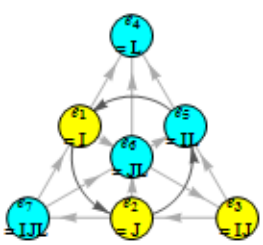
Octonion triads-fPi=16 Sign mask=1 Hex=7A L fp_sm=3

{{1, 2, 5}, {1, 6, 3}, {1, 4, 7},
{2, 7, 3}, {2, 6, 4}, {3, 5, 4}, {5, 7, 6}}

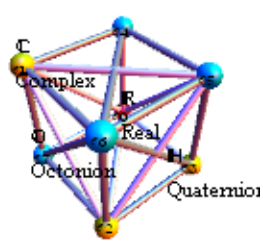
Coxeter (Cyan)

Flattened triad/mask bits
{1, 5, 2, 6, 3, 4, 7}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	7	-2	3	-4
2	-5	-1	-7	-6	1	4	3
3	6	7	-1	-5	4	-1	-2
4	-7	6	5	-1	-3	-2	1
5	2	-1	-4	3	-1	-7	6
6	-3	-4	1	2	7	-1	-5
7	4	-3	2	-1	-6	5	-1

multiplication table

Not Flipped

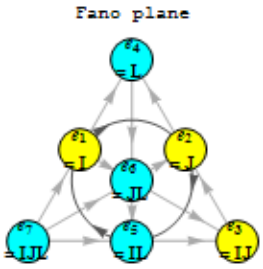
Octonion triads-fPi=15 Sign mask=1 Hex=7A L fp_sm=3

{{1, 2, 5}, {1, 6, 3}, {1, 4, 7},
{2, 4, 3}, {2, 7, 6}, {3, 7, 5}, {4, 6, 5}}

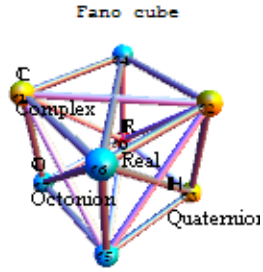
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 5, 6, 3, 4, 7}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	7	-2	3	-4
2	-5	-1	-4	3	1	-7	6
3	6	4	-1	-2	-7	-1	5
4	-7	-3	2	-1	-6	5	1
5	2	-1	7	6	-1	-4	-3
6	-3	7	1	-5	4	-1	-2
7	4	-6	-5	-1	3	2	-1

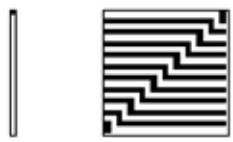
multiplication table

86 $x_2 \Phi_{c_d}^{\rightarrow \frac{1}{3}}$ Ref. Symbols: 2D 3D

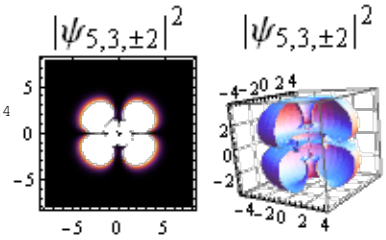
0apccssgg 000100000_2	Root{ 3 2 4 3 2 1 1 2 } Weight{ 1 -1 0 0 0 0 1 0 } Height= 19	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{1_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	0	0	0	1	1	0	0	1	}
E8{	0	0	0	0	-1	0	1	0	}
Physics {	0	0	0	0	-1	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{102}No[Rn]$7s^2 5f^{14}$



Flipped

Octonion triads-fPi=16 Sign mask=1 Hex=02 L fp_sm=3

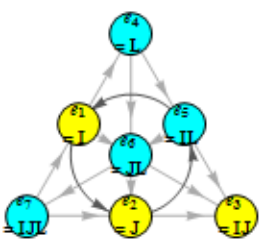
{{1, 2, 5}, {1, 6, 3}, {1, 4, 7},
{2, 3, 7}, {2, 4, 6}, {3, 4, 5}, {5, 6, 7}}

Coxeter (Cyan)

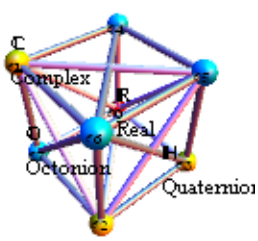
Flattened triad/mask bits

{1, 5, 2, 6, 3, 4, 7}
{0, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	7	-2	3	-4
2	-5	-1	7	6	1	-4	-3
3	6	-7	-1	5	-4	-1	2
4	-7	-6	-5	-1	3	2	1
5	2	-1	4	-3	-1	7	-6
6	-3	4	1	-2	-7	-1	5
7	4	3	-2	-1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=1 Hex=02 L fp_sm=3

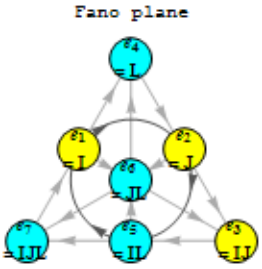
{{1, 2, 5}, {1, 6, 3}, {1, 4, 7},
{2, 3, 4}, {2, 6, 7}, {3, 5, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

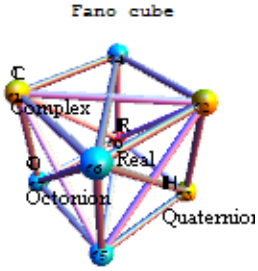
Flattened triad/mask bits

{1, 2, 5, 6, 3, 4, 7}
{0, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-6	7	-2	3	-4
2	-5	-1	4	-3	1	7	-6
3	6	-4	-1	2	7	-1	-5
4	-7	3	-2	-1	6	-5	1
5	2	-1	-7	-6	-1	4	3
6	-3	-7	1	5	-4	-1	2
7	4	6	5	-1	-3	-2	-1

multiplication table

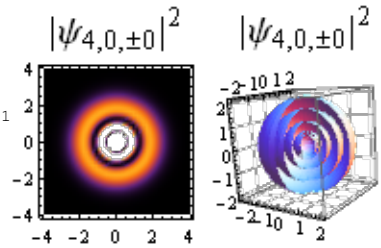
52 $\overline{e_T \Phi}_{g_1}^{\,0\to -1}$ Ref. Symbols: 2D 3D

0apccssgg 011100100_2	Root{ 0 -1 -1 -1 0 0 0 0 } Weight{ 0 0 1 -1 0 1 0 -1 } Height= 4	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{2_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	0	0	1	0	0	0	1	}
E8{	0	-1	-1	0	0	0	0	0	}
Physics {	0	-1	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{19}K[Ar]4s^1



Flipped

Octonion triads-fPi=16 Sign mask=2 Hex=64 L fp_sm=3

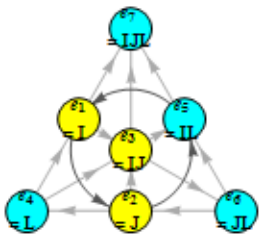
{{1, 2, 5}, {1, 3, 6}, {1, 7, 4},
{2, 3, 7}, {2, 4, 6}, {3, 5, 4}, {5, 7, 6}}

Coxeter (Cyan)

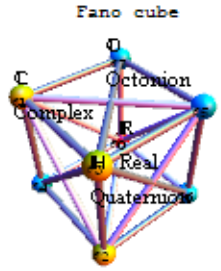
Flattened triad/mask bits

{1, 5, 2, 3, 6, 7, 4}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	-7	-2	-3	4
2	-5	-1	7	6	1	-4	-3
3	-6	-7	-1	-5	4	1	2
4	7	-6	5	-1	-3	2	-1
5	2	-1	-4	3	-1	-7	6
6	3	4	-1	-2	7	-1	-5
7	-4	3	-2	1	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=2 Hex=64 L fp_sm=3

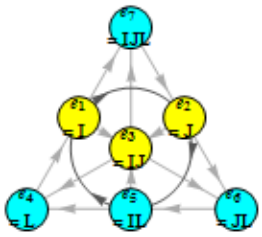
{{1, 2, 5}, {1, 3, 6}, {1, 7, 4},
{2, 3, 4}, {2, 6, 7}, {3, 7, 5}, {4, 6, 5}}

HoffmanSingleton (Yellow)

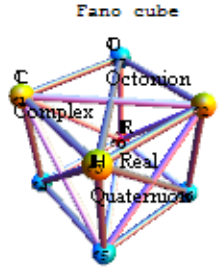
Flattened triad/mask bits

{1, 2, 5, 3, 6, 7, 4}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	-7	-2	-3	4
2	-5	-1	4	-3	1	7	-6
3	-6	-4	-1	2	-7	1	5
4	7	3	-2	-1	-6	5	-1
5	2	-1	7	6	-1	-4	-3
6	3	-7	-1	-5	4	-1	2
7	-4	6	-5	1	3	-2	-1

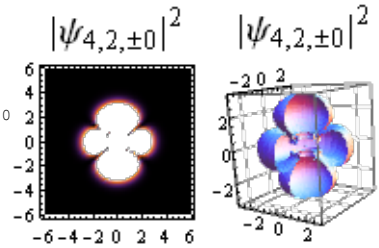
multiplication table

89 $x_2 \Phi_{c_1}^{\hat{R}} \to -\frac{2}{3}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-1	-1	-1	-1	-1	0 }	Exp. m	$1.\times 10^{-18}$ MeV
000100100_2	Weight{	-1	0	0	0	1	-1	1	-1 }	Theo. m	$\frac{0_{Hg}}{\text{eVperC2 Mega}}$
	Height=	8								Exp. τ	? s
Binary{	0	0	0	1	0	0	1	1	}		
E8{	0	0	0	0	0	-1	0	-1	}		
Physics {	0	0	0	0	0	$-\frac{2}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}		

Bit NKS CA Pascal E8

^{46}Pd[Kr]4d^{10}



Flipped

Octonion triads-fPi=16 Sign mask=2 Hex=1C L fp_sm=3

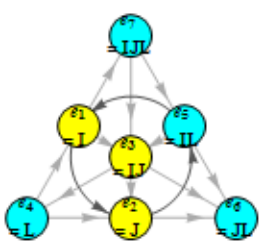
{{1, 2, 5}, {1, 3, 6}, {1, 7, 4},
{2, 7, 3}, {2, 6, 4}, {3, 4, 5}, {5, 6, 7}}

Coxeter (Cyan)

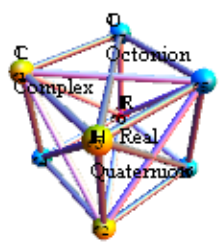
Flattened triad/mask bits

{1, 5, 2, 3, 6, 7, 4}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	-7	-2	-3	4
2	-5	-1	-7	-6	1	4	3
3	-6	7	-1	5	-4	1	-2
4	7	6	-5	-1	3	-2	-1
5	2	-1	4	-3	-1	7	-6
6	3	-4	-1	2	-7	-1	5
7	-4	-3	2	1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=2 Hex=1C L fp_sm=3

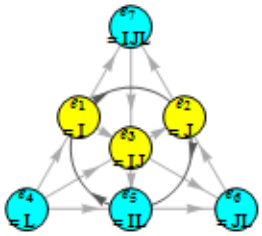
{{1, 2, 5}, {1, 3, 6}, {1, 7, 4},
{2, 4, 3}, {2, 7, 6}, {3, 5, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

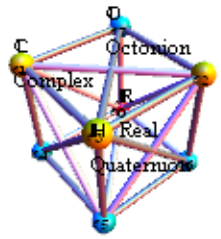
Flattened triad/mask bits

{1, 2, 5, 3, 6, 7, 4}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	6	-7	-2	-3	4
2	-5	-1	-4	3	1	-7	6
3	-6	4	-1	-2	7	1	-5
4	7	-3	2	-1	6	-5	-1
5	2	-1	-7	-6	-1	4	3
6	3	7	-1	5	-4	-1	-2
7	-4	-6	5	1	-3	2	-1

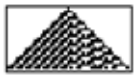
multiplication table

63 $\overline{e_T \Phi}_{g_m}^{0\to 1}$ Ref. Symbols: 2D 3D

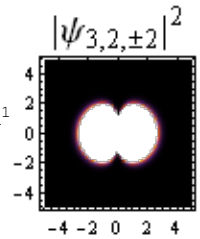
0apccssgg 011101000_2	Root{ 1 0 1 1 0 0 0 0 } Weight{ 0 0 -1 1 0 1 -1 -1 } Height= 4	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{0_{Hg}}{\text{eVperC2 Mega}}$? s

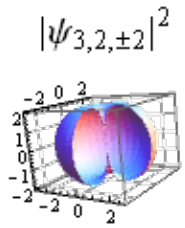
Binary{	0	1	1	0	0	0	0	1	}
E8{	0	-1	1	0	0	0	0	0	}
Physics {	0	-1	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8



$^{21}Sc[Ar]4s^2 3d^1$





Flipped

Octonion triads-fPi=16 Sign mask=3 Hex=57 L fp_sm=3

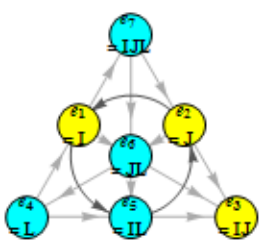
{{1, 5, 2}, {1, 6, 3}, {1, 7, 4},
{2, 3, 7}, {2, 6, 4}, {3, 4, 5}, {5, 7, 6}}

Coxeter (Cyan)

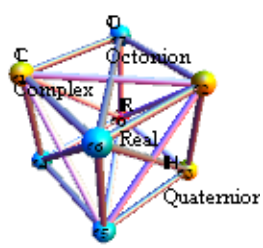
Flattened triad/mask bits

{1, 2, 5, 6, 3, 7, 4}
{1, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	-7	2	3	4
2	5	-1	7	-6	-1	4	-3
3	6	-7	-1	5	-4	-1	2
4	7	6	-5	-1	3	-2	-1
5	-2	1	4	-3	-1	-7	6
6	-3	-4	1	2	7	-1	-5
7	-4	3	-2	1	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=3 Hex=57 L fp_sm=3

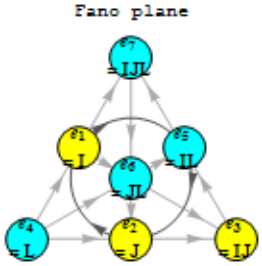
{{1, 5, 2}, {1, 6, 3}, {1, 7, 4},
{2, 3, 4}, {2, 7, 6}, {3, 5, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

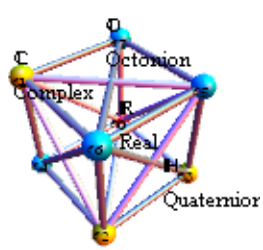
Flattened triad/mask bits

{1, 5, 2, 6, 3, 7, 4}
{1, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	-7	2	3	4
2	5	-1	4	-3	-1	-7	6
3	6	-4	-1	2	7	-1	-5
4	7	3	-2	-1	-6	5	-1
5	-2	1	-7	6	-1	-4	3
6	-3	7	1	-5	4	-1	-2
7	-4	-6	5	1	-3	2	-1

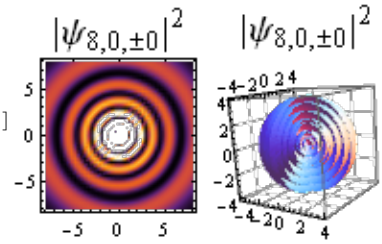
multiplication table

174 $x_2 \Phi_{c_m} \overset{\hat{L}}{\to}^{\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 000101000_2	Root{	4	3	6	5	4	3	1	2 }	Exp. m	$1.\times 10^{-18}$ MeV			
	Weight{	-1	1	0	0	0	0	0	0 }	Theo. m	$\frac{2_{Hg}}{\text{eVperC2 Mega}}$			
	Height=	29								Exp. τ	? s			
Binary{	1		1		0		1			1	1	0	0	}
E8{	0		0		0		0			1	0	1	0	}
Physics {	0		0		0		0			1	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

Missing[Unknown] UueMissing[Unknown]



Flipped

Octonion triads-fPi=16 Sign mask=3 Hex=2F L fp_sm=3

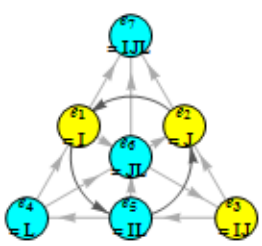
{{1, 5, 2}, {1, 6, 3}, {1, 7, 4},
{2, 7, 3}, {2, 4, 6}, {3, 5, 4}, {5, 6, 7}}

Coxeter (Cyan)

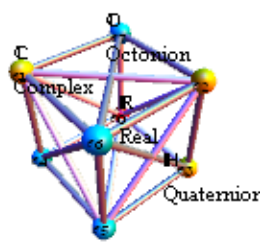
Flattened triad/mask bits

{1, 2, 5, 6, 3, 7, 4}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	-7	2	3	4
2	5	-1	-7	6	-1	-4	3
3	6	7	-1	-5	4	-1	-2
4	7	-6	5	-1	-3	2	-1
5	-2	1	-4	3	-1	7	-6
6	-3	4	1	-2	-7	-1	5
7	-4	-3	2	1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=3 Hex=2F L fp_sm=3

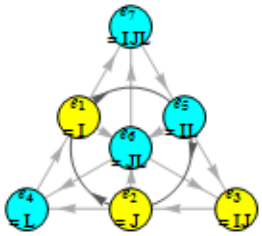
{{1, 5, 2}, {1, 6, 3}, {1, 7, 4},
{2, 4, 3}, {2, 6, 7}, {3, 7, 5}, {4, 5, 6}}

HoffmanSingleton (Yellow)

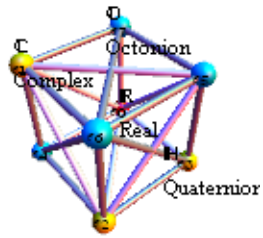
Flattened triad/mask bits

{1, 5, 2, 6, 3, 7, 4}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-6	-7	2	3	4
2	5	-1	-4	3	-1	7	-6
3	6	4	-1	-2	-7	-1	5
4	7	-3	2	-1	6	-5	-1
5	-2	1	7	-6	-1	4	-3
6	-3	-7	1	5	-4	-1	2
7	-4	6	-5	1	3	-2	-1

multiplication table

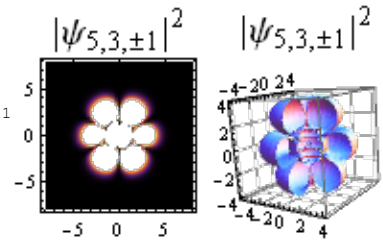
91 $g^{r\bar{b}}_{c_m}$ $\vec{\vec{R}}^{\to 0}$ Ref. Symbols: 2D 3D

0apccssgg 000101100_2	Root{ 3 2 4 3 2 1 0 2 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ -1 0 0 0 0 0 1 0 }	Theo. m	2.9674×10^{-18}
	Height= 18	Exp. τ	? s

Binary{	0	0	0	0	1	1	0	1 }
E8{	0	0	0	0	0	-1	1	0 }
Physics {	0	0	0	0	0	0	$\sqrt{2}$	0 }

Bit NKS CA Pascal E8

^{99}Es[Rn]$7s^2 5f^{11}$



Flipped

Octonion triads-fPi=16 Sign mask=4 Hex=31 L fp_sm=3

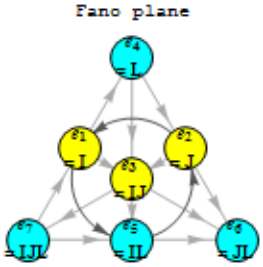
{{1, 5, 2}, {1, 3, 6}, {1, 4, 7},
{2, 3, 7}, {2, 6, 4}, {3, 5, 4}, {5, 6, 7}}

Coxeter (Cyan)

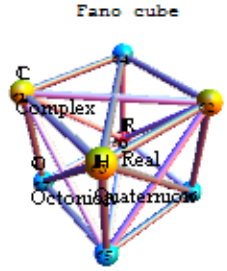
Flattened triad/mask bits

{1, 2, 5, 3, 6, 4, 7}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	7	2	-3	-4
2	5	-1	7	-6	-1	4	-3
3	-6	-7	-1	-5	4	1	2
4	-7	6	5	-1	-3	-2	1
5	-2	1	-4	3	-1	7	-6
6	3	-4	-1	2	-7	-1	5
7	4	3	-2	-1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=15 Sign mask=4 Hex=31 L fp_sm=3

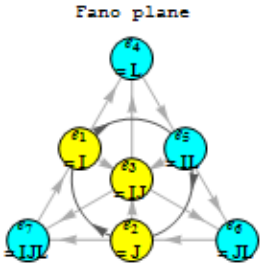
{{1, 5, 2}, {1, 3, 6}, {1, 4, 7},
{2, 3, 4}, {2, 7, 6}, {3, 7, 5}, {4, 5, 6}}

HoffmanSingleton (Yellow)

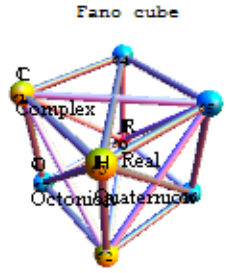
Flattened triad/mask bits

{1, 5, 2, 3, 6, 4, 7}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	7	2	-3	-4
2	5	-1	4	-3	-1	-7	6
3	-6	-4	-1	2	-7	1	5
4	-7	3	-2	-1	6	-5	1
5	-2	1	7	-6	-1	4	-3
6	3	7	-1	5	-4	-1	-2
7	4	-6	-5	-1	3	2	-1

multiplication table

206 $\overline{\omega_R}$ $\overset{0}{\underset{g_m}{\vee}}$ $\overset{}{\underset{R}{}}$ Ref. Symbols: 2D 3D

0apccssgg
011101100_2

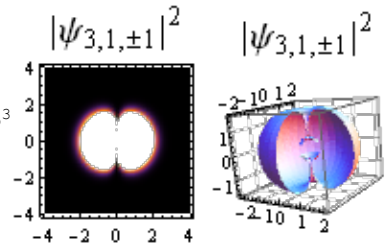
Root{ 1 0 1 0 0 0 0 0 }
Weight{ 0 0 0 -1 1 1 -1 -1 }
Height= 3

Exp. m $1.\times 10^{-18}$ MeV
Theo. m 2.9674×10^{-18}
Exp. τ ? s

Binary{	0	1	1	0	1	1	0	1 }
E8{	1	-1	0	0	0	0	0	0 }
Physics {	1	-1	0	0	0	0	0	0 }

Bit NKS CA Pascal E8

^{15}P[Ne]3s^{2}3p^3

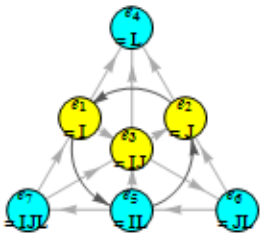


Flipped

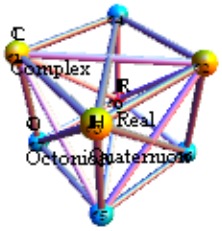
Octonion triads-fPi=16 Sign mask=4 Hex=49 L fp_sm=3
{{1, 5, 2}, {1, 3, 6}, {1, 4, 7},
{2, 7, 3}, {2, 4, 6}, {3, 4, 5}, {5, 7, 6}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 5, 3, 6, 4, 7}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	6	7	2	-3	-4
2	5	-1	-7	6	-1	-4	3
3	-6	7	-1	5	-4	1	-2
4	-7	-6	-5	-1	3	2	1
5	-2	1	4	-3	-1	-7	6
6	3	4	-1	-2	7	-1	-5
7	4	-3	2	-1	-6	5	-1

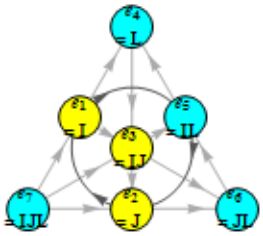
multiplication table

Not Flipped

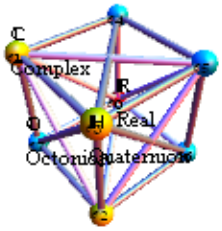
Octonion triads-fPi=15 Sign mask=4 Hex=49 L fp_sm=3
{{1, 5, 2}, {1, 3, 6}, {1, 4, 7},
{2, 4, 3}, {2, 6, 7}, {3, 5, 7}, {4, 6, 5}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 5, 2, 3, 6, 4, 7}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



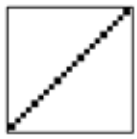
0↦1	1	2	3	4	5	6	7
1	-1	-5	6	7	2	-3	-4
2	5	-1	-4	3	-1	7	-6
3	-6	4	-1	-2	7	1	-5
4	-7	-3	2	-1	-6	5	1
5	-2	1	-7	6	-1	-4	3
6	3	-7	-1	-5	4	-1	2
7	4	6	5	-1	-3	-2	-1

multiplication table

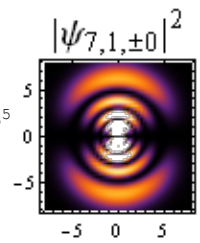
67 $d_{\substack{C_d \\ L}}^{-\frac{1}{3}\to-\frac{4}{3}}$ Ref. Symbols: 2D 3D

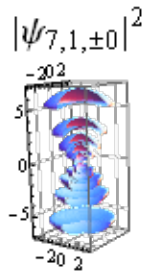
0apccssgg	Root{	-4	-3	-6	-5	-3	-2	-1	-2 }	Exp. m 5. MeV
000100001_2	Weight{	0	0	1	-1	0	0	0	0 }	Theo. m 3.2107
	Height=	27								Exp. τ ? s
Binary{	0	1	0	1	0	0	0	1	}	
E8{	0	0	-1	0	0	0	-1	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



^{117}Uus[Rn]$7s^2 5f^{14} 6d^{10} 7p^5$





Flipped

Octonion triads-fPi=17 Sign mask=1 Hex=0B L fp_sm=8

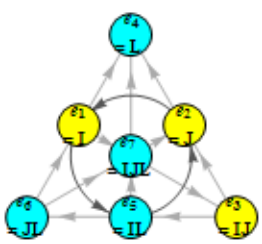
{{1, 5, 2}, {1, 7, 3}, {1, 4, 6},
{2, 4, 3}, {2, 6, 7}, {3, 5, 6}, {4, 5, 7}}

Coxeter (Cyan)

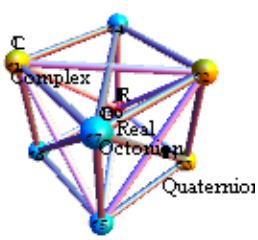
Flattened triad/mask bits

{1, 2, 5, 7, 3, 4, 6}
{1, 1, 0, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	6	2	-4	3
2	5	-1	-4	3	-1	7	-6
3	7	4	-1	-2	6	-5	-1
4	-6	-3	2	-1	7	1	-5
5	-2	1	-6	-7	-1	3	4
6	4	-7	5	-1	-3	-1	2
7	-3	6	1	5	-4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=1 Hex=02 L fp_sm=3

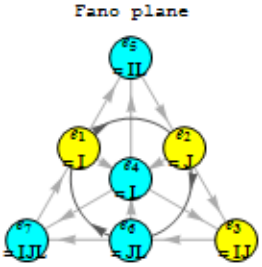
{{1, 2, 6}, {1, 4, 3}, {1, 5, 7},
{2, 3, 5}, {2, 4, 7}, {3, 6, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

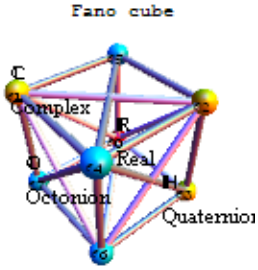
Flattened triad/mask bits

{1, 2, 6, 4, 3, 5, 7}
{0, 1, 0, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	7	-2	-5
2	-6	-1	5	7	-3	1	-4
3	4	-5	-1	-1	2	7	-6
4	-3	-7	1	-1	6	-5	2
5	-7	3	-2	-6	-1	4	1
6	2	-1	-7	5	-4	-1	3
7	5	4	6	-2	-1	-3	-1

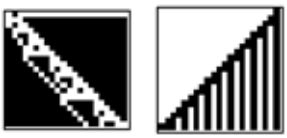
multiplication table

79 $\overline{u}_{g_d}\ \overset{-\frac{2}{3}\to\frac{1}{3}}{\underset{L}{\vee}}$ Ref. Symbols: 2D 3D

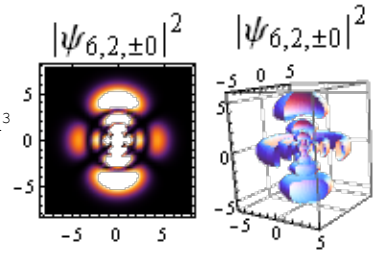
0apccssgg	Root{	3	2	4	3	2	2	1	2 }	Exp. m 2.2 MeV
011100001_2	Weight{	0	1	-1	0	0	0	1	0 }	Theo. m 1.60535
	Height= 20									Exp. τ ? s

Binary{	0	0	1	0	1	0	1	0	}
E8{	0	0	0	-1	0	0	1	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{105}Db[Rn]$7s^2 5f^{14} 6d^3$



Flipped

Octonion triads-fPi=17 Sign mask=1 Hex=73 L fp_sm=8

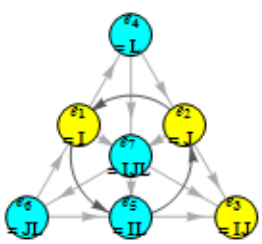
{{1, 5, 2}, {1, 7, 3}, {1, 4, 6},
{2, 3, 4}, {2, 7, 6}, {3, 6, 5}, {4, 7, 5}}

Flattened triad/mask bits

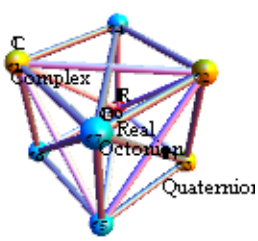
{1, 2, 5, 7, 3, 4, 6}
{1, 1, 0, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	6	2	-4	3
2	5	-1	4	-3	-1	-7	6
3	7	-4	-1	2	-6	5	-1
4	-6	3	-2	-1	-7	1	5
5	-2	1	6	7	-1	-3	-4
6	4	7	-5	-1	3	-1	-2
7	-3	-6	1	-5	4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=1 Hex=7A L fp_sm=3

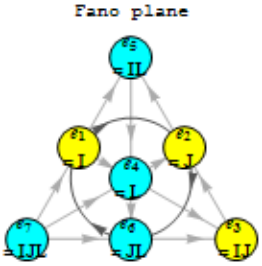
{{1, 2, 6}, {1, 4, 3}, {1, 5, 7},
{2, 5, 3}, {2, 7, 4}, {3, 7, 6}, {4, 6, 5}}

Flattened triad/mask bits

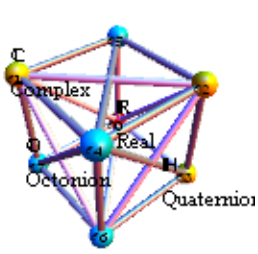
{1, 2, 6, 4, 3, 5, 7}
{0, 1, 0, 1, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



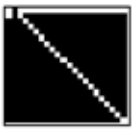
0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	7	-2	-5
2	-6	-1	-5	-7	3	1	4
3	4	5	-1	-1	-2	-7	6
4	-3	7	1	-1	-6	5	-2
5	-7	-3	2	6	-1	-4	1
6	2	-1	7	-5	4	-1	-3
7	5	-4	-6	2	-1	3	-1

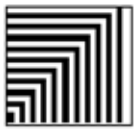
multiplication table

70 $\overline{u}_{g_1}\hat{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

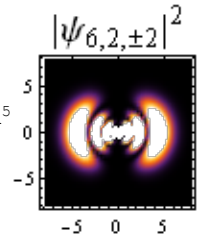
0apccssgg 011100101_2	Root{	3	2	4	3	3	2	1	2 }	Exp. m 2.2 MeV
	Weight{	0	0	1	-1	0	0	1	0 }	Theo. m 1.60535
	Height=	21								Exp. τ ? s
Binary{	0	1	0	0	1	0	0	1	}	
E8{	0	0	-1	0	0	0	1	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

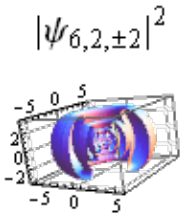
Bit NKS CA Pascal E8





^{107}Bh[Rn]$7s^2 5f^{14} 6d^5$





Flipped

Octonion triads-fPi=17 Sign mask=2 Hex=6D L fp_sm=8

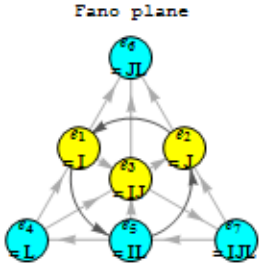
{{1, 5, 2}, {1, 3, 7}, {1, 6, 4},
{2, 4, 3}, {2, 6, 7}, {3, 6, 5}, {4, 7, 5}}

Coxeter (Cyan)

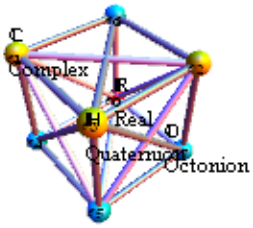
Flattened triad/mask bits

{1, 2, 5, 3, 7, 6, 4}
{1, 0, 1, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	-6	2	4	-3
2	5	-1	-4	3	-1	7	-6
3	-7	4	-1	-2	-6	5	1
4	6	-3	2	-1	-7	-1	5
5	-2	1	6	7	-1	-3	-4
6	-4	-7	-5	1	3	-1	2
7	3	6	-1	-5	4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=2 Hex=64 L fp_sm=3

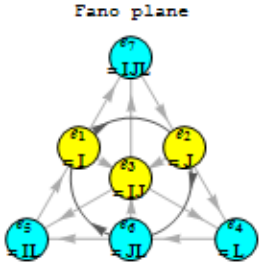
{{1, 2, 6}, {1, 3, 4}, {1, 7, 5},
{2, 3, 5}, {2, 4, 7}, {3, 7, 6}, {4, 6, 5}}

HoffmanSingleton (Yellow)

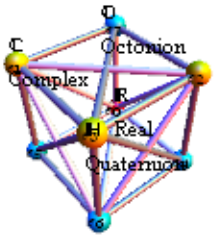
Flattened triad/mask bits

{1, 2, 6, 3, 4, 7, 5}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	-7	-2	5
2	-6	-1	5	7	-3	1	-4
3	-4	-5	-1	1	2	-7	6
4	3	-7	-1	-1	-6	5	2
5	7	3	-2	6	-1	-4	-1
6	2	-1	7	-5	4	-1	-3
7	-5	4	-6	-2	1	3	-1

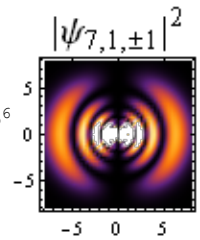
multiplication table

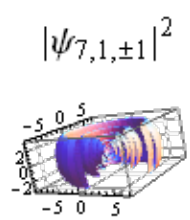
76 $d_{c_1 \hat{R}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 000100101_2	Root{	-4	-3	-6	-5	-4	-2	-1	-2 }
	Weight{	0	1	-1	0	0	0	0	0 }
	Height=	28							
Exp. m	5. MeV								
Theo. m	3.2107								
Exp. τ	? s								
Binary{	0	0	1	1	0	0	1	0	}
E8{	0	0	0	-1	0	0	-1	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{118}Uuo[Rn]$7s^2 5f^{14} 6d^{10} 7p^6$





Flipped

Octonion triads-fPi=17 Sign mask=2 Hex=15 L fp_sm=8

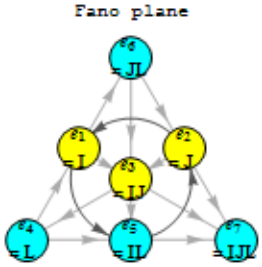
{{1, 5, 2}, {1, 3, 7}, {1, 6, 4},
{2, 3, 4}, {2, 7, 6}, {3, 5, 6}, {4, 5, 7}}

Coxeter (Cyan)

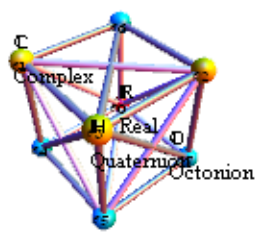
Flattened triad/mask bits

{1, 2, 5, 3, 7, 6, 4}
{1, 0, 1, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	-6	2	4	-3
2	5	-1	4	-3	-1	-7	6
3	-7	-4	-1	2	6	-5	1
4	6	3	-2	-1	7	-1	-5
5	-2	1	-6	-7	-1	3	4
6	-4	7	5	1	-3	-1	-2
7	3	-6	-1	5	-4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=2 Hex=1C L fp_sm=3

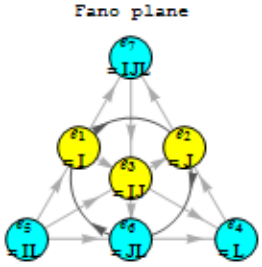
{{1, 2, 6}, {1, 3, 4}, {1, 7, 5},
{2, 5, 3}, {2, 7, 4}, {3, 6, 7}, {4, 5, 6}}

HoffmanSingleton (Yellow)

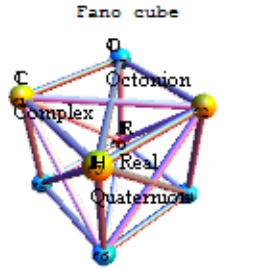
Flattened triad/mask bits

{1, 2, 6, 3, 4, 7, 5}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	-7	-2	5
2	-6	-1	-5	-7	3	1	4
3	-4	5	-1	1	-2	7	-6
4	3	7	-1	-1	6	-5	-2
5	7	-3	2	-6	-1	4	-1
6	2	-1	-7	5	-4	-1	3
7	-5	-4	6	2	1	-3	-1

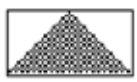
multiplication table

59 $\overline{u}_{g_m \hat{L}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

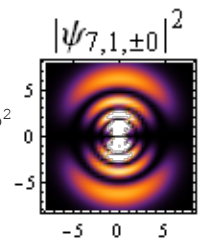
0apccssgg	Root{	4	2	5	4	3	2	1	2 }	Exp. m	2.2 MeV
011101001_2	Weight{	0	0	0	0	0	1	0	-1 }	Theo. m	1.60535
	Height= 24									Exp. τ	? s

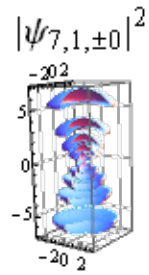
Binary{	0	1	1	1	0	0	0	0 }
E8{	0	-1	0	0	0	0	1	0 }
Physics {	0	-1	0	0	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8



^{114}Uuq[Rn]$7s^2 5f^{14} 6d^{10} 7p^2$





Flipped

Octonion triads-fPi=17 Sign mask=3 Hex=5E L fp_sm=8

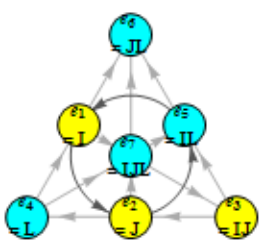
{{1, 2, 5}, {1, 7, 3}, {1, 6, 4},
{2, 4, 3}, {2, 7, 6}, {3, 5, 6}, {4, 7, 5}}

Flattened triad/mask bits

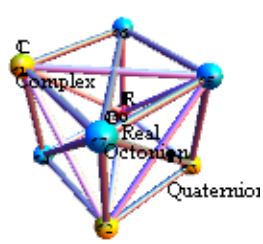
{1, 5, 2, 7, 3, 6, 4}
{0, 1, 1, 1, 1, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	-6	-2	4	3
2	-5	-1	-4	3	1	-7	6
3	7	4	-1	-2	6	-5	-1
4	6	-3	2	-1	-7	-1	5
5	2	-1	-6	7	-1	3	-4
6	-4	7	5	1	-3	-1	-2
7	-3	-6	1	-5	4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=3 Hex=57 L fp_sm=3

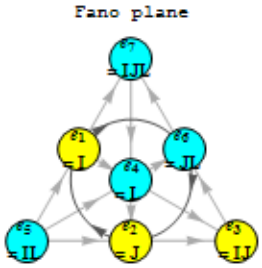
{{1, 6, 2}, {1, 4, 3}, {1, 7, 5},
{2, 3, 5}, {2, 7, 4}, {3, 6, 7}, {4, 6, 5}}

Flattened triad/mask bits

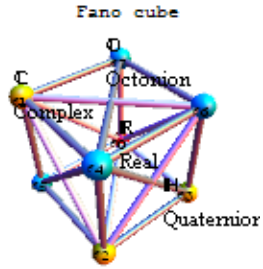
{1, 6, 2, 4, 3, 7, 5}
{1, 1, 1, 0, 1, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	-7	2	5
2	6	-1	5	-7	-3	-1	4
3	4	-5	-1	-1	2	7	-6
4	-3	7	1	-1	-6	5	-2
5	7	3	-2	6	-1	-4	-1
6	-2	1	-7	-5	4	-1	3
7	-5	-4	6	2	1	-3	-1

multiplication table

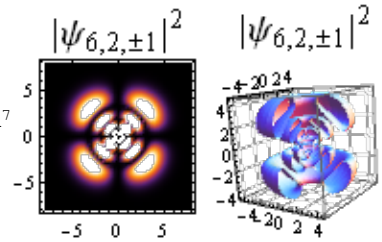
211 $d_{C_m \hat{L}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-2	-4	-4	-3	-2	-1	-2 }	Exp. m 5. MeV
000101001_2	Weight{	0	0	0	-1	1	0	-1	0 }	Theo. m 3.2107
	Height= 22									Exp. τ ? s

Binary{	0	1	0	1	1	0	1	1	}
E8{	1	0	0	0	0	0	-1	0	}
Physics {	1	0	0	0	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{109}Mt[Rn]$7s^2 5f^{14} 6d^7$



Flipped

Octonion triads-fPi=17 Sign mask=3 Hex=26 L fp_sm=8

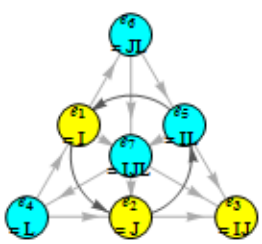
{{1, 2, 5}, {1, 7, 3}, {1, 6, 4},
{2, 3, 4}, {2, 6, 7}, {3, 6, 5}, {4, 5, 7}}

Coxeter (Cyan)

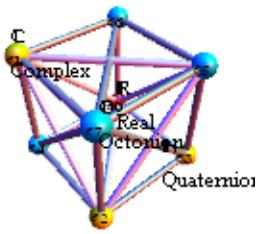
Flattened triad/mask bits

{1, 5, 2, 7, 3, 6, 4}
{0, 1, 1, 0, 0, 1, 0}

Fano plane



Fano cube



$0 \mapsto 1$	1	2	3	4	5	6	7
1	-1	5	-7	-6	-2	4	3
2	-5	-1	4	-3	1	7	-6
3	7	-4	-1	2	-6	5	-1
4	6	3	-2	-1	7	-1	-5
5	2	-1	6	-7	-1	-3	4
6	-4	-7	-5	1	3	-1	2
7	-3	6	1	5	-4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=3 Hex=2F L fp_sm=3

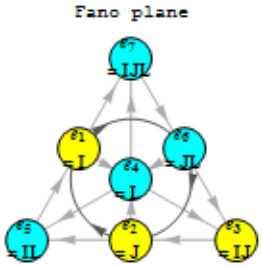
{{1, 6, 2}, {1, 4, 3}, {1, 7, 5},
{2, 5, 3}, {2, 4, 7}, {3, 7, 6}, {4, 5, 6}}

HoffmanSingleton (Yellow)

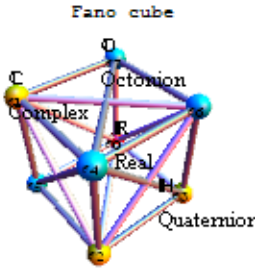
Flattened triad/mask bits

{1, 6, 2, 4, 3, 7, 5}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



$0 \mapsto 1$	1	2	3	4	5	6	7
1	-1	-6	-4	3	-7	2	5
2	6	-1	-5	7	3	-1	-4
3	4	5	-1	-1	-2	-7	6
4	-3	-7	1	-1	6	-5	2
5	7	-3	2	-6	-1	4	-1
6	-2	1	7	5	-4	-1	-3
7	-5	4	-6	-2	1	3	-1

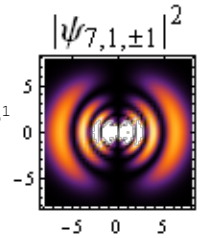
multiplication table

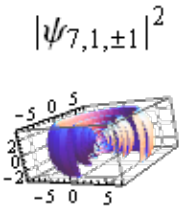
56 $d_{C_m \vee R}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-3	-5	-4	-3	-2	-1	-2 }	Exp. m 5. MeV
000101101_2	Weight{	0	0	0	0	0	1	-1	-1 }	Theo. m 3.2107
	Height= 24									Exp. τ ? s
Binary{	1	0	0	0	0	1	1	0	}	
E8{	0	-1	0	0	0	0	-1	0	}	
Physics {	0	-1	0	0	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

^{113}Uut[Rn]$7s^2 5f^{14} 6d^{10} 7p^1$





Flipped

Octonion triads-fPi=17 Sign mask=4 Hex=38 L fp_sm=8

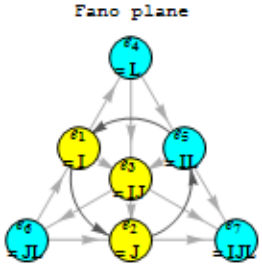
{{1, 2, 5}, {1, 3, 7}, {1, 4, 6},
{2, 4, 3}, {2, 7, 6}, {3, 6, 5}, {4, 5, 7}}

Coxeter (Cyan)

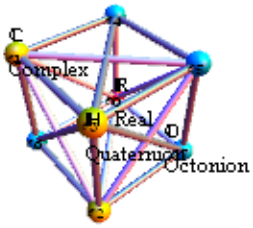
Flattened triad/mask bits

{1, **5**, **2**, 3, 7, 4, 6}
{0, 0, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	7	6	-2	-4	-3
2	-5	-1	-4	3	1	-7	6
3	-7	4	-1	-2	-6	5	1
4	-6	-3	2	-1	7	1	-5
5	2	-1	6	-7	-1	-3	4
6	4	7	-5	-1	3	-1	-2
7	3	-6	-1	5	-4	2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=4 Hex=31 L fp_sm=3

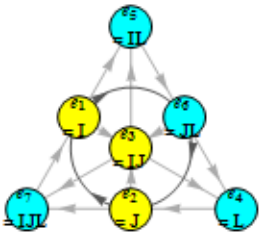
{{1, 6, 2}, {1, 3, 4}, {1, 5, 7},
{2, 3, 5}, {2, 7, 4}, {3, 7, 6}, {4, 5, 6}}

HoffmanSingleton (Yellow)

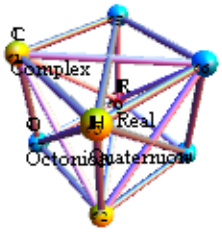
Flattened triad/mask bits

{1, 6, 2, 3, 4, 5, 7}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	7	2	-5
2	6	-1	5	-7	-3	-1	4
3	-4	-5	-1	1	2	-7	6
4	3	7	-1	-1	6	-5	-2
5	-7	3	-2	-6	-1	4	1
6	-2	1	7	5	-4	-1	-3
7	5	-4	-6	2	-1	3	-1

multiplication table

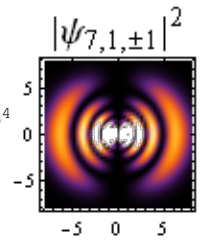
214 $\overline{u}_{g_m}^{\,-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

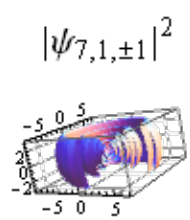
0apccssgg	Root{	4	3	6	4	3	2	1	2 }	Exp. m 2.2 MeV
011101101_2	Weight{	0	0	0	-1	1	0	0	0 }	Theo. m 1.60535
	Height= 26									Exp. τ ? s

Binary{	0	0	1	1	1	1	1	0 }
E8{	1	0	0	0	0	0	1	0 }
Physics {	1	0	0	0	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{116}Uuh[Rn]$7s^2 5f^{14} 6d^{10} 7p^4$





Flipped

Octonion triads-fPi=17 Sign mask=4 Hex=40 L fp_sm=8

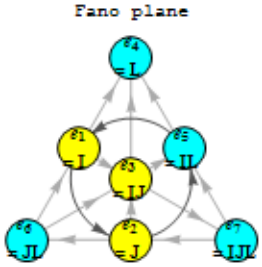
{{1, 2, 5}, {1, 3, 7}, {1, 4, 6},
{2, 3, 4}, {2, 6, 7}, {3, 5, 6}, {4, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, **5**, **2**, 3, 7, 4, 6}
{0, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	5	7	6	-2	-4	-3
2	-5	-1	4	-3	1	7	-6
3	-7	-4	-1	2	6	-5	1
4	-6	3	-2	-1	-7	1	5
5	2	-1	-6	7	-1	3	-4
6	4	-7	5	-1	-3	-1	2
7	3	6	-1	-5	4	-2	-1

multiplication table

Not Flipped

Octonion triads-fPi=19 Sign mask=4 Hex=49 L fp_sm=3

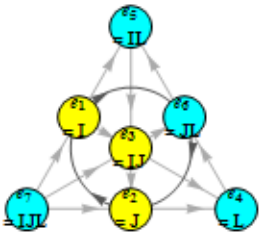
{{1, 6, 2}, {1, 3, 4}, {1, 5, 7},
{2, 5, 3}, {2, 4, 7}, {3, 6, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

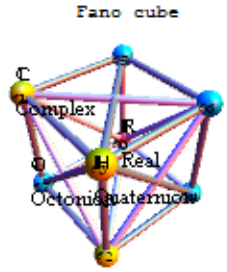
Flattened triad/mask bits

{1, 6, 2, 3, 4, 5, 7}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	7	2	-5
2	6	-1	-5	7	3	-1	-4
3	-4	5	-1	1	-2	7	-6
4	3	-7	-1	-1	-6	5	2
5	-7	-3	2	6	-1	-4	1
6	-2	1	-7	-5	4	-1	3
7	5	4	6	-2	-1	-3	-1

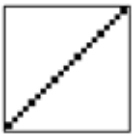
multiplication table

111 $\overline{C}_{g_d}\ \check{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

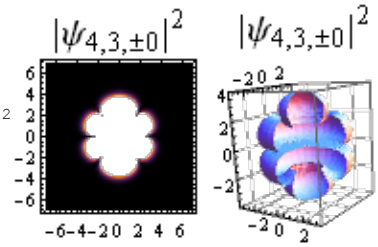
0apccssgg	Root{	2	1	3	2	1	0	0	1 }	Exp. m 1250. MeV
011100010_2	Weight{	0	-1	0	0	1	0	0	-1 }	Theo. m 1319.95
	Height= 11									Exp. τ ? s

Binary{	1	0	1	1	0	0	1	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{68}Er[Xe]$6s^2 4f^{12}$



Flipped

Octonion triads-fPi=18 Sign mask=1 Hex=71 R fp_sm=6

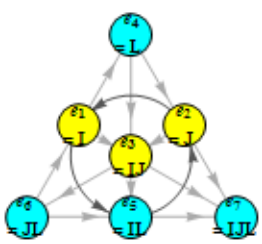
{{1, 5, 2}, {1, 3, 7}, {1, 4, 6},
{2, 3, 6}, {2, 7, 4}, {3, 5, 4}, {5, 7, 6}}

Flattened triad/mask bits

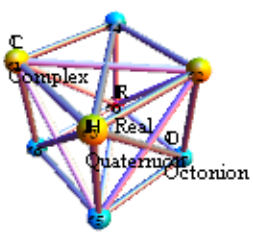
{1, 2, 5, 3, 7, 4, 6}
{1, 0, 0, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	6	2	-4	-3
2	5	-1	6	-7	-1	-3	4
3	-7	-6	-1	-5	4	2	1
4	-6	7	5	-1	-3	1	-2
5	-2	1	-4	3	-1	-7	6
6	4	3	-2	-1	7	-1	-5
7	3	-4	-1	2	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=1 Hex=78 R fp_sm=1

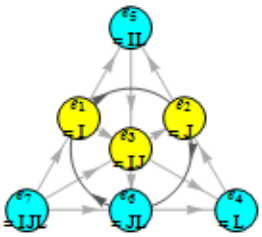
{{1, 2, 6}, {1, 3, 4}, {1, 5, 7},
{2, 7, 3}, {2, 5, 4}, {3, 6, 5}, {4, 7, 6}}

Flattened triad/mask bits

{1, 2, 6, 3, 4, 5, 7}
{0, 0, 0, 1, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	7	-2	-5
2	-6	-1	-7	-5	4	1	3
3	-4	7	-1	1	-6	5	-2
4	3	5	-1	-1	-2	-7	6
5	-7	-4	6	2	-1	-3	1
6	2	-1	-5	7	3	-1	-4
7	5	-3	2	-6	-1	4	-1

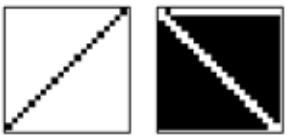
multiplication table

242 $s_{\substack{C_d \\ L}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

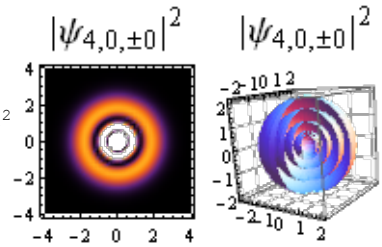
0apccssgg	Root{	-1	0	-1	0	0	0	0	-1 }	Exp. m	95. MeV
000100010_2	Weight{	0	0	0	1	-1	0	-1	1 }	Theo. m	98.1056
	Height=	4								Exp. τ	? s

Binary{	0	1	1	1	1	1	0	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{20}Ca[Ar]4s^2



Flipped

Octonion triads-fPi=18 Sign mask=1 Hex=09 R fp_sm=6

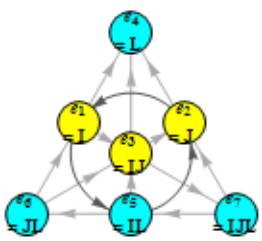
{{1, 5, 2}, {1, 3, 7}, {1, 4, 6},
{2, 6, 3}, {2, 4, 7}, {3, 4, 5}, {5, 6, 7}}

Flattened triad/mask bits

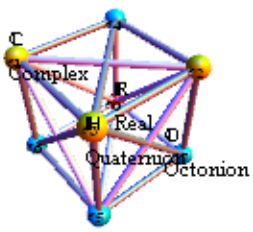
{1, 2, 5, 3, 7, 4, 6}
{1, 0, 0, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	6	2	-4	-3
2	5	-1	-6	7	-1	3	-4
3	-7	6	-1	5	-4	-2	1
4	-6	-7	-5	-1	3	1	2
5	-2	1	4	-3	-1	7	-6
6	4	-3	2	-1	-7	-1	5
7	3	4	-1	-2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=1 Hex=00 R fp_sm=1

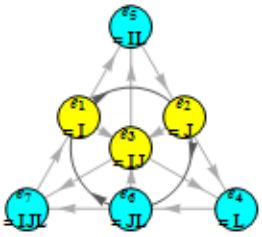
{{1, 2, 6}, {1, 3, 4}, {1, 5, 7},
{2, 3, 7}, {2, 4, 5}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

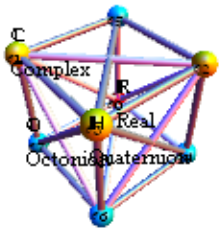
{1, 2, 6, 3, 4, 5, 7}
{0, 0, 0, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	7	-2	-5
2	-6	-1	7	5	-4	1	-3
3	-4	-7	-1	1	6	-5	2
4	3	-5	-1	-1	2	7	-6
5	-7	4	-6	-2	-1	3	1
6	2	-1	5	-7	-3	-1	4
7	5	3	-2	6	-1	-4	-1

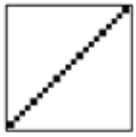
multiplication table

131 $\overline{C}_{g_1}\hat{R}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

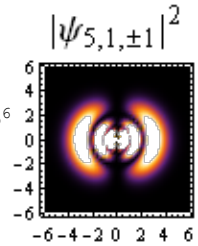
0apccssgg	Root{ 1 1 2 2 1 0 0 1 }	Exp. m	1250. MeV
011100110_2	Weight{ 0 -1 0 1 0 -1 1 0 }	Theo. m	1319.95
	Height= 9	Exp. τ	? s

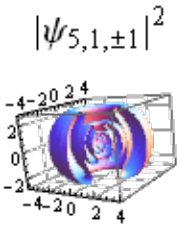
Binary{	0	1	1	1	0	0	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



$^{54}Xe[Kr]5s^2 4d^{10} 5p^6$





Flipped

Octonion triads-fPi=18 Sign mask=2 Hex=6F R fp_sm=6

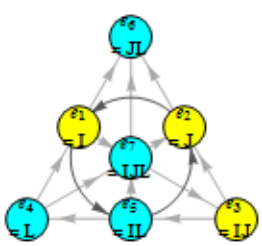
{{1, 5, 2}, {1, 7, 3}, {1, 6, 4},
{2, 6, 3}, {2, 4, 7}, {3, 5, 4}, {5, 7, 6}}

Flattened triad/mask bits

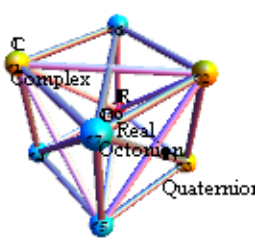
{1, 2, 5, 7, 3, 6, 4}
{1, 1, 1, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	-6	2	4	3
2	5	-1	-6	7	-1	3	-4
3	7	6	-1	-5	4	-2	-1
4	6	-7	5	-1	-3	-1	2
5	-2	1	-4	3	-1	-7	6
6	-4	-3	2	1	7	-1	-5
7	-3	4	1	-2	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=2 Hex=66 R fp_sm=1

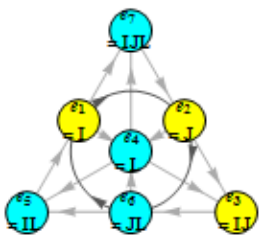
{{1, 2, 6}, {1, 4, 3}, {1, 7, 5},
{2, 3, 7}, {2, 4, 5}, {3, 6, 5}, {4, 7, 6}}

Flattened triad/mask bits

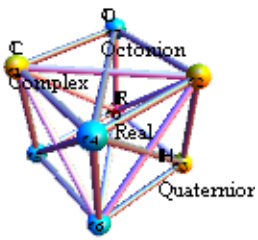
{1, 2, 6, 4, 3, 7, 5}
{0, 1, 1, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	-7	-2	5
2	-6	-1	7	5	-4	1	-3
3	4	-7	-1	-1	-6	5	2
4	-3	-5	1	-1	2	-7	6
5	7	4	6	-2	-1	-3	-1
6	2	-1	-5	7	3	-1	-4
7	-5	3	-2	-6	1	4	-1

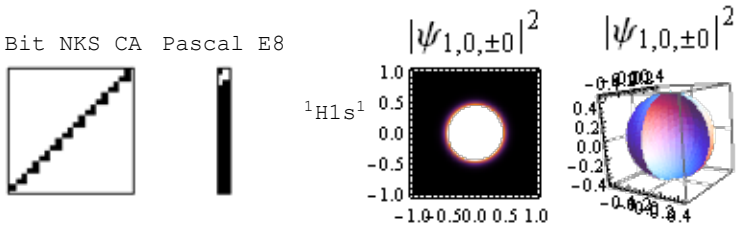
multiplication table

236 $s_{C_1 \hat{R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 0 0 0 0 0 0 0 -1 }	Exp. m	95. MeV
000100110_2	Weight{ 0 0 0 0 0 1 -2 0 }	Theo. m	98.1056
	Height= 2	Exp. τ	? s

Binary{	1	0	1	1	1	1	0	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



Flipped

Octonion triads-fPi=18 Sign mask=2 Hex=17 R fp_sm=6

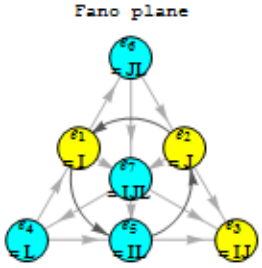
{{1, 5, 2}, {1, 7, 3}, {1, 6, 4},
{2, 3, 6}, {2, 7, 4}, {3, 4, 5}, {5, 6, 7}}

Flattened triad/mask bits

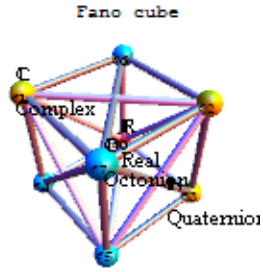
{1, 2, 5, 7, 3, 6, 4}
{1, 1, 1, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	-6	2	4	3
2	5	-1	6	-7	-1	-3	4
3	7	-6	-1	5	-4	2	-1
4	6	7	-5	-1	3	-1	-2
5	-2	1	4	-3	-1	7	-6
6	-4	3	-2	1	-7	-1	5
7	-3	-4	1	2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=2 Hex=1E R fp_sm=1

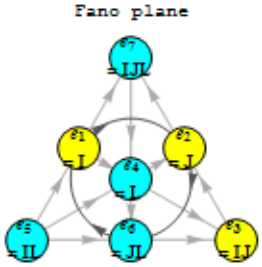
{{1, 2, 6}, {1, 4, 3}, {1, 7, 5},
{2, 7, 3}, {2, 5, 4}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

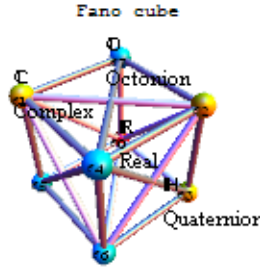
{1, 2, 6, 4, 3, 7, 5}
{0, 1, 1, 1, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	-7	-2	5
2	-6	-1	-7	-5	4	1	3
3	4	7	-1	-1	6	-5	-2
4	-3	5	1	-1	-2	7	-6
5	7	-4	-6	2	-1	3	-1
6	2	-1	5	-7	-3	-1	4
7	-5	-3	2	6	1	-4	-1

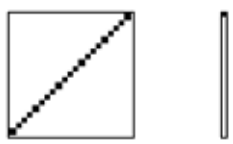
multiplication table

97 $\overline{C}_{g_m \hat{L}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

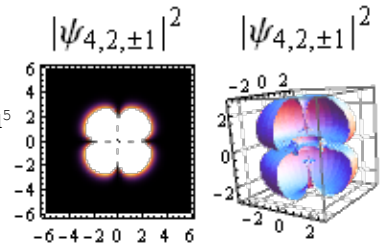
0apccssgg 011101010_2	Root{ 1 1 2 1 0 0 0 1 } Weight{ 0 0 -1 0 1 -1 1 0 } Height= 7	Exp. m Theo. m Exp. τ	1250. MeV 1319.95 ? s

Binary{	1	1	1	0	0	0	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{42}Mo[Kr]5s^{1}4d^5



Flipped

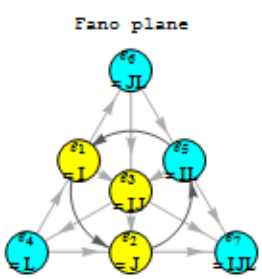
Octonion triads-fPi=18 Sign mask=3 Hex=5C R fp_sm=6

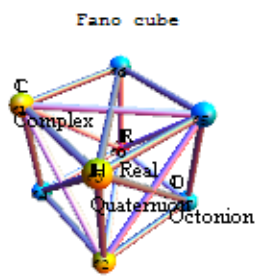
{{1, 2, 5}, {1, 3, 7}, {1, 6, 4},
{2, 6, 3}, {2, 7, 4}, {3, 4, 5}, {5, 7, 6}}

Flattened triad/mask bits

{1, 5, 2, 3, 7, 6, 4}
{0, 0, 1, 1, 1, 0, 1}

HoffmanSingleton (Yellow)





0↦1	1	2	3	4	5	6	7
1	-1	5	7	-6	-2	4	-3
2	-5	-1	-6	-7	1	3	4
3	-7	6	-1	5	-4	-2	1
4	6	7	-5	-1	3	-1	-2
5	2	-1	4	-3	-1	-7	6
6	-4	-3	2	1	7	-1	-5
7	3	-4	-1	2	-6	5	-1

multiplication table

Not Flipped

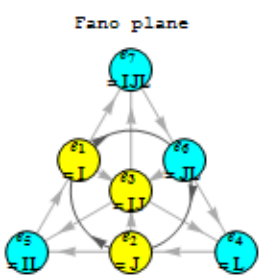
Octonion triads-fPi=20 Sign mask=3 Hex=55 R fp_sm=1

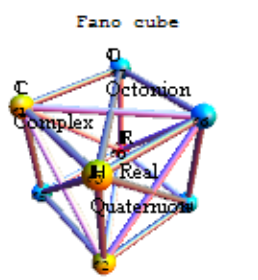
{{1, 6, 2}, {1, 3, 4}, {1, 7, 5},
{2, 3, 7}, {2, 5, 4}, {3, 5, 6}, {4, 7, 6}}

Flattened triad/mask bits

{1, 6, 2, 3, 4, 7, 5}
{1, 0, 1, 0, 1, 0, 1}

Coxeter (Cyan)





0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	-7	2	5
2	6	-1	7	-5	4	-1	-3
3	-4	-7	-1	1	6	-5	2
4	3	5	-1	-1	-2	-7	6
5	7	-4	-6	2	-1	3	-1
6	-2	1	5	7	-3	-1	-4
7	-5	3	-2	-6	1	4	-1

multiplication table

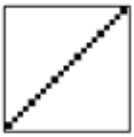
231 $s_{C_m}^{-\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	0	-1	-1	0	0	0	-1	}
000101010_2	Weight{	0	0	1	-1	0	0	-1	1	}
	Height=	5								

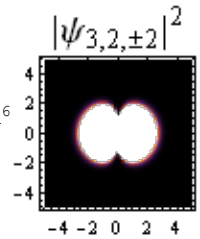
Exp. m 95. MeV
Theo. m 98.1056
Exp. τ ? s

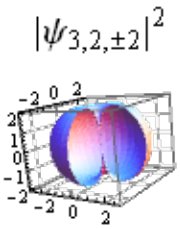
Binary{	1	1	0	1	1	1	0	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{26}Fe[Ar]4s^{2}3d^6





Flipped

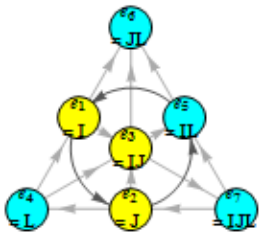
Octonion triads-fPi=18 Sign mask=3 Hex=24 R fp_sm=6

{{1, 2, 5}, {1, 3, 7}, {1, 6, 4},
{2, 3, 6}, {2, 4, 7}, {3, 5, 4}, {5, 6, 7}}

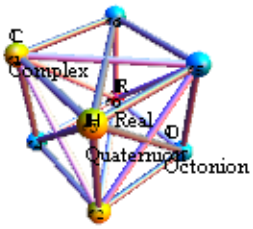
Flattened triad/mask bits
{1, 5, 2, 3, 7, 6, 4}
{0, 0, 1, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	7	-6	-2	4	-3
2	-5	-1	6	7	1	-3	-4
3	-7	-6	-1	-5	4	2	1
4	6	-7	5	-1	-3	-1	2
5	2	-1	-4	3	-1	7	-6
6	-4	3	-2	1	-7	-1	5
7	3	4	-1	-2	6	-5	-1

multiplication table

Not Flipped

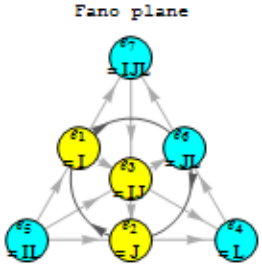
Octonion triads-fPi=20 Sign mask=3 Hex=2D R fp_sm=1

{{1, 6, 2}, {1, 3, 4}, {1, 7, 5},
{2, 7, 3}, {2, 4, 5}, {3, 6, 5}, {4, 6, 7}}

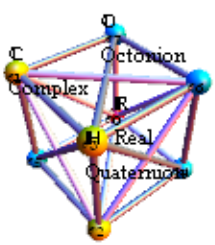
Flattened triad/mask bits
{1, 6, 2, 3, 4, 7, 5}
{1, 0, 1, 1, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	-7	2	5
2	6	-1	-7	5	-4	-1	3
3	-4	7	-1	1	-6	5	-2
4	3	-5	-1	-1	2	7	-6
5	7	4	6	-2	-1	-3	-1
6	-2	1	-5	-7	3	-1	4
7	-5	-3	2	6	1	-4	-1

multiplication table

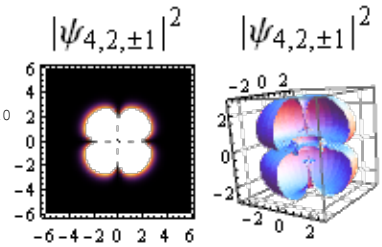
101 $\frac{\bar{C}}{g_m} \sqrt{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 011101110_2	Root{ 1 1 2 1 1 0 0 1 } Weight{ 0 -1 1 -1 1 -1 1 0 } Height= 8	Exp. m Theo. m Exp. τ	1250. MeV 1319.95 ? s

Binary{	1	1	0	1	0	0	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{47}Ag[Kr]5s^{1}4d^{10}



Flipped

Octonion triads-fPi=18 Sign mask=4 Hex=42 R fp_sm=6

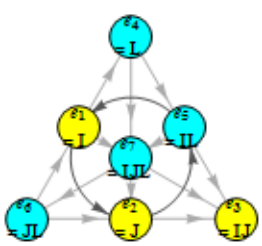
{{1, 2, 5}, {1, 7, 3}, {1, 4, 6},
{2, 3, 6}, {2, 4, 7}, {3, 4, 5}, {5, 7, 6}}

Flattened triad/mask bits

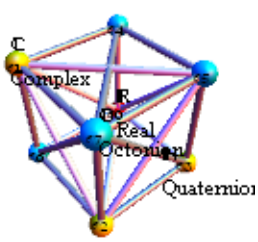
{1, 5, 2, 7, 3, 4, 6}
{0, 1, 0, 0, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	6	-2	-4	3
2	-5	-1	6	7	1	-3	-4
3	7	-6	-1	5	-4	2	-1
4	-6	-7	-5	-1	3	1	2
5	2	-1	4	-3	-1	-7	6
6	4	3	-2	-1	7	-1	-5
7	-3	4	1	-2	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=4 Hex=4B R fp_sm=1

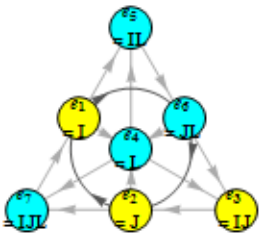
{{1, 6, 2}, {1, 4, 3}, {1, 5, 7},
{2, 7, 3}, {2, 4, 5}, {3, 5, 6}, {4, 7, 6}}

Flattened triad/mask bits

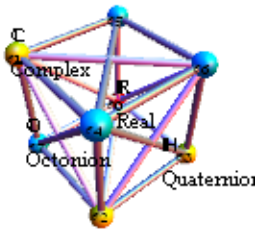
{1, 6, 2, 4, 3, 5, 7}
{1, 1, 0, 1, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



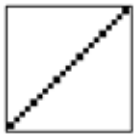
0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	7	2	-5
2	6	-1	-7	5	-4	-1	3
3	4	7	-1	-1	6	-5	-2
4	-3	-5	1	-1	2	-7	6
5	-7	4	-6	-2	-1	3	1
6	-2	1	5	7	-3	-1	-4
7	5	-3	2	-6	-1	4	-1

multiplication table

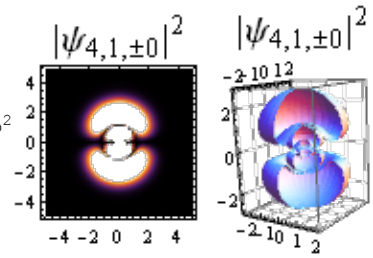
227 $s_{C_m R}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	0	-1	-1	-1	0	0	-1 }	Exp. m	95. MeV					
000101110_2	Weight{	0	1	-1	0	0	0	-1	1 }	Theo. m	98.1056					
	Height=	6								Exp. τ	? s					
Binary{	1	1	1	0	1	1	0	1 }								
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }								
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }								

Bit NKS CA Pascal E8



^{32}Ge[Ar]$4s^2 3d^{10} 4p^2$



Flipped

Octonion triads-fPi=18 Sign mask=4 Hex=3A R fp_sm=6

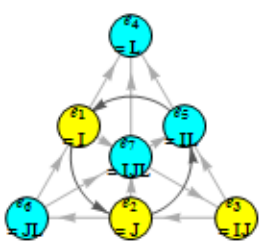
{{1, 2, 5}, {1, 7, 3}, {1, 4, 6},
{2, 6, 3}, {2, 7, 4}, {3, 5, 4}, {5, 6, 7}}

Flattened triad/mask bits

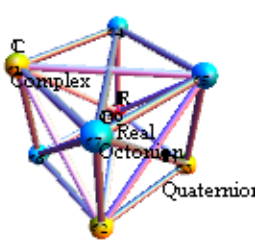
{1, 5, 2, 7, 3, 4, 6}
{0, 1, 0, 1, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	6	-2	-4	3
2	-5	-1	-6	-7	1	3	4
3	7	6	-1	-5	4	-2	-1
4	-6	7	5	-1	-3	1	-2
5	2	-1	-4	3	-1	7	-6
6	4	-3	2	-1	-7	-1	5
7	-3	-4	1	2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=20 Sign mask=4 Hex=33 R fp_sm=1

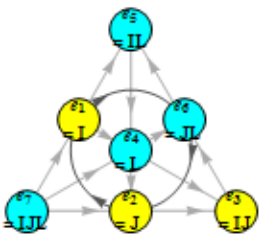
{{1, 6, 2}, {1, 4, 3}, {1, 5, 7},
{2, 3, 7}, {2, 5, 4}, {3, 6, 5}, {4, 6, 7}}

Flattened triad/mask bits

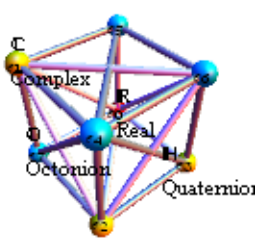
{1, 6, 2, 4, 3, 5, 7}
{1, 1, 0, 0, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	7	2	-5
2	6	-1	7	-5	4	-1	-3
3	4	-7	-1	-1	-6	5	2
4	-3	5	1	-1	-2	7	-6
5	-7	-4	6	2	-1	-3	1
6	-2	1	-5	-7	3	-1	4
7	5	3	-2	6	-1	-4	-1

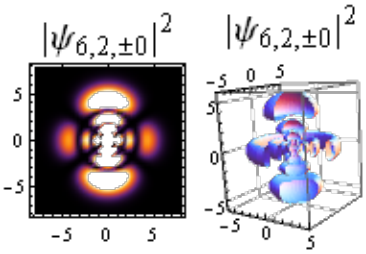
multiplication table

178 $u_{g_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-2	-4	-3	-2	-2	-1	-2 }	Exp. m 2.2 MeV
001100001_2	Weight{	0	-1	1	0	0	0	-1	0 }	Theo. m 1.60535
	Height= 20									Exp. τ ? s
Binary{	1	1	0	1	0	1	0	1	}	
E8{	0	0	0	1	0	0	-1	0	}	
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8

^{105}Db[Rn]$7s^2 5f^{14} 6d^3$



Flipped

Octonion triads-fPi=19 Sign mask=1 Hex=05 L fp_sm=3

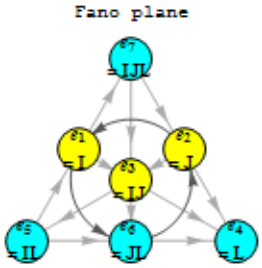
{{1, 6, 2}, {1, 3, 4}, {1, 7, 5},
{2, 3, 5}, {2, 4, 7}, {3, 6, 7}, {4, 5, 6}}

Flattened triad/mask bits

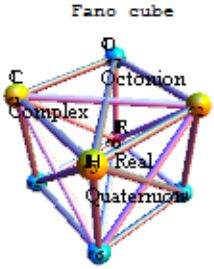
{1, 2, 6, 3, 4, 7, 5}
{1, 0, 1, 0, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	-7	2	5
2	6	-1	5	7	-3	-1	-4
3	-4	-5	-1	1	2	7	-6
4	3	-7	-1	-1	6	-5	2
5	7	3	-2	-6	-1	4	-1
6	-2	1	-7	5	-4	-1	3
7	-5	4	6	-2	1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=1 Hex=0C L fp_sm=8

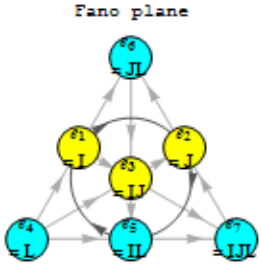
{{1, 2, 5}, {1, 3, 7}, {1, 6, 4},
{2, 4, 3}, {2, 6, 7}, {3, 5, 6}, {4, 5, 7}}

Flattened triad/mask bits

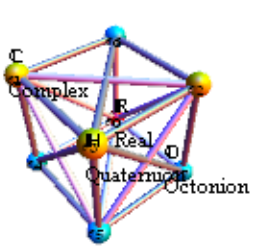
{1, 2, 5, 3, 7, 6, 4}
{0, 0, 1, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	7	-6	-2	4	-3
2	-5	-1	-4	3	1	7	-6
3	-7	4	-1	-2	6	-5	1
4	6	-3	2	-1	7	-1	-5
5	2	-1	-6	-7	-1	3	4
6	-4	-7	5	1	-3	-1	2
7	3	6	-1	5	-4	-2	-1

multiplication table

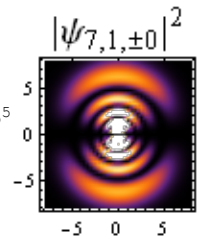
190 $\overline{d}_{C_d}^{\frac{1}{3}\to\frac{4}{3}}$ Ref. Symbols: 2D 3D

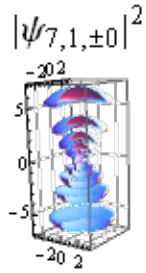
0apccssgg	Root{	4	3	6	5	3	2	1	2 }	Exp. m	5. MeV
010100001_2	Weight{	0	0	-1	1	0	0	0	0 }	Theo. m	3.2107
	Height= 27									Exp. τ	? s

Binary{	1	0	1	0	1	1	1	0	}
E8{	0	0	1	0	0	0	1	0	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{117}Uus[Rn]$7s^2 5f^{14} 6d^{10} 7p^5$





Flipped

Octonion triads-fPi=19 Sign mask=1 Hex=7D L fp_sm=3

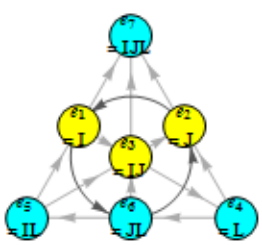
{{1, 6, 2}, {1, 3, 4}, {1, 7, 5},
{2, 5, 3}, {2, 7, 4}, {3, 7, 6}, {4, 6, 5}}

HoffmanSingleton (Yellow)

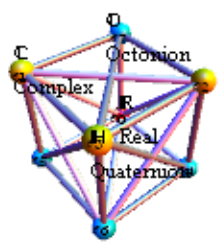
Flattened triad/mask bits

{1, 2, 6, 3, 4, 7, 5}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	-7	2	5
2	6	-1	-5	-7	3	-1	4
3	-4	5	-1	1	-2	-7	6
4	3	7	-1	-1	-6	5	-2
5	7	-3	2	6	-1	-4	-1
6	-2	1	7	-5	4	-1	-3
7	-5	-4	-6	2	1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=1 Hex=74 L fp_sm=8

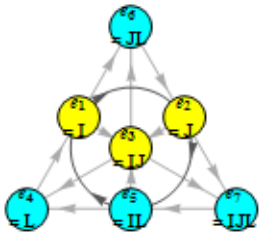
{{1, 2, 5}, {1, 3, 7}, {1, 6, 4},
{2, 3, 4}, {2, 7, 6}, {3, 6, 5}, {4, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 5, 3, 7, 6, 4}
{0, 0, 1, 0, 1, 1, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	5	7	-6	-2	4	-3
2	-5	-1	4	-3	1	-7	6
3	-7	-4	-1	2	-6	5	1
4	6	3	-2	-1	-7	-1	5
5	2	-1	6	7	-1	-3	-4
6	-4	7	-5	1	3	-1	-2
7	3	-6	-1	-5	4	2	-1

multiplication table

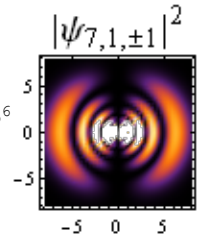
181 $\overline{d}_{C_1}^{\frac{1}{3}\hat{R}}$ Ref. Symbols: 2D 3D

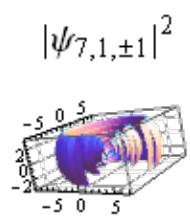
0apccssgg	Root{	4	3	6	5	4	2	1	2 }	Exp. m	5. MeV
010100101_2	Weight{	0	-1	1	0	0	0	0	0 }	Theo. m	3.2107
	Height=	28								Exp. τ	? s

Binary{	1	1	0	0	1	1	0	1	}
E8{	0	0	0	1	0	0	1	0	}
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{118}Uuo[Rn]$7s^2 5f^{14} 6d^{10} 7p^6$





Flipped

Octonion triads-fPi=19 Sign mask=2 Hex=63 L fp_sm=3

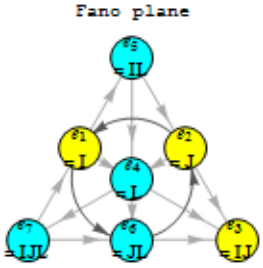
{{1, 6, 2}, {1, 4, 3}, {1, 5, 7},
{2, 3, 5}, {2, 4, 7}, {3, 7, 6}, {4, 6, 5}}

Flattened triad/mask bits

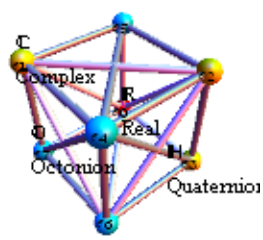
{1, **2**, **6**, 4, 3, 5, 7}
{1, 1, 0, 0, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	7	2	-5
2	6	-1	5	7	-3	-1	-4
3	4	-5	-1	-1	2	-7	6
4	-3	-7	1	-1	-6	5	2
5	-7	3	-2	6	-1	-4	1
6	-2	1	7	-5	4	-1	-3
7	5	4	-6	-2	-1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=2 Hex=6A L fp_sm=8

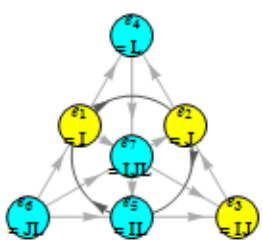
{{1, 2, 5}, {1, 7, 3}, {1, 4, 6},
{2, 4, 3}, {2, 6, 7}, {3, 6, 5}, {4, 7, 5}}

Flattened triad/mask bits

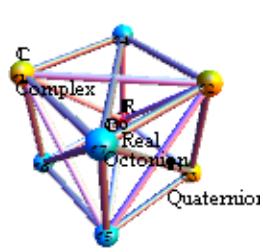
{1, 2, 5, 7, 3, 4, 6}
{0, 1, 0, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



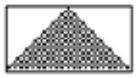
0↦1	1	2	3	4	5	6	7
1	-1	5	-7	6	-2	-4	3
2	-5	-1	-4	3	1	7	-6
3	7	4	-1	-2	-6	5	-1
4	-6	-3	2	-1	-7	1	5
5	2	-1	6	7	-1	-3	-4
6	4	-7	-5	-1	3	-1	2
7	-3	6	1	-5	4	-2	-1

multiplication table

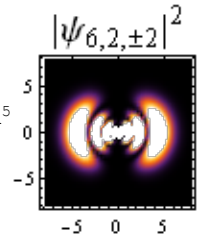
187 $u_{g_1}^{\frac{2}{3}\hat{R}}$ Ref. Symbols: 2D 3D

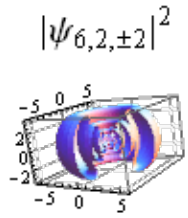
0apccssgg	Root{	-3	-2	-4	-3	-3	-2	-1	-2 }	Exp. m 2.2 MeV
001100101_2	Weight{	0	0	-1	1	0	0	-1	0 }	Theo. m 1.60535
	Height= 21									Exp. τ ? s
Binary{	1	0	1	1	0	1	1	0	}	
E8{	0	0	1	0	0	0	-1	0	}	
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



$^{107}Bh[Rn]7s^2 5f^{14} 6d^5$





Flipped

Octonion triads-fPi=19 Sign mask=2 Hex=1B L fp_sm=3

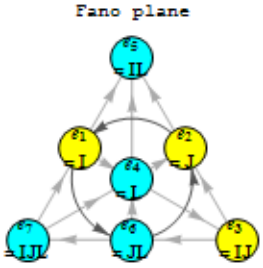
{{1, 6, 2}, {1, 4, 3}, {1, 5, 7},
{2, 5, 3}, {2, 7, 4}, {3, 6, 7}, {4, 5, 6}}

Flattened triad/mask bits

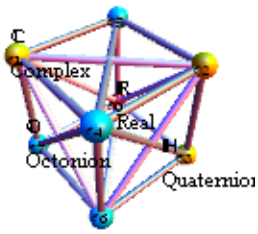
{1, 2, 6, 4, 3, 5, 7}
{1, 1, 0, 1, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	7	2	-5
2	6	-1	-5	-7	3	-1	4
3	4	5	-1	-1	-2	7	-6
4	-3	7	1	-1	6	-5	-2
5	-7	-3	2	-6	-1	4	1
6	-2	1	-7	5	-4	-1	3
7	5	-4	6	2	-1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=2 Hex=12 L fp_sm=8

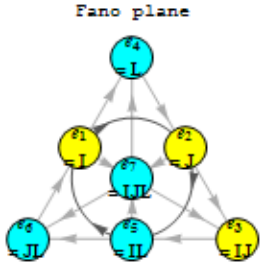
{{1, 2, 5}, {1, 7, 3}, {1, 4, 6},
{2, 3, 4}, {2, 7, 6}, {3, 5, 6}, {4, 5, 7}}

Flattened triad/mask bits

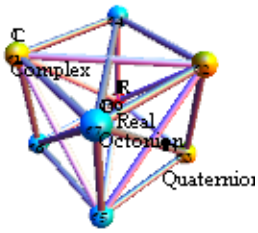
{1, 2, 5, 7, 3, 4, 6}
{0, 1, 0, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	6	-2	-4	3
2	-5	-1	4	-3	1	-7	6
3	7	-4	-1	2	6	-5	-1
4	-6	3	-2	-1	7	1	-5
5	2	-1	-6	-7	-1	3	4
6	4	7	5	-1	-3	-1	-2
7	-3	-6	1	5	-4	2	-1

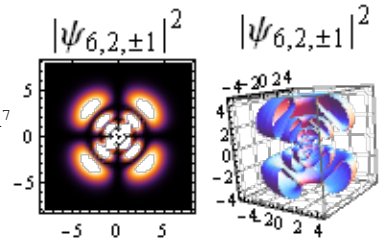
multiplication table

46 $\overline{d}_{c_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	3	2	4	4	3	2	1	2 }	Exp. m			5. MeV			
010101001_2	Weight{	0	0	0	1	-1	0	1	0 }	Theo. m			3.2107			
	Height=	22								Exp. τ			? s			
Binary{	1	0	1	0	0	1	0	0	}							
E8{	-1	0	0	0	0	0	1	0	}							
Physics {	-1	0	0	0	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}							

Bit NKS CA Pascal E8

^{109}Mt[Rn]$7s^2 5f^{14} 6d^7$



Flipped

Octonion triads-fPi=19 Sign mask=3 Hex=50 L fp_sm=3

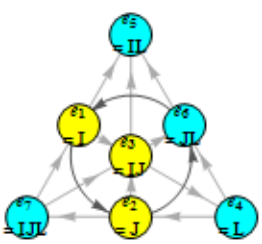
{{1, 2, 6}, {1, 3, 4}, {1, 5, 7},
{2, 3, 5}, {2, 7, 4}, {3, 6, 7}, {4, 6, 5}}

HoffmanSingleton (Yellow)

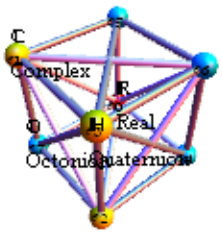
Flattened triad/mask bits

{1, 6, 2, 3, 4, 5, 7}
{0, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	7	-2	-5
2	-6	-1	5	-7	-3	1	4
3	-4	-5	-1	1	2	7	-6
4	3	7	-1	-1	-6	5	-2
5	-7	3	-2	6	-1	-4	1
6	2	-1	-7	-5	4	-1	3
7	5	-4	6	2	-1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=3 Hex=59 L fp_sm=8

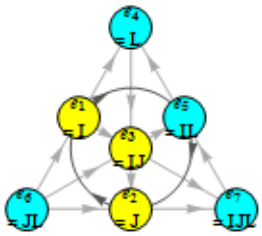
{{1, 5, 2}, {1, 3, 7}, {1, 4, 6},
{2, 4, 3}, {2, 7, 6}, {3, 5, 6}, {4, 7, 5}}

Coxeter (Cyan)

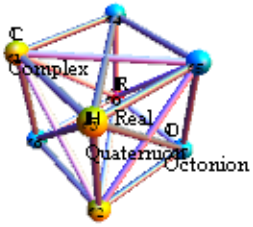
Flattened triad/mask bits

{1, 5, 2, 3, 7, 4, 6}
{1, 0, 0, 1, 1, 0, 1}

Fano plane



Fano cube



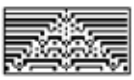
0↦1	1	2	3	4	5	6	7
1	-1	-5	7	6	2	-4	-3
2	5	-1	-4	3	-1	-7	6
3	-7	4	-1	-2	6	-5	1
4	-6	-3	2	-1	-7	1	5
5	-2	1	-6	7	-1	3	-4
6	4	7	5	-1	-3	-1	-2
7	3	-6	-1	-5	4	2	-1

multiplication table

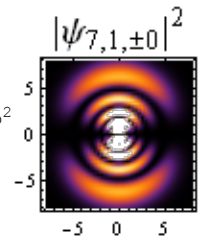
198 $u_{g_m \hat{L}}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

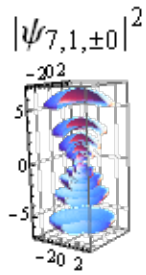
0apccssgg 001101001_2	Root{	-4	-2	-5	-4	-3	-2	-1	-2 }	Exp. m 2.2 MeV
	Weight{	0	0	0	0	0	-1	0	1 }	Theo. m 1.60535
	Height= 24									Exp. τ ? s
Binary{	1	0	0	0	1	1	1	1	}	
E8{	0	1	0	0	0	0	-1	0	}	
Physics {	0	1	0	0	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



^{114}Uuq[Rn]$7s^2 5f^{14} 6d^{10} 7p^2$





Flipped

Octonion triads-fPi=19 Sign mask=3 Hex=28 L fp_sm=3

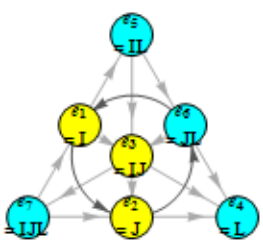
{{1, 2, 6}, {1, 3, 4}, {1, 5, 7},
{2, 5, 3}, {2, 4, 7}, {3, 7, 6}, {4, 5, 6}}

HoffmanSingleton (Yellow)

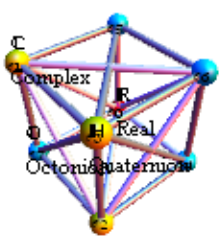
Flattened triad/mask bits

{1, 6, 2, 3, 4, 5, 7}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	7	-2	-5
2	-6	-1	-5	7	3	1	-4
3	-4	5	-1	1	-2	-7	6
4	3	-7	-1	-1	6	-5	2
5	-7	-3	2	-6	-1	4	1
6	2	-1	7	5	-4	-1	-3
7	5	4	-6	-2	-1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=3 Hex=21 L fp_sm=8

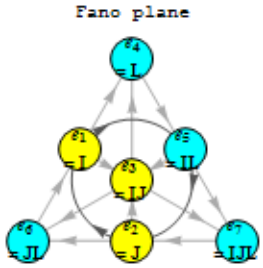
{{1, 5, 2}, {1, 3, 7}, {1, 4, 6},
{2, 3, 4}, {2, 6, 7}, {3, 6, 5}, {4, 5, 7}}

Coxeter (Cyan)

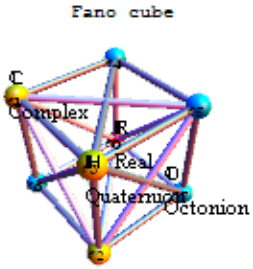
Flattened triad/mask bits

{1, 5, 2, 3, 7, 4, 6}
{1, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	6	2	-4	-3
2	5	-1	4	-3	-1	7	-6
3	-7	-4	-1	2	-6	5	1
4	-6	3	-2	-1	7	1	-5
5	-2	1	6	-7	-1	-3	4
6	4	-7	-5	-1	3	-1	2
7	3	6	-1	5	-4	-2	-1

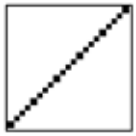
multiplication table

43 $u_{g_m}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

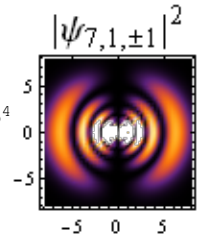
0apccssgg	Root{	-4	-3	-6	-4	-3	-2	-1	-2 }	Exp. m 2.2 MeV
001101101_2	Weight{	0	0	0	1	-1	0	0	0 }	Theo. m 1.60535
	Height= 26									Exp. τ ? s

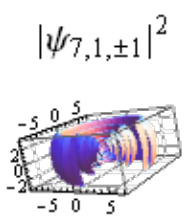
Binary{	1	1	0	0	0	0	0	1	}
E8{	-1	0	0	0	0	0	-1	0	}
Physics {	-1	0	0	0	0	$-\frac{1}{\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{116}Uuh[Rn]$7s^2 5f^{14} 6d^{10} 7p^4$





Flipped

Octonion triads-fPi=19 Sign mask=4 Hex=36 L fp_sm=3

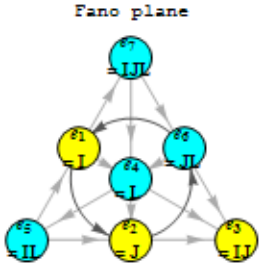
{{1, 2, 6}, {1, 4, 3}, {1, 7, 5},
{2, 3, 5}, {2, 7, 4}, {3, 7, 6}, {4, 5, 6}}

Flattened triad/mask bits

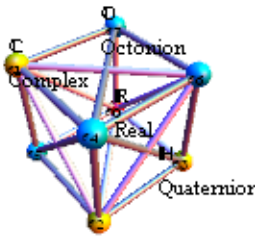
{1, 6, 2, 4, 3, 7, 5}
{0, 1, 1, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	-7	-2	5
2	-6	-1	5	-7	-3	1	4
3	4	-5	-1	-1	2	-7	6
4	-3	7	1	-1	6	-5	-2
5	7	3	-2	-6	-1	4	-1
6	2	-1	7	5	-4	-1	-3
7	-5	-4	-6	2	1	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=4 Hex=3F L fp_sm=8

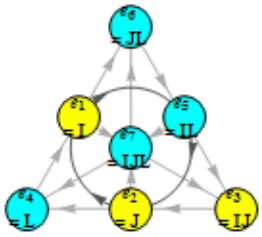
{{1, 5, 2}, {1, 7, 3}, {1, 6, 4},
{2, 4, 3}, {2, 7, 6}, {3, 6, 5}, {4, 5, 7}}

Flattened triad/mask bits

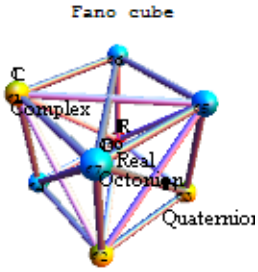
{1, 5, 2, 7, 3, 6, 4}
{1, 1, 1, 1, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	-6	2	4	3
2	5	-1	-4	3	-1	-7	6
3	7	4	-1	-2	-6	5	-1
4	6	-3	2	-1	7	-1	-5
5	-2	1	6	-7	-1	-3	4
6	-4	7	-5	1	3	-1	-2
7	-3	-6	1	5	-4	2	-1

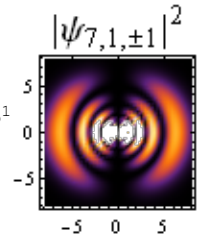
multiplication table

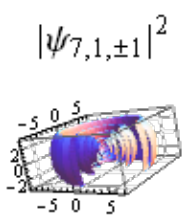
201 $\overline{d}_{C_m}^{\frac{1}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	3	3	5	4	3	2	1	2 }	Exp. m		5. MeV		
010101101_2	Weight{	0	0	0	0	0	-1	1	1 }	Theo. m		3.2107		
	Height=	24								Exp. τ		? s		
Binary{	0	1	1	1	1	0	0	1	}					
E8{	0	1	0	0	0	0	1	0	}					
Physics {	0	1	0	0	0	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}					

Bit NKS CA Pascal E8

^{113}Uut[Rn]$7s^2 5f^{14} 6d^{10} 7p^1$





Flipped

Octonion triads-fPi=19 Sign mask=4 Hex=4E L fp_sm=3

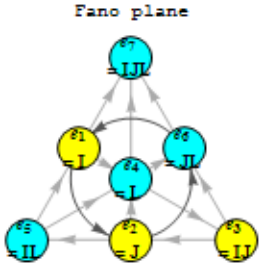
{{1, 2, 6}, {1, 4, 3}, {1, 7, 5},
{2, 5, 3}, {2, 4, 7}, {3, 6, 7}, {4, 6, 5}}

Flattened triad/mask bits

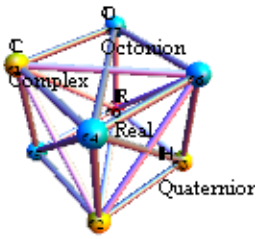
{1, 6, 2, 4, 3, 7, 5}
{0, 1, 1, 1, 0, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	-7	-2	5
2	-6	-1	-5	7	3	1	-4
3	4	5	-1	-1	-2	7	-6
4	-3	-7	1	-1	-6	5	2
5	7	-3	2	6	-1	-4	-1
6	2	-1	-7	-5	4	-1	3
7	-5	4	6	-2	1	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=17 Sign mask=4 Hex=47 L fp_sm=8

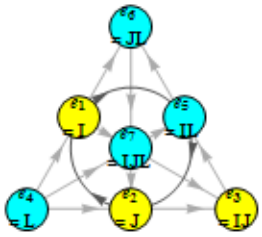
{{1, 5, 2}, {1, 7, 3}, {1, 6, 4},
{2, 3, 4}, {2, 6, 7}, {3, 5, 6}, {4, 7, 5}}

Flattened triad/mask bits

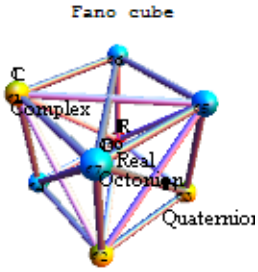
{1, 5, 2, 7, 3, 6, 4}
{1, 1, 1, 0, 0, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	-6	2	4	3
2	5	-1	4	-3	-1	7	-6
3	7	-4	-1	2	6	-5	-1
4	6	3	-2	-1	-7	-1	5
5	-2	1	-6	7	-1	3	-4
6	-4	-7	5	1	-3	-1	2
7	-3	6	1	-5	4	-2	-1

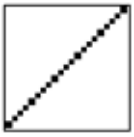
multiplication table

15 $\overline{\underset{\text{Cd}}{\text{S}}}\ \frac{1}{3}\to-\frac{2}{3}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 0 1 0 0 0 0 1 }	Exp. m	95. MeV
010100010_2	Weight{ 0 0 0 -1 1 0 1 -1 }	Theo. m	98.1056
	Height= 4	Exp. τ	? s

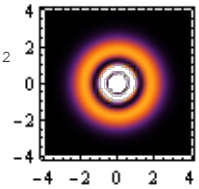
Binary{	1	0	0	0	0	0	1	0 }
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$ }
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

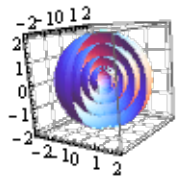


^{20}Ca[Ar]4s^2

$|\psi_{4,0,\pm0}|^2$



$|\psi_{4,0,\pm0}|^2$



Flipped

Octonion triads-fPi=20 Sign mask=1 Hex=7F R fp_sm=1

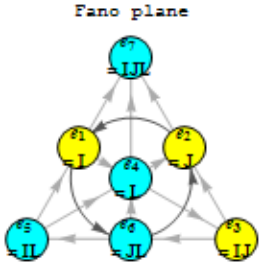
{{1, 6, 2}, {1, 4, 3}, {1, 7, 5},
{2, 7, 3}, {2, 5, 4}, {3, 6, 5}, {4, 7, 6}}

Flattened triad/mask bits

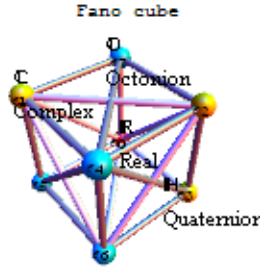
{1, 2, 6, 4, 3, 7, 5}
{1, 1, 1, 1, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	-7	2	5
2	6	-1	-7	-5	4	-1	3
3	4	7	-1	-1	-6	5	-2
4	-3	5	1	-1	-2	-7	6
5	7	-4	6	2	-1	-3	-1
6	-2	1	-5	7	3	-1	-4
7	-5	-3	2	-6	1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=1 Hex=76 R fp_sm=6

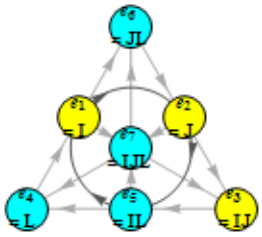
{{1, 2, 5}, {1, 7, 3}, {1, 6, 4},
{2, 3, 6}, {2, 7, 4}, {3, 5, 4}, {5, 7, 6}}

Flattened triad/mask bits

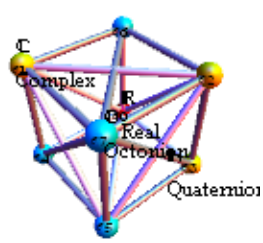
{1, 2, 5, 7, 3, 6, 4}
{0, 1, 1, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	-6	-2	4	3
2	-5	-1	6	-7	1	-3	4
3	7	-6	-1	-5	4	2	-1
4	6	7	5	-1	-3	-1	-2
5	2	-1	-4	3	-1	-7	6
6	-4	3	-2	1	7	-1	-5
7	-3	-4	1	2	-6	5	-1

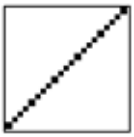
multiplication table

146 $c_{g_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

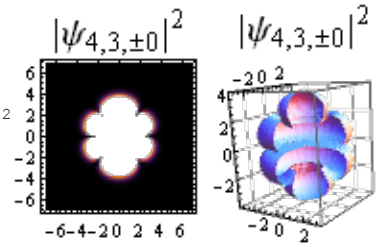
0apccssgg	Root{ -2 -1 -3 -2 -1 0 0 -1 }	Exp. m	1250. MeV
001100010_2	Weight{ 0 1 0 0 -1 0 0 1 }	Theo. m	1319.95
	Height= 11	Exp. τ	? s

Binary{	0	1	0	0	1	1	0	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{68}Er[Xe]$6s^2 4f^{12}$



Flipped

Octonion triads-fPi=20 Sign mask=1 Hex=07 R fp_sm=1

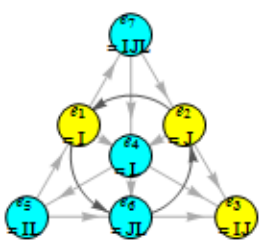
{{1, 6, 2}, {1, 4, 3}, {1, 7, 5},
{2, 3, 7}, {2, 4, 5}, {3, 5, 6}, {4, 6, 7}}

Coxeter (Cyan)

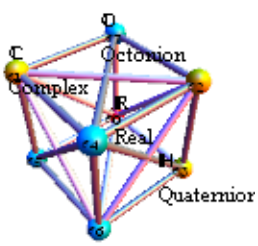
Flattened triad/mask bits

{1, 2, 6, 4, 3, 7, 5}
{1, 1, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-4	3	-7	2	5
2	6	-1	7	5	-4	-1	-3
3	4	-7	-1	-1	6	-5	2
4	-3	-5	1	-1	2	7	-6
5	7	4	-6	-2	-1	3	-1
6	-2	1	5	-7	-3	-1	4
7	-5	3	-2	6	1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=1 Hex=0E R fp_sm=6

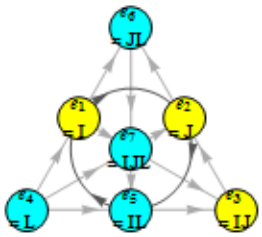
{{1, 2, 5}, {1, 7, 3}, {1, 6, 4},
{2, 6, 3}, {2, 4, 7}, {3, 4, 5}, {5, 6, 7}}

HoffmanSingleton (Yellow)

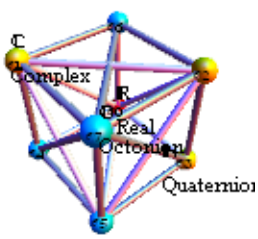
Flattened triad/mask bits

{1, 2, 5, 7, 3, 6, 4}
{0, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	-7	-6	-2	4	3
2	-5	-1	-6	7	1	3	-4
3	7	6	-1	5	-4	-2	-1
4	6	-7	-5	-1	3	-1	2
5	2	-1	4	-3	-1	7	-6
6	-4	-3	2	1	-7	-1	5
7	-3	4	1	-2	6	-5	-1

multiplication table

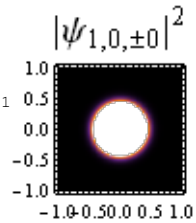
21 $\overline{\underset{C_1\ \hat{R}}{S}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

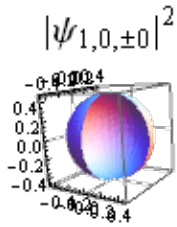
0apccssgg 010100110_2	Root{ 0 0 0 0 0 0 0 1 }	Exp. m	95. MeV
	Weight{ 0 0 0 0 0 -1 2 0 }	Theo. m	98.1056
	Height= 2	Exp. τ	? s

Binary{	0	1	0	0	0	0	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{1}H1s^1





Flipped

Octonion triads-fPi=20 Sign mask=2 Hex=61 R fp_sm=1

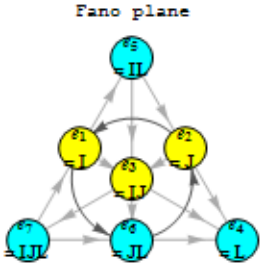
{{1, 6, 2}, {1, 3, 4}, {1, 5, 7},
{2, 3, 7}, {2, 4, 5}, {3, 6, 5}, {4, 7, 6}}

Coxeter (Cyan)

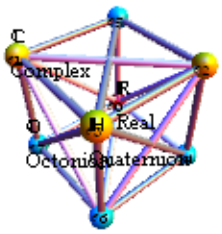
Flattened triad/mask bits

{1, 2, 6, 3, 4, 5, 7}
{1, 0, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	7	2	-5
2	6	-1	7	5	-4	-1	-3
3	-4	-7	-1	1	-6	5	2
4	3	-5	-1	-1	2	-7	6
5	-7	4	6	-2	-1	-3	1
6	-2	1	-5	7	3	-1	-4
7	5	3	-2	-6	-1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=2 Hex=68 R fp_sm=6

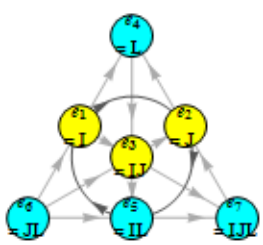
{{1, 2, 5}, {1, 3, 7}, {1, 4, 6},
{2, 6, 3}, {2, 4, 7}, {3, 5, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

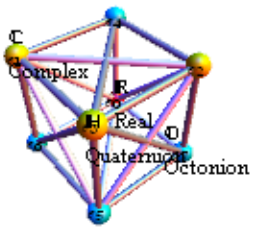
Flattened triad/mask bits

{1, 2, 5, 3, 7, 4, 6}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	7	6	-2	-4	-3
2	-5	-1	-6	7	1	3	-4
3	-7	6	-1	-5	4	-2	1
4	-6	-7	5	-1	-3	1	2
5	2	-1	-4	3	-1	-7	6
6	4	-3	2	-1	7	-1	-5
7	3	4	-1	-2	-6	5	-1

multiplication table

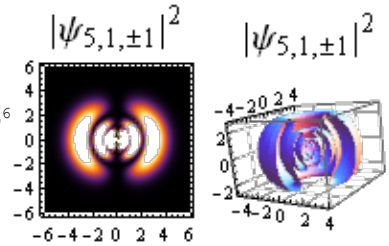
126 $\underset{g_1}{c}\ \hat{R}\ \frac{2}{3}\to-\frac{1}{3}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-2	-2	-1	0	0	-1 }	Exp. m	1250. MeV
001100110_2	Weight{	0	1	0	-1	0	1	-1	0 }	Theo. m	1319.95
	Height=	9								Exp. τ	? s

Binary{	1	0	0	0	1	1	0	1	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{54}Xe[Kr]5s^{2}4d^{10}5p^6



Flipped

Octonion triads-fPi=20 Sign mask=2 Hex=19 R fp_sm=1

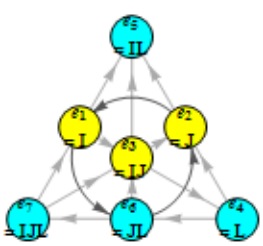
{{1, 6, 2}, {1, 3, 4}, {1, 5, 7},
{2, 7, 3}, {2, 5, 4}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

{1, 2, 6, 3, 4, 5, 7}
{1, 0, 0, 1, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	4	-3	7	2	-5
2	6	-1	-7	-5	4	-1	3
3	-4	7	-1	1	6	-5	-2
4	3	5	-1	-1	-2	7	-6
5	-7	-4	-6	2	-1	3	1
6	-2	1	5	-7	-3	-1	4
7	5	-3	2	6	-1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=2 Hex=10 R fp_sm=6

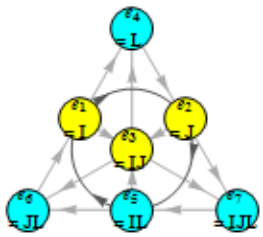
{{1, 2, 5}, {1, 3, 7}, {1, 4, 6},
{2, 3, 6}, {2, 7, 4}, {3, 4, 5}, {5, 6, 7}}

Flattened triad/mask bits

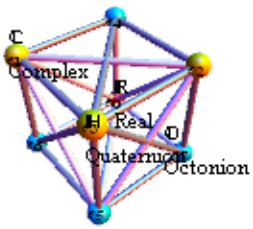
{1, 2, 5, 3, 7, 4, 6}
{0, 0, 0, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	5	7	6	-2	-4	-3
2	-5	-1	6	-7	1	-3	4
3	-7	-6	-1	5	-4	2	1
4	-6	7	-5	-1	3	1	-2
5	2	-1	4	-3	-1	7	-6
6	4	3	-2	-1	-7	-1	5
7	3	-4	-1	2	6	-5	-1

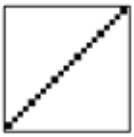
multiplication table

26 $\overline{S}_{C_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

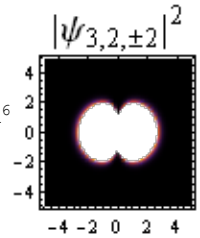
0apccssgg	Root{ 1 0 1 1 0 0 0 1 }	Exp. m	95. MeV
010101010_2	Weight{ 0 0 -1 1 0 0 1 -1 }	Theo. m	98.1056
	Height= 5	Exp. τ	? s

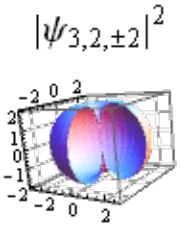
Binary{	0	0	1	0	0	0	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{26}Fe[Ar]4s^{2}3d^6





Flipped

Octonion triads-fPi=20 Sign mask=3 Hex=52 R fp_sm=1

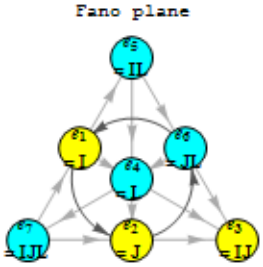
{{1, 2, 6}, {1, 4, 3}, {1, 5, 7},
{2, 3, 7}, {2, 5, 4}, {3, 5, 6}, {4, 7, 6}}

Coxeter (Cyan)

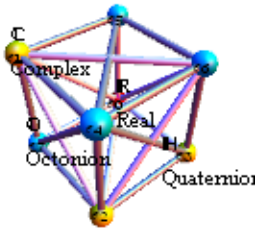
Flattened triad/mask bits

{1, 6, 2, 4, 3, 5, 7}
{0, 1, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	7	-2	-5
2	-6	-1	7	-5	4	1	-3
3	4	-7	-1	-1	6	-5	2
4	-3	5	1	-1	-2	-7	6
5	-7	-4	-6	2	-1	3	1
6	2	-1	5	7	-3	-1	-4
7	5	3	-2	-6	-1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=3 Hex=5B R fp_sm=6

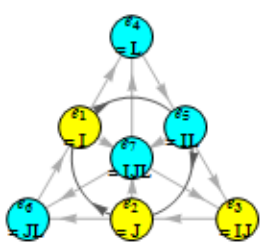
{{1, 5, 2}, {1, 7, 3}, {1, 4, 6},
{2, 6, 3}, {2, 7, 4}, {3, 4, 5}, {5, 7, 6}}

HoffmanSingleton (Yellow)

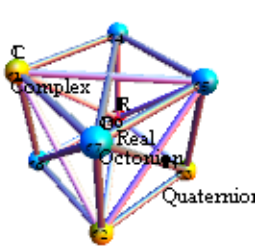
Flattened triad/mask bits

{1, 5, 2, 7, 3, 4, 6}
{1, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	6	2	-4	3
2	5	-1	-6	-7	-1	3	4
3	7	6	-1	5	-4	-2	-1
4	-6	7	-5	-1	3	1	-2
5	-2	1	4	-3	-1	-7	6
6	4	-3	2	-1	7	-1	-5
7	-3	-4	1	2	-6	5	-1

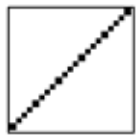
multiplication table

160 $c_{g_m \hat{L}}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

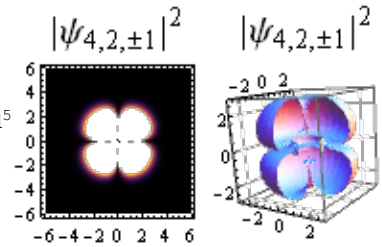
0apccssgg	Root{	-1	-1	-2	-1	0	0	0	-1 }	Exp. m 1250. MeV
001101010_2	Weight{	0	0	1	0	-1	1	-1	0 }	Theo. m 1319.95
	Height=	7								Exp. τ ? s

Binary{	0	0	0	1	1	1	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{42}Mo[Kr]5s^{1}4d^5



Flipped

Octonion triads-fPi=20 Sign mask=3 Hex=2A R fp_sm=1

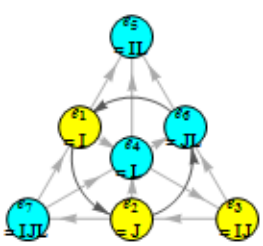
{{1, 2, 6}, {1, 4, 3}, {1, 5, 7},
{2, 7, 3}, {2, 4, 5}, {3, 6, 5}, {4, 6, 7}}

Flattened triad/mask bits

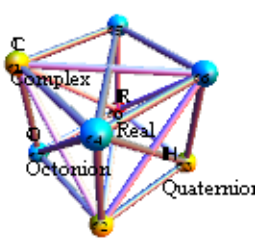
{1, 6, 2, 4, 3, 5, 7}
{0, 1, 0, 1, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-4	3	7	-2	-5
2	-6	-1	-7	5	-4	1	3
3	4	7	-1	-1	-6	5	-2
4	-3	-5	1	-1	2	7	-6
5	-7	4	6	-2	-1	-3	1
6	2	-1	-5	-7	3	-1	4
7	5	-3	2	6	-1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=3 Hex=23 R fp_sm=6

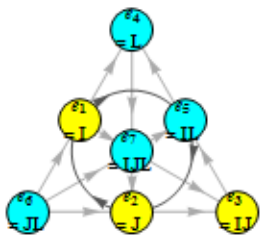
{{1, 5, 2}, {1, 7, 3}, {1, 4, 6},
{2, 3, 6}, {2, 4, 7}, {3, 5, 4}, {5, 6, 7}}

Flattened triad/mask bits

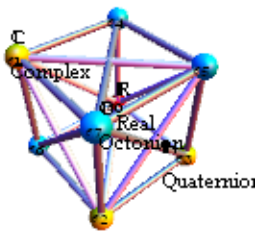
{1, 5, 2, 7, 3, 4, 6}
{1, 1, 0, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	-7	6	2	-4	3
2	5	-1	6	7	-1	-3	-4
3	7	-6	-1	-5	4	2	-1
4	-6	-7	5	-1	-3	1	2
5	-2	1	-4	3	-1	7	-6
6	4	3	-2	-1	-7	-1	5
7	-3	4	1	-2	6	-5	-1

multiplication table

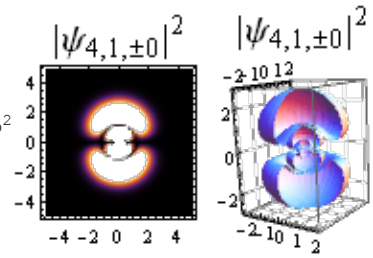
30 $\overline{S}_{C_m\ R}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 0 1 1 1 0 0 1 }	Exp. m	95. MeV
010101110_2	Weight{ 0 -1 1 0 0 0 1 -1 }	Theo. m	98.1056
	Height= 6	Exp. τ	? s

Binary{	0	0	0	1	0	0	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{32}Ge[Ar]$4s^2 3d^{10} 4p^2$



Flipped

Octonion triads-fPi=20 Sign mask=4 Hex=4C ℝ fp_sm=1

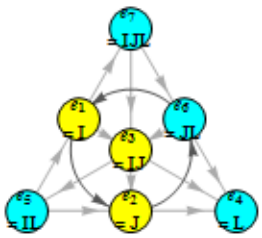
{{1, 2, 6}, {1, 3, 4}, {1, 7, 5},
{2, 7, 3}, {2, 4, 5}, {3, 5, 6}, {4, 7, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 6, 2, 3, 4, 7, 5}
{0, 0, 1, 1, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	-7	-2	5
2	-6	-1	-7	5	-4	1	3
3	-4	7	-1	1	6	-5	-2
4	3	-5	-1	-1	2	-7	6
5	7	4	-6	-2	-1	3	-1
6	2	-1	5	7	-3	-1	-4
7	-5	-3	2	-6	1	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=4 Hex=45 ℝ fp_sm=6

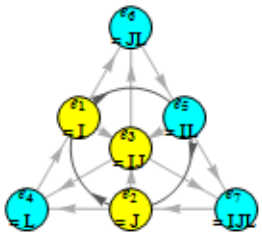
{{1, 5, 2}, {1, 3, 7}, {1, 6, 4},
{2, 3, 6}, {2, 4, 7}, {3, 4, 5}, {5, 7, 6}}

HoffmanSingleton (Yellow)

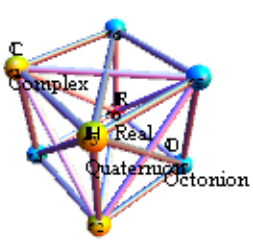
Flattened triad/mask bits

{1, 5, 2, 3, 7, 6, 4}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	-6	2	4	-3
2	5	-1	6	7	-1	-3	-4
3	-7	-6	-1	5	-4	2	1
4	6	-7	-5	-1	3	-1	2
5	-2	1	4	-3	-1	-7	6
6	-4	3	-2	1	7	-1	-5
7	3	4	-1	-2	-6	5	-1

multiplication table

156 $c\, g_m^{\frac{2}{3}} \sqrt{R}$ Ref. Symbols: 2D 3D

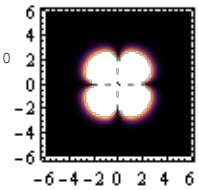
0apccssgg 001101110_2	Root{	-1	-1	-2	-1	-1	0	0	-1 }	Exp. m	1250. MeV
	Weight{	0	1	-1	1	-1	1	-1	0 }	Theo. m	1319.95
	Height=	8								Exp. τ	? s

Binary{	0	0	1	0	1	1	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

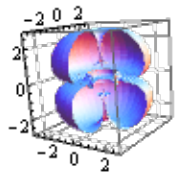
Bit NKS CA Pascal E8

^{47}Ag[Kr]5s^{1}4d^{10}

$|\psi_{4,2,\pm1}|^2$



$|\psi_{4,2,\pm1}|^2$



Flipped

Octonion triads-fPi=20 Sign mask=4 Hex=34 R fp_sm=1

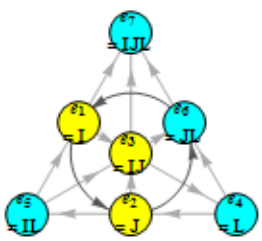
{{1, 2, 6}, {1, 3, 4}, {1, 7, 5},
{2, 3, 7}, {2, 5, 4}, {3, 6, 5}, {4, 6, 7}}

Coxeter (Cyan)

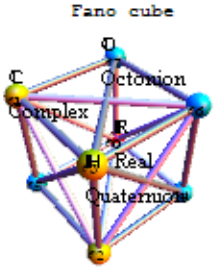
Flattened triad/mask bits

{1, 6, 2, 3, 4, 7, 5}
{0, 0, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	4	-3	-7	-2	5
2	-6	-1	7	-5	4	1	-3
3	-4	-7	-1	1	-6	5	2
4	3	5	-1	-1	-2	7	-6
5	7	-4	6	2	-1	-3	-1
6	2	-1	-5	-7	3	-1	4
7	-5	3	-2	6	1	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=18 Sign mask=4 Hex=3D R fp_sm=6

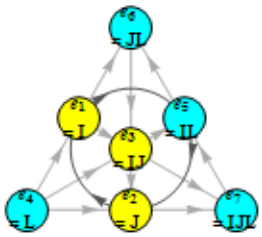
{{1, 5, 2}, {1, 3, 7}, {1, 6, 4},
{2, 6, 3}, {2, 7, 4}, {3, 5, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

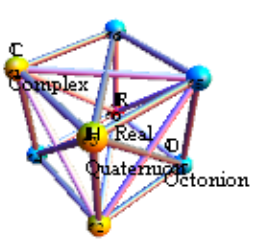
Flattened triad/mask bits

{1, 5, 2, 3, 7, 6, 4}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-5	7	-6	2	4	-3
2	5	-1	-6	-7	-1	3	4
3	-7	6	-1	-5	4	-2	1
4	6	7	5	-1	-3	-1	-2
5	-2	1	-4	3	-1	7	-6
6	-4	-3	2	1	-7	-1	5
7	3	-4	-1	2	6	-5	-1

multiplication table

33 $\overline{b}_{C_d\ \check{L}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg
010100011_2

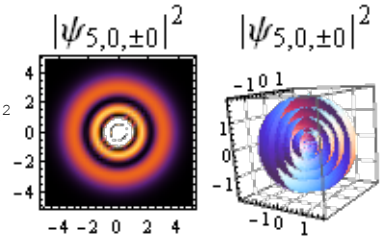
Root{	1	0	1	1	1	1	0	1	}
Weight{	-1	1	0	0	0	0	1	-1	}
Height=	7								

Exp. m 4200. MeV
Theo. m 3270.13
Exp. τ ? s

Binary{	0	0	0	0	1	0	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{38}Sr[Kr]5s^2



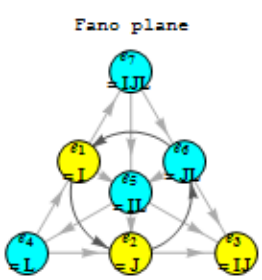
Flipped

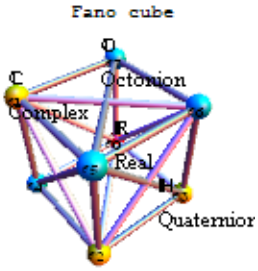
Octonion triads-fPi=21 Sign mask=1 Hex=76 R fp_sm=6

{{1, 2, 6}, {1, 5, 3}, {1, 7, 4},
{2, 3, 4}, {2, 7, 5}, {3, 7, 6}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 6, 2, 5, 3, 7, 4}
{0, 1, 1, 0, 1, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	6	-5	-7	3	-2	4
2	-6	-1	4	-3	-7	1	5
3	5	-4	-1	2	-1	-7	6
4	7	3	-2	-1	-6	5	-1
5	-3	7	1	6	-1	-4	-2
6	2	-1	7	-5	4	-1	-3
7	-4	-5	-6	1	2	3	-1

multiplication table

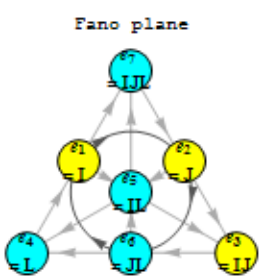
Not Flipped

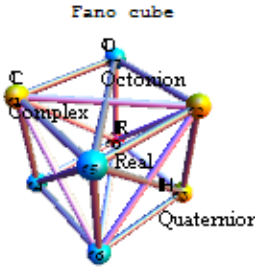
Octonion triads-fPi=22 Sign mask=1 Hex=76 R fp_sm=6

{{1, 2, 6}, {1, 5, 3}, {1, 7, 4},
{2, 3, 7}, {2, 5, 4}, {3, 6, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 6, 5, 3, 7, 4}
{0, 1, 1, 0, 1, 1, 1}





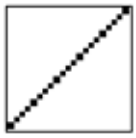
0↦1	1	2	3	4	5	6	7
1	-1	6	-5	-7	3	-2	4
2	-6	-1	7	-5	4	1	-3
3	5	-7	-1	-6	-1	4	2
4	7	5	6	-1	-2	-3	-1
5	-3	-4	1	2	-1	-7	6
6	2	-1	-4	3	7	-1	-5
7	-4	3	-2	1	-6	5	-1

multiplication table

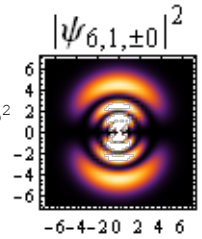
107 $t_{g_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

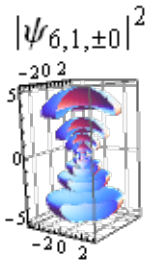
0apccssgg	Root{	-2	-1	-3	-3	-2	-1	0	-1 }	Exp. m 174200. MeV
001100011_2	Weight{	1	0	0	-1	0	0	0	1 }	Theo. m 175990.
	Height= 14									Exp. τ ? s
Binary{	1	1	0	0	0	1	0	1	}	
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



$^{82}Pb[Xe]6s^2 4f^{14} 5d^{10} 6p^2$





Flipped

Octonion triads-fPi=21 Sign mask=1 Hex=0E R fp_sm=6

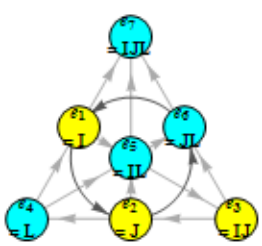
{{1, 2, 6}, {1, 5, 3}, {1, 7, 4},
{2, 4, 3}, {2, 5, 7}, {3, 6, 7}, {4, 5, 6}}

Coxeter (Cyan)

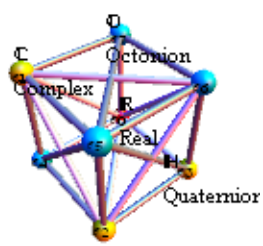
Flattened triad/mask bits

{1, 6, 2, 5, 3, 7, 4}
{0, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	-7	3	-2	4
2	-6	-1	-4	3	7	1	-5
3	5	4	-1	-2	-1	7	-6
4	7	-3	2	-1	6	-5	-1
5	-3	-7	1	-6	-1	4	2
6	2	-1	-7	5	-4	-1	3
7	-4	5	6	1	-2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=1 Hex=0E R fp_sm=6

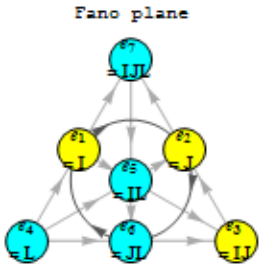
{{1, 2, 6}, {1, 5, 3}, {1, 7, 4},
{2, 7, 3}, {2, 4, 5}, {3, 4, 6}, {5, 6, 7}}

HoffmanSingleton (Yellow)

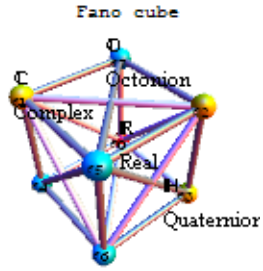
Flattened triad/mask bits

{1, 2, 6, 5, 3, 7, 4}
{0, 1, 1, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	-7	3	-2	4
2	-6	-1	-7	5	-4	1	3
3	5	7	-1	6	-1	-4	-2
4	7	-5	-6	-1	2	3	-1
5	-3	4	1	-2	-1	7	-6
6	2	-1	4	-3	-7	-1	5
7	-4	-3	2	1	6	-5	-1

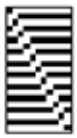
multiplication table

36 $t_{g_1}^{\frac{2}{3}\to-\frac{1}{3}}$ $\hat{R}$ Ref. Symbols: 2D 3D

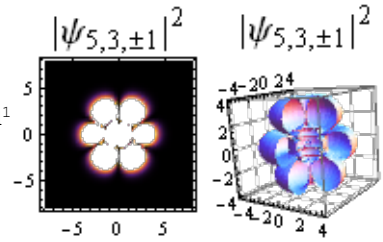
0apccssgg	Root{ -2 -2 -4 -3 -2 -1 0 -1 }	Exp. m	174200. MeV
001100111_2	Weight{ 1 0 0 0 -1 1 0 0 }	Theo. m	175990.
	Height= 16	Exp. τ	? s

Binary{	0	0	0	0	0	1	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{92}U[Rn]$7s^2 5f^3 6d^1$



Flipped

Octonion triads-fPi=21 Sign mask=2 Hex=10 R fp_sm=6

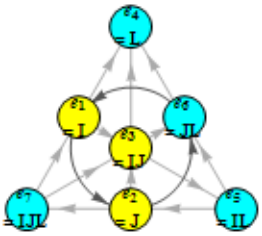
{{1, 2, 6}, {1, 3, 5}, {1, 4, 7},
{2, 3, 4}, {2, 7, 5}, {3, 6, 7}, {4, 5, 6}}

Flattened triad/mask bits

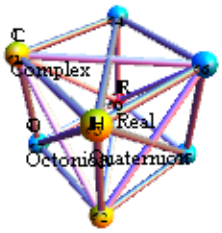
{1, 6, 2, 3, 5, 4, 7}
{0, 0, 0, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	5	7	-3	-2	-4
2	-6	-1	4	-3	-7	1	5
3	-5	-4	-1	2	1	7	-6
4	-7	3	-2	-1	6	-5	1
5	3	7	-1	-6	-1	4	-2
6	2	-1	-7	5	-4	-1	3
7	4	-5	6	-1	2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=2 Hex=10 R fp_sm=6

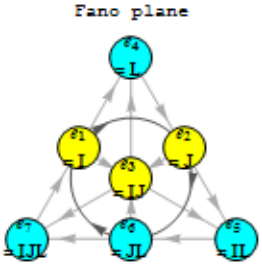
{{1, 2, 6}, {1, 3, 5}, {1, 4, 7},
{2, 3, 7}, {2, 5, 4}, {3, 4, 6}, {5, 6, 7}}

Flattened triad/mask bits

{1, 2, 6, 3, 5, 4, 7}
{0, 0, 0, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	6	5	7	-3	-2	-4
2	-6	-1	7	-5	4	1	-3
3	-5	-7	-1	6	1	-4	2
4	-7	5	-6	-1	-2	3	1
5	3	-4	-1	2	-1	7	-6
6	2	-1	4	-3	-7	-1	5
7	4	3	-2	-1	6	-5	-1

multiplication table

104 $\overline{b}_{c_1\hat{R}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

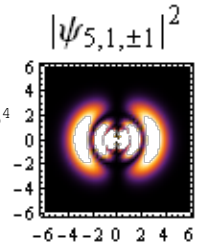
0apccssgg	Root{	1	1	2	1	1	1	0	1 }
010100111_2	Weight{	-1	1	0	-1	1	-1	1	0 }
	Height=	9							

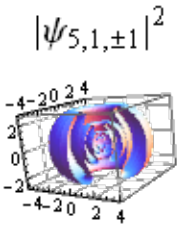
Exp. m 4200. MeV
Theo. m 3270.13
Exp. τ ? s

Binary{	1	1	0	0	1	0	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{52}Te[Kr]5s^{2}4d^{10}5p^4





Flipped

Octonion triads-fPi=21 Sign mask=2 Hex=68 R fp_sm=6

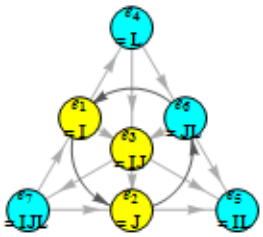
{{1, 2, 6}, {1, 3, 5}, {1, 4, 7},
{2, 4, 3}, {2, 5, 7}, {3, 7, 6}, {4, 6, 5}}

Coxeter (Cyan)

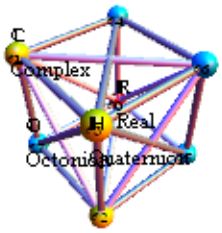
Flattened triad/mask bits

{1, 6, 2, 3, 5, 4, 7}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	5	7	-3	-2	-4
2	-6	-1	-4	3	7	1	-5
3	-5	4	-1	-2	1	-7	6
4	-7	-3	2	-1	-6	5	1
5	3	-7	-1	6	-1	-4	2
6	2	-1	7	-5	4	-1	-3
7	4	5	-6	-1	-2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=2 Hex=68 R fp_sm=6

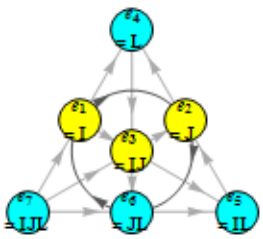
{{1, 2, 6}, {1, 3, 5}, {1, 4, 7},
{2, 7, 3}, {2, 4, 5}, {3, 6, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 6, 3, 5, 4, 7}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube

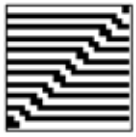
0↦1	1	2	3	4	5	6	7
1	-1	6	5	7	-3	-2	-4
2	-6	-1	-7	5	-4	1	3
3	-5	7	-1	-6	1	4	-2
4	-7	-5	6	-1	2	-3	1
5	3	4	-1	-2	-1	-7	6
6	2	-1	-4	3	7	-1	-5
7	4	-3	2	-1	-6	5	-1

multiplication table

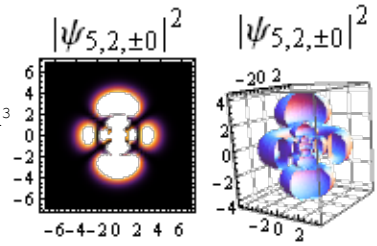
114 $\overline{b}_{C_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg 010101011_2	Root{	2	1	3	2	1	1	0	1 }	Exp. m 4200. MeV
	Weight{	-1	1	-1	0	1	0	0	-1 }	Theo. m 3270.13
	Height= 12									Exp. τ ? s
Binary{	1	0	1	0	1	0	1	0	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



^{73}Ta[Xe]$6s^2 4f^{14} 5d^3$



Flipped

Octonion triads-fPi=21 Sign mask=3 Hex=5B R fp_sm=6

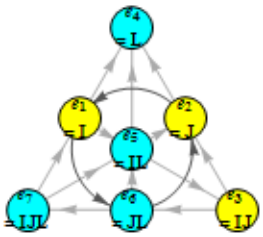
{{1, 6, 2}, {1, 5, 3}, {1, 4, 7},
{2, 4, 3}, {2, 7, 5}, {3, 6, 7}, {4, 6, 5}}

Flattened triad/mask bits

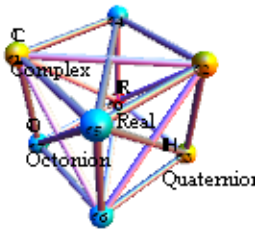
{1, 2, 6, 5, 3, 4, 7}
{1, 1, 0, 1, 1, 0, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	7	3	2	-4
2	6	-1	-4	3	-7	-1	5
3	5	4	-1	-2	-1	7	-6
4	-7	-3	2	-1	-6	5	1
5	-3	7	1	6	-1	-4	-2
6	-2	1	-7	-5	4	-1	3
7	4	-5	6	-1	2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=3 Hex=5B R fp_sm=6

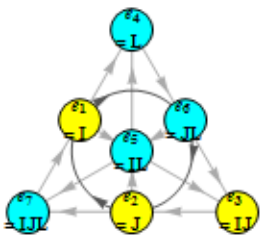
{{1, 6, 2}, {1, 5, 3}, {1, 4, 7},
{2, 7, 3}, {2, 5, 4}, {3, 4, 6}, {5, 7, 6}}

Flattened triad/mask bits

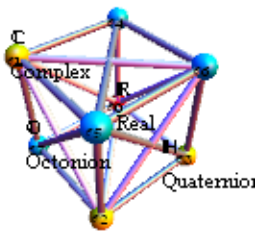
{1, 6, 2, 5, 3, 4, 7}
{1, 1, 0, 1, 1, 0, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	7	3	2	-4
2	6	-1	-7	-5	4	-1	3
3	5	7	-1	6	-1	-4	-2
4	-7	5	-6	-1	-2	3	1
5	-3	-4	1	2	-1	-7	6
6	-2	1	4	-3	7	-1	-5
7	4	-3	2	-1	-6	5	-1

multiplication table

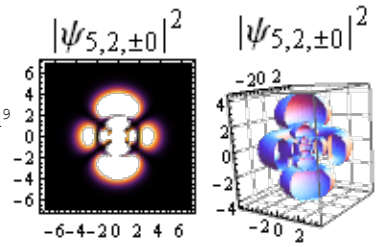
137 $t_{g_m}^{\frac{2}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ -2 -1 -3 -2 -2 -1 0 -1 }	Exp. m	174200. MeV
001101011_2	Weight{ 1 0 -1 1 -1 0 0 1 }	Theo. m	175990.
	Height= 13	Exp. τ	? s

Binary{	0	1	1	0	0	1	0	1 }
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{78}Pt[Xe]$6s^1 4f^{14} 5d^9$



Flipped

Octonion triads-fPi=21 Sign mask=3 Hex=23 R fp_sm=6

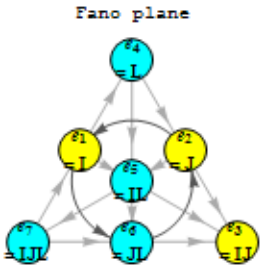
{{1, 6, 2}, {1, 5, 3}, {1, 4, 7},
{2, 3, 4}, {2, 5, 7}, {3, 7, 6}, {4, 5, 6}}

Flattened triad/mask bits

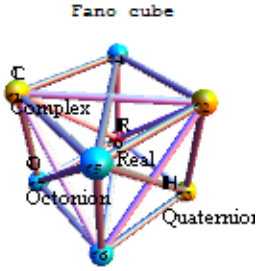
{1, 2, 6, 5, 3, 4, 7}
{1, 1, 0, 0, 0, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	7	3	2	-4
2	6	-1	4	-3	7	-1	-5
3	5	-4	-1	2	-1	-7	6
4	-7	3	-2	-1	6	-5	1
5	-3	-7	1	-6	-1	4	2
6	-2	1	7	5	-4	-1	-3
7	4	5	-6	-1	-2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=3 Hex=23 R fp_sm=6

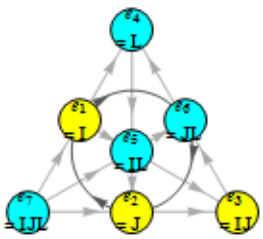
{{1, 6, 2}, {1, 5, 3}, {1, 4, 7},
{2, 3, 7}, {2, 4, 5}, {3, 6, 4}, {5, 6, 7}}

Flattened triad/mask bits

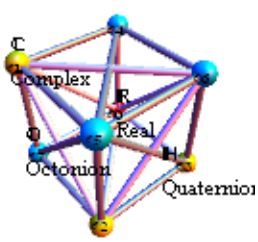
{1, 6, 2, 5, 3, 4, 7}
{1, 1, 0, 0, 0, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



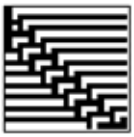
0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	7	3	2	-4
2	6	-1	7	5	-4	-1	-3
3	5	-7	-1	-6	-1	4	2
4	-7	-5	6	-1	2	-3	1
5	-3	4	1	-2	-1	7	-6
6	-2	1	-4	3	-7	-1	5
7	4	3	-2	-1	6	-5	-1

multiplication table

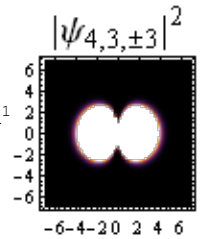
117 $t_{g_m}^{\frac{2}{3}}$ Ref. Symbols: 2D 3D

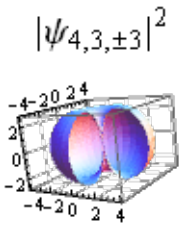
0apccssgg	Root{	-1	-1	-2	-2	-2	-1	0	-1 }	Exp. m 174200. MeV
001101111_2	Weight{	1	0	-1	0	0	1	-1	0 }	Theo. m 175990.
	Height= 11									Exp. τ ? s
Binary{	1	0	1	0	0	1	0	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}	

Bit NKS CA Pascal E8



^{64}Gd[Xe]$6s^2 4f^7 5d^1$





Flipped

Octonion triads-fPi=21 Sign mask=4 Hex=3D R fp_sm=6

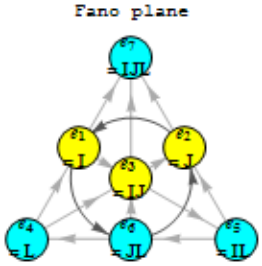
{{1, 6, 2}, {1, 3, 5}, {1, 7, 4},
{2, 4, 3}, {2, 7, 5}, {3, 7, 6}, {4, 5, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 6, 3, 5, 7, 4}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	-7	-3	2	4
2	6	-1	-4	3	-7	-1	5
3	-5	4	-1	-2	1	-7	6
4	7	-3	2	-1	6	-5	-1
5	3	7	-1	-6	-1	4	-2
6	-2	1	7	5	-4	-1	-3
7	-4	-5	-6	1	2	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=4 Hex=3D R fp_sm=6

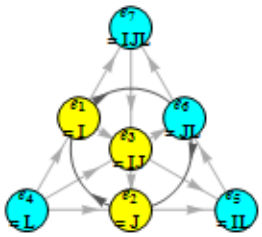
{{1, 6, 2}, {1, 3, 5}, {1, 7, 4},
{2, 7, 3}, {2, 5, 4}, {3, 6, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 6, 2, 3, 5, 7, 4}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	-7	-3	2	4
2	6	-1	-7	-5	4	-1	3
3	-5	7	-1	-6	1	4	-2
4	7	5	6	-1	-2	-3	-1
5	3	-4	-1	2	-1	7	-6
6	-2	1	-4	3	-7	-1	5
7	-4	-3	2	1	6	-5	-1

multiplication table

134 $\overline{b}_{C_m}^{\frac{1}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

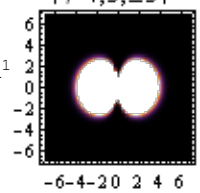
0apccssgg	Root{ 1 1 2 2 1 1 0 1 }	Exp. m	4200. MeV
010101111_2	Weight{ -1 1 -1 1 0 -1 1 0 }	Theo. m	3270.13
	Height= 10	Exp. τ	? s

Binary{	0	1	1	0	1	0	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

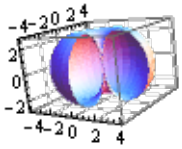
Bit NKS CA Pascal E8

^{58}Ce[Xe]$6s^2 4f^1 5d^1$

$|\psi_{4,3,\pm3}|^2$



$|\psi_{4,3,\pm3}|^2$



Flipped

Octonion triads-fPi=21 Sign mask=4 Hex=45 R fp_sm=6

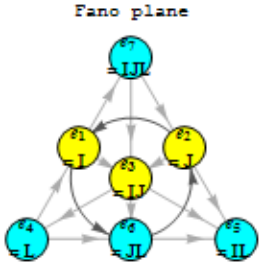
{{1, 6, 2}, {1, 3, 5}, {1, 7, 4},
{2, 3, 4}, {2, 5, 7}, {3, 6, 7}, {4, 6, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 6, 3, 5, 7, 4}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	-7	-3	2	4
2	6	-1	4	-3	7	-1	-5
3	-5	-4	-1	2	1	7	-6
4	7	3	-2	-1	-6	5	-1
5	3	-7	-1	6	-1	-4	2
6	-2	1	-7	-5	4	-1	3
7	-4	5	6	1	-2	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=22 Sign mask=4 Hex=45 R fp_sm=6

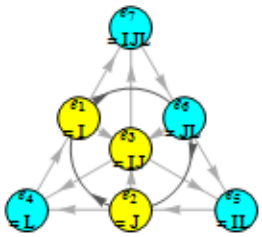
{{1, 6, 2}, {1, 3, 5}, {1, 7, 4},
{2, 3, 7}, {2, 4, 5}, {3, 4, 6}, {5, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 6, 2, 3, 5, 7, 4}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	-7	-3	2	4
2	6	-1	7	5	-4	-1	-3
3	-5	-7	-1	6	1	-4	2
4	7	-5	-6	-1	2	3	-1
5	3	4	-1	-2	-1	-7	6
6	-2	1	4	-3	7	-1	-5
7	-4	3	-2	1	-6	5	-1

multiplication table

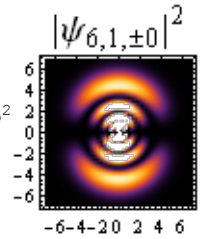
150 $\bar{t}_{g_d \check{L}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

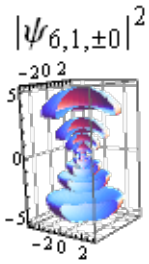
0apccssgg	Root{ 2 1 3 3 2 1 0 1 }	Exp. m	174200. MeV
011100011_2	Weight{ -1 0 0 1 0 0 0 -1 }	Theo. m	175 990.
	Height= 14	Exp. τ	? s

Binary{	0	0	1	1	1	0	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{82}Pb[Xe]$6s^2 4f^{14} 5d^{10} 6p^2$





Flipped

Octonion triads-fPi=22 Sign mask=1 Hex=71 R fp_sm=6

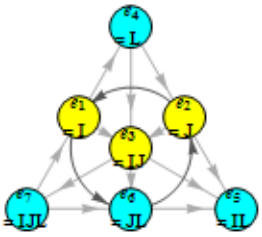
{{1, 6, 2}, {1, 3, 5}, {1, 4, 7},
{2, 3, 7}, {2, 5, 4}, {3, 6, 4}, {5, 7, 6}}

Flattened triad/mask bits

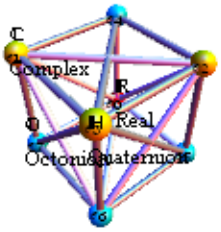
{1, 2, 6, 3, 5, 4, 7}
{1, 0, 0, 0, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	5	7	-3	2	-4
2	6	-1	7	-5	4	-1	-3
3	-5	-7	-1	-6	1	4	2
4	-7	5	6	-1	-2	-3	1
5	3	-4	-1	2	-1	-7	6
6	-2	1	-4	3	7	-1	-5
7	4	3	-2	-1	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=1 Hex=71 R fp_sm=6

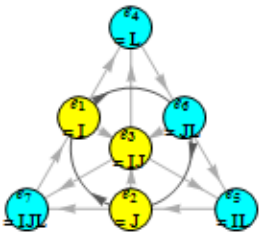
{{1, 6, 2}, {1, 3, 5}, {1, 4, 7},
{2, 3, 4}, {2, 7, 5}, {3, 7, 6}, {4, 6, 5}}

Flattened triad/mask bits

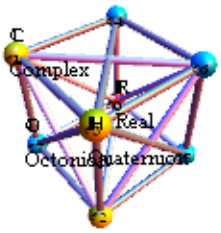
{1, 6, 2, 3, 5, 4, 7}
{1, 0, 0, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



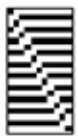
0↦1	1	2	3	4	5	6	7
1	-1	-6	5	7	-3	2	-4
2	6	-1	4	-3	-7	-1	5
3	-5	-4	-1	2	1	-7	6
4	-7	3	-2	-1	-6	5	1
5	3	7	-1	6	-1	-4	-2
6	-2	1	7	-5	4	-1	-3
7	4	-5	-6	-1	2	3	-1

multiplication table

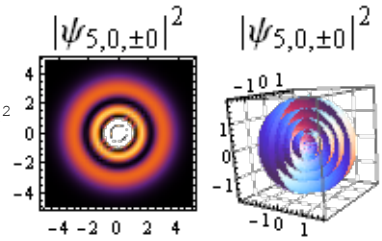
224 $b_{\substack{C_d \\ L}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	0	-1	-1	-1	-1	0	-1 }	Exp. m 4200. MeV
000100011_2	Weight{	1	-1	0	0	0	0	-1	1 }	Theo. m 3270.13
	Height=	7								Exp. τ ? s
Binary{		1	1	1	1	0	1	0	1 }	
E8{		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }	

Bit NKS CA Pascal E8



^{38}Sr[Kr]5s^2



Flipped

Octonion triads-fPi=22 Sign mask=1 Hex=09 R fp_sm=6

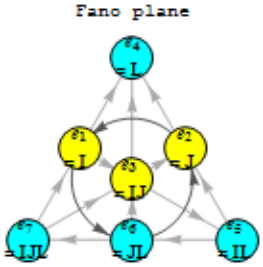
{{1, 6, 2}, {1, 3, 5}, {1, 4, 7},
{2, 7, 3}, {2, 4, 5}, {3, 4, 6}, {5, 6, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 6, 3, 5, 4, 7}
{1, 0, 0, 1, 0, 0, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	7	-3	2	-4
2	6	-1	-7	5	-4	-1	3
3	-5	7	-1	6	1	-4	-2
4	-7	-5	-6	-1	2	3	1
5	3	4	-1	-2	-1	7	-6
6	-2	1	4	-3	-7	-1	5
7	4	-3	2	-1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=1 Hex=09 R fp_sm=6

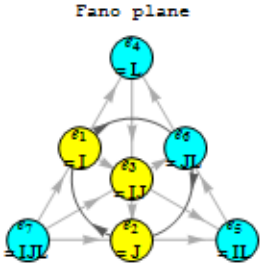
{{1, 6, 2}, {1, 3, 5}, {1, 4, 7},
{2, 4, 3}, {2, 5, 7}, {3, 6, 7}, {4, 5, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 6, 2, 3, 5, 4, 7}
{1, 0, 0, 1, 0, 0, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-6	5	7	-3	2	-4
2	6	-1	-4	3	7	-1	-5
3	-5	4	-1	-2	1	7	-6
4	-7	-3	2	-1	6	-5	1
5	3	-7	-1	-6	-1	4	2
6	-2	1	-7	5	-4	-1	3
7	4	5	6	-1	-2	-3	-1

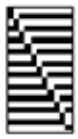
multiplication table

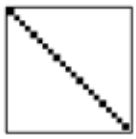
153 $b_{C_1 \hat{R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ -1 -1 -2 -1 -1 -1 0 -1 }	Exp. m	4200. MeV
000100111_2	Weight{ 1 -1 0 1 -1 1 -1 0 }	Theo. m	3270.13
	Height= 9	Exp. τ	? s

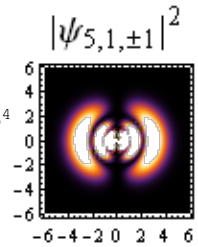
Binary{	0	0	1	1	0	1	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

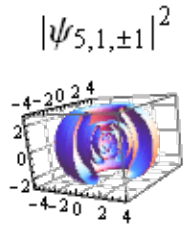
Bit NKS CA Pascal E8





^{52}Te[Kr]5s^{2}4d^{10}5p^4





Flipped

Octonion triads-fPi=22 Sign mask=2 Hex=17 R fp_sm=6

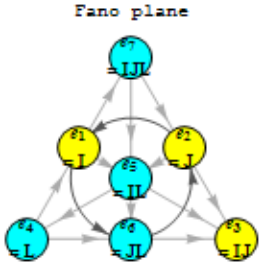
{{1, 6, 2}, {1, 5, 3}, {1, 7, 4},
{2, 3, 7}, {2, 5, 4}, {3, 4, 6}, {5, 6, 7}}

Flattened triad/mask bits

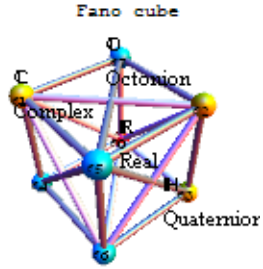
{1, 2, 6, 5, 3, 7, 4}
{1, 1, 1, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	-7	3	2	4
2	6	-1	7	-5	4	-1	-3
3	5	-7	-1	6	-1	-4	2
4	7	5	-6	-1	-2	3	-1
5	-3	-4	1	2	-1	7	-6
6	-2	1	4	-3	-7	-1	5
7	-4	3	-2	1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=2 Hex=17 R fp_sm=6

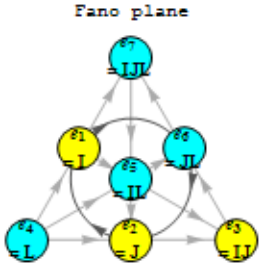
{{1, 6, 2}, {1, 5, 3}, {1, 7, 4},
{2, 3, 4}, {2, 7, 5}, {3, 6, 7}, {4, 5, 6}}

Flattened triad/mask bits

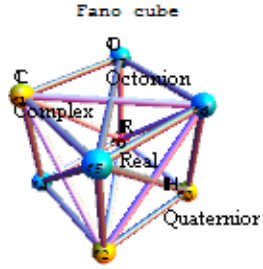
{1, 6, 2, 5, 3, 7, 4}
{1, 1, 1, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	-7	3	2	4
2	6	-1	4	-3	-7	-1	5
3	5	-4	-1	2	-1	7	-6
4	7	3	-2	-1	6	-5	-1
5	-3	7	1	-6	-1	4	-2
6	-2	1	-7	5	-4	-1	3
7	-4	-5	6	1	2	-3	-1

multiplication table

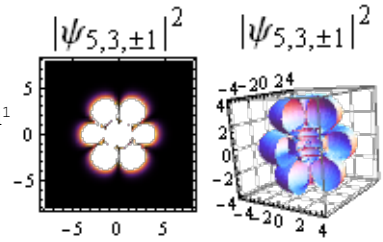
221 $\overline{t}_{g_1 \hat{R}}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	4	3	2	1	0	1 }	Exp. m 174200. MeV
011100111_2	Weight{	-1	0	0	0	1	-1	0	0 }	Theo. m 175 990.
	Height=	16								Exp. τ ? s

Binary{	1	1	1	1	1	0	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

$^{92}U[Rn]7s^2 5f^3 6d^1$



Flipped

Octonion triads-fPi=22 Sign mask=2 Hex=6F R fp_sm=6

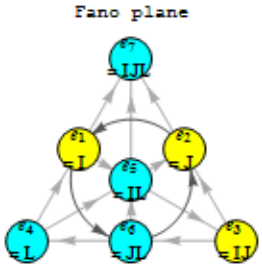
{{1, 6, 2}, {1, 5, 3}, {1, 7, 4},
{2, 7, 3}, {2, 4, 5}, {3, 6, 4}, {5, 7, 6}}

Flattened triad/mask bits

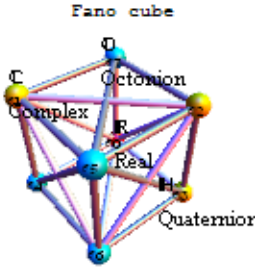
{1, 2, 6, 5, 3, 7, 4}
{1, 1, 1, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	-7	3	2	4
2	6	-1	-7	5	-4	-1	3
3	5	7	-1	-6	-1	4	-2
4	7	-5	6	-1	2	-3	-1
5	-3	4	1	-2	-1	-7	6
6	-2	1	-4	3	7	-1	-5
7	-4	-3	2	1	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=2 Hex=6F R fp_sm=6

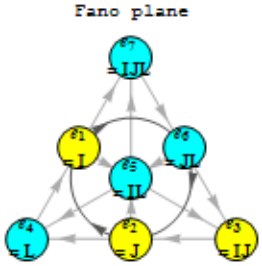
{{1, 6, 2}, {1, 5, 3}, {1, 7, 4},
{2, 4, 3}, {2, 5, 7}, {3, 7, 6}, {4, 6, 5}}

Flattened triad/mask bits

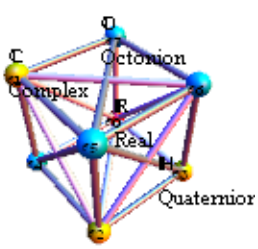
{1, 6, 2, 5, 3, 7, 4}
{1, 1, 1, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-5	-7	3	2	4
2	6	-1	-4	3	7	-1	-5
3	5	4	-1	-2	-1	-7	6
4	7	-3	2	-1	-6	5	-1
5	-3	-7	1	6	-1	-4	2
6	-2	1	7	-5	4	-1	-3
7	-4	5	-6	1	-2	3	-1

multiplication table

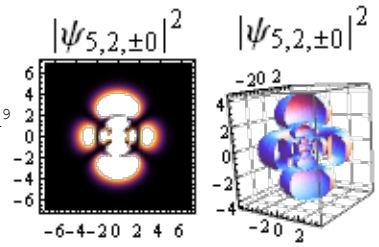
120 $\overline{t}_{g_m \hat{L}}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 011101011_2	Root{ 2 1 3 2 2 1 0 1 } Weight{ -1 0 1 -1 1 0 0 -1 } Height= 13	Exp. m Theo. m Exp. τ	174200. MeV 175 990. ? s

Binary{	1	0	0	1	1	0	1	0 }
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$ }
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$ }

Bit NKS CA Pascal E8

^{78}Pt[Xe]6s^{1}4f^{14}5d^9



Flipped

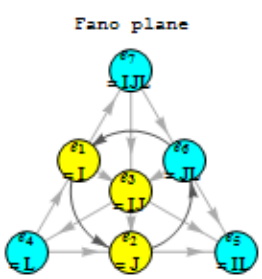
Octonion triads-fPi=22 Sign mask=3 Hex=5C R fp_sm=6

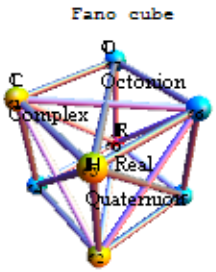
{{1, 2, 6}, {1, 3, 5}, {1, 7, 4},
{2, 7, 3}, {2, 5, 4}, {3, 4, 6}, {5, 7, 6}}

Flattened triad/mask bits

{1, 6, 2, 3, 5, 7, 4}
{0, 0, 1, 1, 1, 0, 1}

HoffmanSingleton (Yellow)





0↦1	1	2	3	4	5	6	7
1	-1	6	5	-7	-3	-2	4
2	-6	-1	-7	-5	4	1	3
3	-5	7	-1	6	1	-4	-2
4	7	5	-6	-1	-2	3	-1
5	3	-4	-1	2	-1	-7	6
6	2	-1	4	-3	7	-1	-5
7	-4	-3	2	1	-6	5	-1

multiplication table

Not Flipped

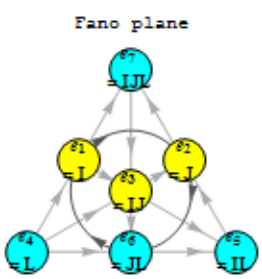
Octonion triads-fPi=21 Sign mask=3 Hex=5C R fp_sm=6

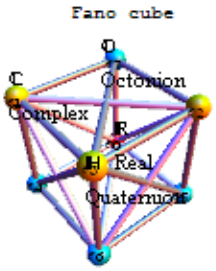
{{1, 2, 6}, {1, 3, 5}, {1, 7, 4},
{2, 4, 3}, {2, 7, 5}, {3, 6, 7}, {4, 6, 5}}

Flattened triad/mask bits

{1, 2, 6, 3, 5, 7, 4}
{0, 0, 1, 1, 1, 0, 1}

Coxeter (Cyan)





0↦1	1	2	3	4	5	6	7
1	-1	6	5	-7	-3	-2	4
2	-6	-1	-4	3	-7	1	5
3	-5	4	-1	-2	1	7	-6
4	7	-3	2	-1	-6	5	-1
5	3	7	-1	6	-1	-4	-2
6	2	-1	-7	-5	4	-1	3
7	-4	-5	6	1	2	-3	-1

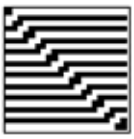
multiplication table

143 $b_{C_m \hat{L}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

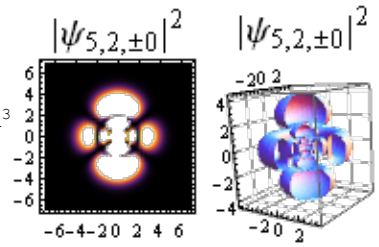
0apccssgg	Root{ -2 -1 -3 -2 -1 -1 0 -1 }	Exp. m	4200. MeV
000101011_2	Weight{ 1 -1 1 0 -1 0 0 1 }	Theo. m	3270.13
	Height= 12	Exp. τ	? s

Binary{	0	1	0	1	0	1	0	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8



^{73}Ta[Xe]$6s^2 4f^{14} 5d^3$



Flipped

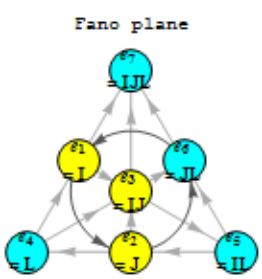
Octonion triads-fPi=22 Sign mask=3 Hex=24 R fp_sm=6

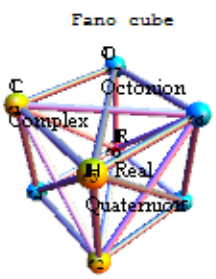
{{1, 2, 6}, {1, 3, 5}, {1, 7, 4},
{2, 3, 7}, {2, 4, 5}, {3, 6, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 6, 2, 3, 5, 7, 4}
{0, 0, 1, 0, 0, 1, 0}





0↦1	1	2	3	4	5	6	7
1	-1	6	5	-7	-3	-2	4
2	-6	-1	7	5	-4	1	-3
3	-5	-7	-1	-6	1	4	2
4	7	-5	6	-1	2	-3	-1
5	3	4	-1	-2	-1	7	-6
6	2	-1	-4	3	-7	-1	5
7	-4	3	-2	1	6	-5	-1

multiplication table

Not Flipped

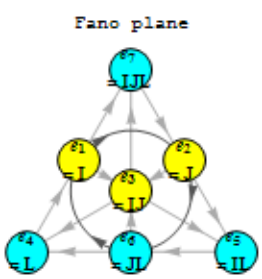
Octonion triads-fPi=21 Sign mask=3 Hex=24 R fp_sm=6

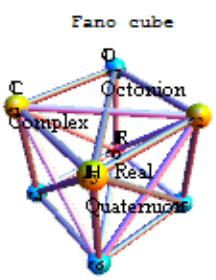
{{1, 2, 6}, {1, 3, 5}, {1, 7, 4},
{2, 3, 4}, {2, 5, 7}, {3, 7, 6}, {4, 5, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 6, 3, 5, 7, 4}
{0, 0, 1, 0, 0, 1, 0}





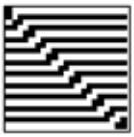
0↦1	1	2	3	4	5	6	7
1	-1	6	5	-7	-3	-2	4
2	-6	-1	4	-3	7	1	-5
3	-5	-4	-1	2	1	-7	6
4	7	3	-2	-1	6	-5	-1
5	3	-7	-1	-6	-1	4	2
6	2	-1	7	5	-4	-1	-3
7	-4	5	-6	1	-2	3	-1

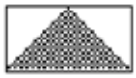
multiplication table

123 $b_{C_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

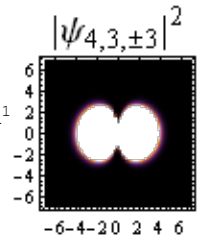
0apccssgg	Root{	-1	-1	-2	-2	-1	-1	0	-1 }	Exp. m 4200. MeV
000101111_2	Weight{	1	-1	1	-1	0	1	-1	0 }	Theo. m 3270.13
	Height= 10									Exp. τ ? s
Binary{		1	0	0	1	0	1	0	1 }	
E8{		$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{6}}$ }	

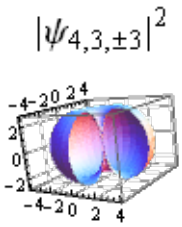
Bit NKS CA Pascal E8





^{58}Ce[Xe]$6s^2 4f^1 5d^1$





Flipped

Octonion triads-fPi=22 Sign mask=4 Hex=3A R fp_sm=6

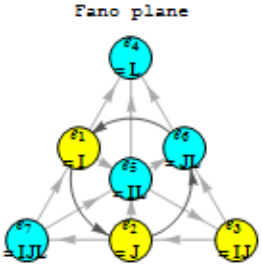
{{1, 2, 6}, {1, 5, 3}, {1, 4, 7},
{2, 7, 3}, {2, 5, 4}, {3, 6, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

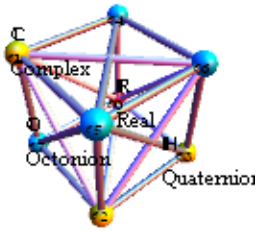
Flattened triad/mask bits

{1, 6, 2, 5, 3, 4, 7}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	7	3	-2	-4
2	-6	-1	-7	-5	4	1	3
3	5	7	-1	-6	-1	4	-2
4	-7	5	6	-1	-2	-3	1
5	-3	-4	1	2	-1	7	-6
6	2	-1	-4	3	-7	-1	5
7	4	-3	2	-1	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=4 Hex=3A R fp_sm=6

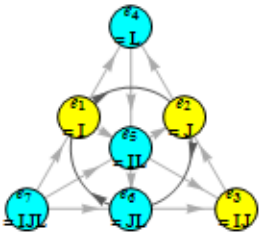
{{1, 2, 6}, {1, 5, 3}, {1, 4, 7},
{2, 4, 3}, {2, 7, 5}, {3, 7, 6}, {4, 5, 6}}

Coxeter (Cyan)

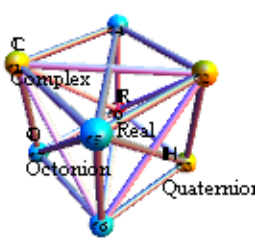
Flattened triad/mask bits

{1, 2, 6, 5, 3, 4, 7}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	7	3	-2	-4
2	-6	-1	-4	3	-7	1	5
3	5	4	-1	-2	-1	-7	6
4	-7	-3	2	-1	6	-5	1
5	-3	7	1	-6	-1	4	-2
6	2	-1	7	5	-4	-1	-3
7	4	-5	-6	-1	2	3	-1

multiplication table

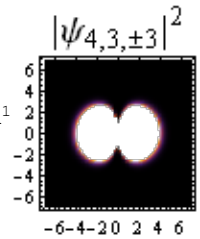
140 $\overline{t}_{g_m}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

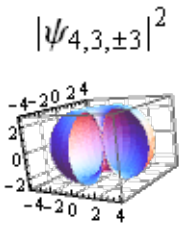
0apccssgg	Root{	1	1	2	2	2	1	0	1 }	Exp. m	174200. MeV
011101111_2	Weight{	-1	0	1	0	0	-1	1	0 }	Theo. m	175 990.
	Height=	11								Exp. τ	? s

Binary{	0	1	0	1	1	0	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{6}}$	}

Bit NKS CA Pascal E8

^{64}Gd[Xe]$6s^2 4f^7 5d^1$





Flipped

Octonion triads-fPi=22 Sign mask=4 Hex=42 R fp_sm=6

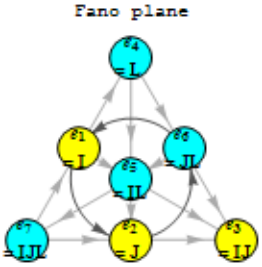
{{1, 2, 6}, {1, 5, 3}, {1, 4, 7},
{2, 3, 7}, {2, 4, 5}, {3, 4, 6}, {5, 7, 6}}

HoffmanSingleton (Yellow)

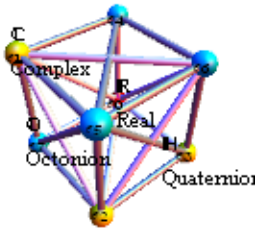
Flattened triad/mask bits

{1, 6, 2, 5, 3, 4, 7}
{0, 1, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	7	3	-2	-4
2	-6	-1	7	5	-4	1	-3
3	5	-7	-1	6	-1	-4	2
4	-7	-5	-6	-1	2	3	1
5	-3	4	1	-2	-1	-7	6
6	2	-1	4	-3	7	-1	-5
7	4	3	-2	-1	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=21 Sign mask=4 Hex=42 R fp_sm=6

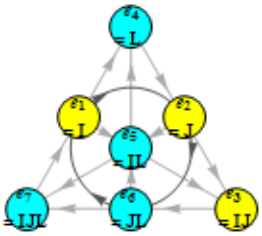
{{1, 2, 6}, {1, 5, 3}, {1, 4, 7},
{2, 3, 4}, {2, 5, 7}, {3, 6, 7}, {4, 6, 5}}

Coxeter (Cyan)

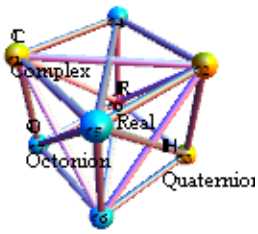
Flattened triad/mask bits

{1, 2, 6, 5, 3, 4, 7}
{0, 1, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-5	7	3	-2	-4
2	-6	-1	4	-3	7	1	-5
3	5	-4	-1	2	-1	7	-6
4	-7	3	-2	-1	-6	5	1
5	-3	-7	1	6	-1	-4	2
6	2	-1	-7	-5	4	-1	3
7	4	5	6	-1	-2	-3	-1

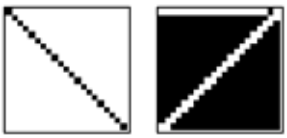
multiplication table

172 $\overline{x_3 \Phi}_{m_d}^{\,+\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

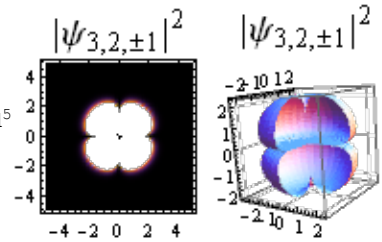
0apccssgg 010110000_2	Root{ 0 0 1 1 1 1 0 0 } Weight{ -1 1 0 0 1 -1 0 -1 } Height= 5	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{3_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	1	1	0	0	1	0	1	}
E8{	0	0	0	0	1	0	0	-1	}
Physics {	0	0	0	0	1	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{24}Cr[Ar]4s^{1}3d^5



Flipped

Octonion triads-fPi=23 Sign mask=1 Hex=7E L fp_sm=2

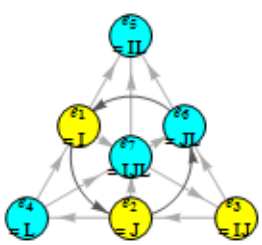
{{1, 2, 6}, {1, 7, 3}, {1, 5, 4},
{2, 4, 3}, {2, 7, 5}, {3, 6, 5}, {4, 7, 6}}

HoffmanSingleton (Yellow)

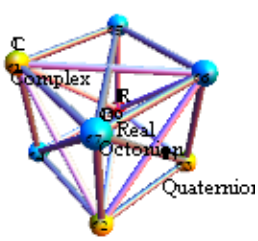
Flattened triad/mask bits

{1, 6, 2, 7, 3, 5, 4}
{0, 1, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	-5	4	-2	3
2	-6	-1	-4	3	-7	1	5
3	7	4	-1	-2	-6	5	-1
4	5	-3	2	-1	-1	-7	6
5	-4	7	6	1	-1	-3	-2
6	2	-1	-5	7	3	-1	-4
7	-3	-5	1	-6	2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=24 Sign mask=1 Hex=7D L fp_sm=3

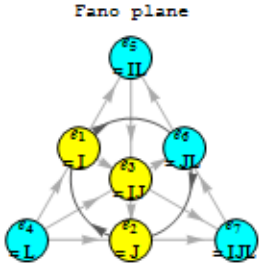
{{1, 6, 2}, {1, 3, 7}, {1, 5, 4},
{2, 5, 3}, {2, 7, 4}, {3, 6, 4}, {5, 7, 6}}

Coxeter (Cyan)

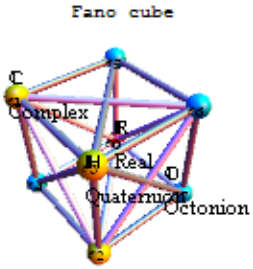
Flattened triad/mask bits

{1, 6, 2, 3, 7, 5, 4}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	-5	4	2	-3
2	6	-1	-5	-7	3	-1	4
3	-7	5	-1	-6	-2	4	1
4	5	7	6	-1	-1	-3	-2
5	-4	-3	2	1	-1	-7	6
6	-2	1	-4	3	7	-1	-5
7	3	-4	-1	2	-6	5	-1

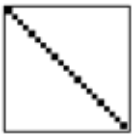
multiplication table

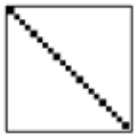
217 $e_S \Phi \overset{0}{\underset{b_d}{\vee}} \overset{}{\underset{L}{}}$ Ref. Symbols: 2D 3D

0apccssgg 001110000_2	Root{ 1 1 2 1 1 0 0 0 } Weight{ 0 -1 1 -1 1 0 -1 0 } Height= 7	Exp. m Theo. m Exp. τ	$1. \times 10^{-18}$ MeV $\frac{1_z}{\text{eVperC2 Mega}}$? s

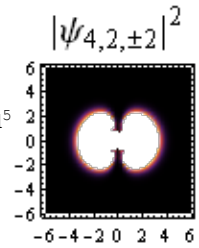
Binary{	0	0	1	1	0	1	1	1	}
E8{	1	0	0	1	0	0	0	0	}
Physics {	1	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0	}

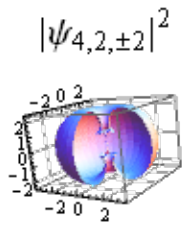
Bit NKS CA Pascal E8





^{43}Tc[Kr]5s^{2}4d^5





Flipped

Octonion triads-fPi=23 Sign mask=1 Hex=06 L fp_sm=2

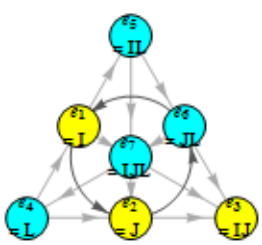
{{1, 2, 6}, {1, 7, 3}, {1, 5, 4},
{2, 3, 4}, {2, 5, 7}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

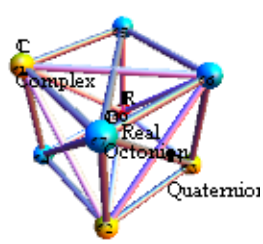
{1, 6, 2, 7, 3, 5, 4}
{0, 1, 1, 0, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	-5	4	-2	3
2	-6	-1	4	-3	7	1	-5
3	7	-4	-1	2	6	-5	-1
4	5	3	-2	-1	-1	7	-6
5	-4	-7	-6	1	-1	3	2
6	2	-1	5	-7	-3	-1	4
7	-3	5	1	6	-2	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=24 Sign mask=1 Hex=05 L fp_sm=3

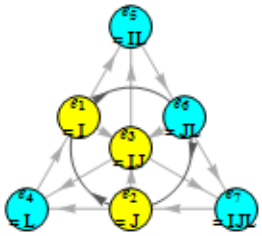
{{1, 6, 2}, {1, 3, 7}, {1, 5, 4},
{2, 3, 5}, {2, 4, 7}, {3, 4, 6}, {5, 6, 7}}

Flattened triad/mask bits

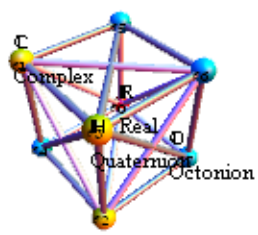
{1, 6, 2, 3, 7, 5, 4}
{1, 0, 1, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	-5	4	2	-3
2	6	-1	5	7	-3	-1	-4
3	-7	-5	-1	6	2	-4	1
4	5	-7	-6	-1	-1	3	2
5	-4	3	-2	1	-1	7	-6
6	-2	1	4	-3	-7	-1	5
7	3	4	-1	-2	6	-5	-1

multiplication table

49 $e_T \Phi \begin{smallmatrix} 0 \\ \hat{} \\ R \end{smallmatrix}$ $\underset{b_1}{}$ Ref. Symbols: 2D 3D

0apccssgg
001110100_2

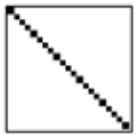
Root{ 0 0 0 1 1 0 0 0 }
Weight{ 0 -1 1 1 -1 0 0 0 }
Height= 3

Exp. m
Theo. m
Exp. τ

$1.\times 10^{-18}$ MeV
$\frac{2_z}{\text{eVperC2 Mega}}$
? s

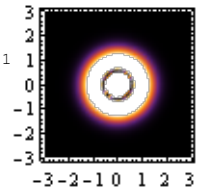
Binary{	1	0	0	1	1	0	0	0 }
E8{	-1	0	0	1	0	0	0	0 }
Physics {	-1	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	0	0	0 }

Bit NKS CA Pascal E8

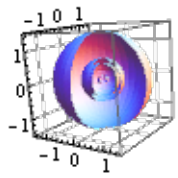


^{11}Na[Ne]3s^1

$|\psi_{3,0,\pm 0}|^2$



$|\psi_{3,0,\pm 0}|^2$



Flipped

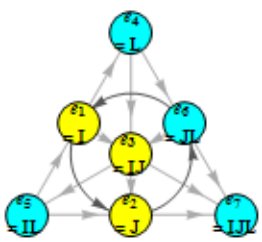
Octonion triads-fPi=23 Sign mask=2 Hex=18 L fp_sm=2

{{1, 2, 6}, {1, 3, 7}, {1, 4, 5},
{2, 4, 3}, {2, 7, 5}, {3, 5, 6}, {4, 6, 7}}

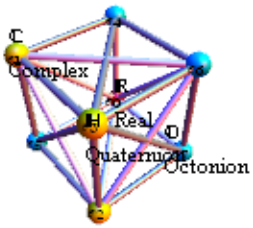
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 6, 2, 3, 7, 4, 5}
{0, 0, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	5	-4	-2	-3
2	-6	-1	-4	3	-7	1	5
3	-7	4	-1	-2	6	-5	1
4	-5	-3	2	-1	1	7	-6
5	4	7	-6	-1	-1	3	-2
6	2	-1	5	-7	-3	-1	4
7	3	-5	-1	6	2	-4	-1

multiplication table

Not Flipped

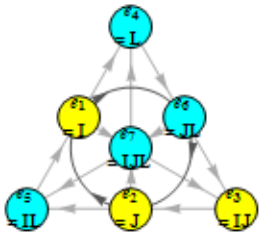
Octonion triads-fPi=24 Sign mask=2 Hex=1B L fp_sm=3

{{1, 6, 2}, {1, 7, 3}, {1, 4, 5},
{2, 5, 3}, {2, 7, 4}, {3, 4, 6}, {5, 6, 7}}

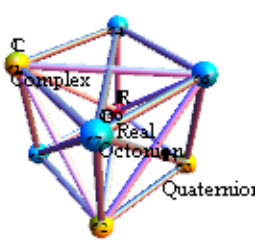
Coxeter (Cyan)

Flattened triad/mask bits
{1, 6, 2, 7, 3, 4, 5}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	5	-4	2	3
2	6	-1	-5	-7	3	-1	4
3	7	5	-1	6	-2	-4	-1
4	-5	7	-6	-1	1	3	-2
5	4	-3	2	-1	-1	7	-6
6	-2	1	4	-3	-7	-1	5
7	-3	-4	1	2	6	-5	-1

multiplication table

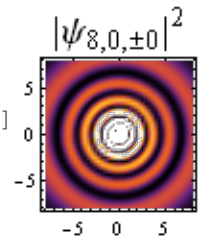
169 $\overline{x_3 \Phi}_{m_1}^{\hat{R}}{}^{+\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

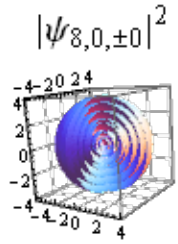
0apccssgg 010110100_2	Root{ 4 3 6 5 4 3 2 2 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 1 0 0 0 0 0 0 0 }	Theo. m	$\frac{0_{Hg}}{\text{eVperC2 Mega}}$
	Height= 30	Exp. τ	? s

Binary{	1	1	1	0	1	0	1	0 }
E8{	0	0	0	0	0	1	1	0 }
Physics {	0	0	0	0	0	$\frac{2}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$ }

Bit NKS CA Pascal E8

Missing[Unknown] UbnMissing[Unknown]





Flipped

Octonion triads-fPi=23 Sign mask=2 Hex=60 L fp_sm=2

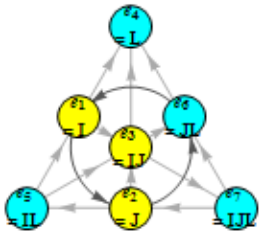
{{1, 2, 6}, {1, 3, 7}, {1, 4, 5},
{2, 3, 4}, {2, 5, 7}, {3, 6, 5}, {4, 7, 6}}

Flattened triad/mask bits

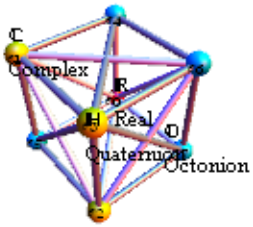
{1, 6, 2, 3, 7, 4, 5}
{0, 0, 0, 0, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	5	-4	-2	-3
2	-6	-1	4	-3	7	1	-5
3	-7	-4	-1	2	-6	5	1
4	-5	3	-2	-1	1	-7	6
5	4	-7	6	-1	-1	-3	2
6	2	-1	-5	7	3	-1	-4
7	3	5	-1	-6	-2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=24 Sign mask=2 Hex=63 L fp_sm=3

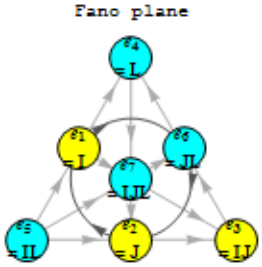
{{1, 6, 2}, {1, 7, 3}, {1, 4, 5},
{2, 3, 5}, {2, 4, 7}, {3, 6, 4}, {5, 7, 6}}

Flattened triad/mask bits

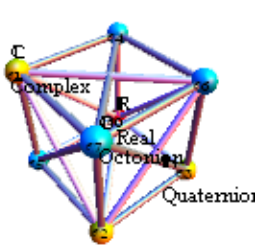
{1, 6, 2, 7, 3, 4, 5}
{1, 1, 0, 0, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	5	-4	2	3
2	6	-1	5	7	-3	-1	-4
3	7	-5	-1	-6	2	4	-1
4	-5	-7	6	-1	1	-3	2
5	4	3	-2	-1	-1	-7	6
6	-2	1	-4	3	7	-1	-5
7	-3	4	1	-2	-6	5	-1

multiplication table

73 $B_{b_m \hat{L}}^{0\to -1}$ Ref. Symbols: 2D 3D

0apccssgg
001111000_2

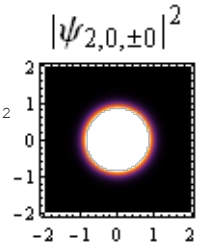
Root{ 0 0 0 0 1 0 0 0 }
Weight{ 0 -1 2 -1 0 0 0 0 }
Height= 2

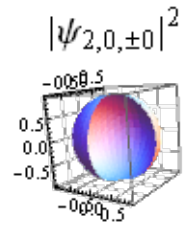
Exp. m 91187.6 MeV
Theo. m $\frac{0_z}{\text{eVperC2 Mega}}$
Exp. τ $1.\times 10^{-18}$ s

Binary{	0	1	0	0	0	0	1	1	}
E8{	0	0	-1	1	0	0	0	0	}
Physics {	0	0	$-\sqrt{2}$	0	0	0	0	0	}

Bit NKS CA Pascal E8

^{4}Be[He]2s^2



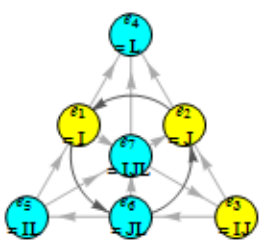


Flipped

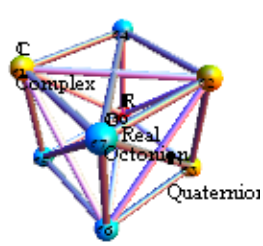
Octonion triads-fPi=23 Sign mask=3 Hex=2B L fp_sm=2
{{1, 6, 2}, {1, 7, 3}, {1, 4, 5},
{2, 4, 3}, {2, 5, 7}, {3, 6, 5}, {4, 6, 7}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 6, 7, 3, 4, 5}
{1, 1, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	5	-4	2	3
2	6	-1	-4	3	7	-1	-5
3	7	4	-1	-2	-6	5	-1
4	-5	-3	2	-1	1	7	-6
5	4	-7	6	-1	-1	-3	2
6	-2	1	-5	-7	3	-1	4
7	-3	5	1	6	-2	-4	-1

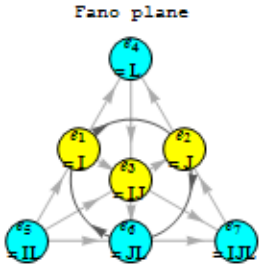
multiplication table

Not Flipped

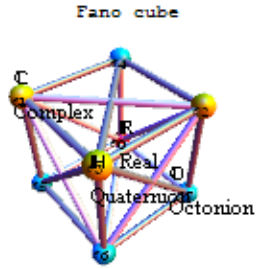
Octonion triads-fPi=24 Sign mask=3 Hex=28 L fp_sm=3
{{1, 2, 6}, {1, 3, 7}, {1, 4, 5},
{2, 5, 3}, {2, 4, 7}, {3, 6, 4}, {5, 6, 7}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 6, 3, 7, 4, 5}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	5	-4	-2	-3
2	-6	-1	-5	7	3	1	-4
3	-7	5	-1	-6	-2	4	1
4	-5	-7	6	-1	1	-3	2
5	4	-3	2	-1	-1	7	-6
6	2	-1	-4	3	-7	-1	5
7	3	4	-1	-2	6	-5	-1

multiplication table

84 $\overline{x_3 \Phi}_{m_m}^{+\to -\frac{1}{3}}$ $\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg 010111000_2	Root{	-1	-1	-1	-1	-1	-1	0	0	}
	Weight{	1	-1	0	0	1	-1	1	-1	}
	Height=	7								

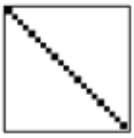
Exp. m $1.\times 10^{-18}$ MeV

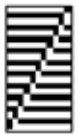
Theo. m $\frac{0_{Hg}}{\text{eVperC2 Mega}}$

Exp. τ ? s

Binary{	0	0	0	1	1	1	0	0	}
E8{	0	0	0	0	-1	0	0	-1	}
Physics {	0	0	0	0	-1	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

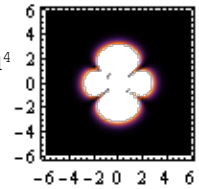
Bit NKS CA Pascal E8



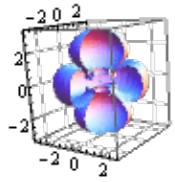


^{41}Nb[Kr]5s^{1}4d^4

$|\psi_{4,2,\pm 0}|^2$



$|\psi_{4,2,\pm 0}|^2$



Flipped

Octonion triads-fPi=23 Sign mask=3 Hex=53 L fp_sm=2

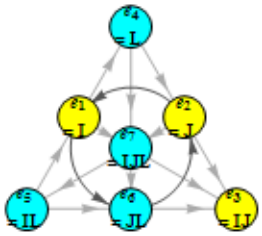
{{1, 6, 2}, {1, 7, 3}, {1, 4, 5},
{2, 3, 4}, {2, 7, 5}, {3, 5, 6}, {4, 7, 6}}

HoffmanSingleton (Yellow)

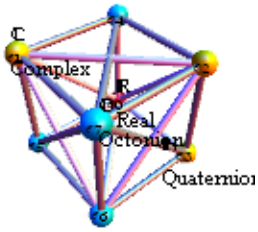
Flattened triad/mask bits

{1, 2, 6, 7, 3, 4, 5}
{1, 1, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	5	-4	2	3
2	6	-1	4	-3	-7	-1	5
3	7	-4	-1	2	6	-5	-1
4	-5	3	-2	-1	1	-7	6
5	4	7	-6	-1	-1	3	-2
6	-2	1	5	7	-3	-1	-4
7	-3	-5	1	-6	2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=24 Sign mask=3 Hex=50 L fp_sm=3

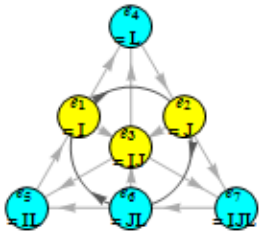
{{1, 2, 6}, {1, 3, 7}, {1, 4, 5},
{2, 3, 5}, {2, 7, 4}, {3, 4, 6}, {5, 7, 6}}

Coxeter (Cyan)

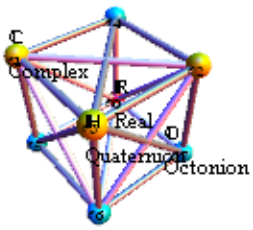
Flattened triad/mask bits

{1, 2, 6, 3, 7, 4, 5}
{0, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	5	-4	-2	-3
2	-6	-1	5	-7	-3	1	4
3	-7	-5	-1	6	2	-4	1
4	-5	7	-6	-1	1	3	-2
5	4	3	-2	-1	-1	-7	6
6	2	-1	4	-3	7	-1	-5
7	3	-4	-1	2	-6	5	-1

multiplication table

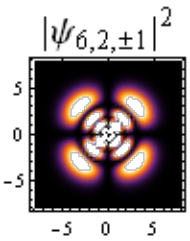
164 $\overline{g^{r\bar{g}}_{m_m}}$ $\overset{+\to 0}{\underset{R}{\vee}}$ Ref. Symbols: 2D 3D

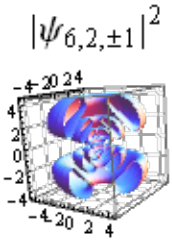
0apccssgg 010111100_2	Root{ 3 2 5 4 3 2 1 2 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 0 0 0 0 1 -1 1 -1 }	Theo. m	2.9674×10^{-18}
	Height= 23	Exp. τ	? s

Binary{	1	1	1	1	1	0	0	0 }
E8{	0	0	0	0	0	0	1	-1 }
Physics {	0	0	0	0	0	0	$\frac{1}{\sqrt{2}}$	$-\sqrt{\frac{3}{2}}$ }

Bit NKS CA Pascal E8

^{111}Rg[Rn]$7s^1 5f^{14} 6d^{10}$





Flipped

Octonion triads-fPi=23 Sign mask=4 Hex=4D L fp_sm=2

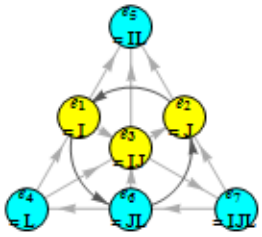
{{1, 6, 2}, {1, 3, 7}, {1, 5, 4},
{2, 4, 3}, {2, 5, 7}, {3, 5, 6}, {4, 7, 6}}

HoffmanSingleton (Yellow)

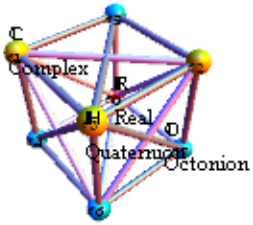
Flattened triad/mask bits

{1, 2, 6, 3, 7, 5, 4}
{1, 0, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	-5	4	2	-3
2	6	-1	-4	3	7	-1	-5
3	-7	4	-1	-2	6	-5	1
4	5	-3	2	-1	-1	-7	6
5	-4	-7	-6	1	-1	3	2
6	-2	1	5	7	-3	-1	-4
7	3	5	-1	-6	-2	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=24 Sign mask=4 Hex=4E L fp_sm=3

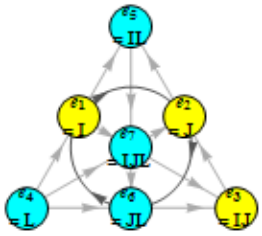
{{1, 2, 6}, {1, 7, 3}, {1, 5, 4},
{2, 5, 3}, {2, 4, 7}, {3, 4, 6}, {5, 7, 6}}

Coxeter (Cyan)

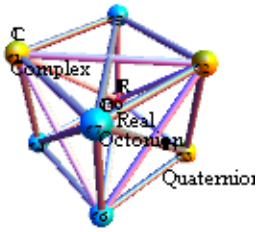
Flattened triad/mask bits

{1, 2, 6, 7, 3, 5, 4}
{0, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	-5	4	-2	3
2	-6	-1	-5	7	3	1	-4
3	7	5	-1	6	-2	-4	-1
4	5	-7	-6	-1	-1	3	2
5	-4	-3	2	1	-1	-7	6
6	2	-1	4	-3	7	-1	-5
7	-3	4	1	-2	-6	5	-1

multiplication table

219 $W^{0}_{b_m \vee R}$ Ref. Symbols: 2D 3D

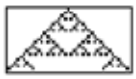
0apccssgg
001111100_2

Root{ 0 1 1 0 0 0 0 0 }
Weight{ 0 0 0 -1 1 -1 0 1 }
Height= 3

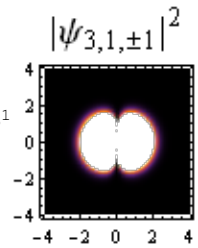
Exp. m 80403. MeV
Theo. m $\frac{1_W}{\text{eVperC2 Mega}}$
Exp. τ $1. \times 10^{-18}$ s

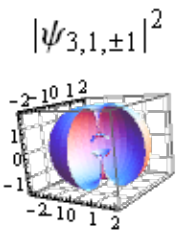
Binary{	0	0	0	1	1	1	1	1 }
E8{	1	1	0	0	0	0	0	0 }
Physics {	1	1	0	0	0	0	0	0 }

Bit NKS CA Pascal E8



^{13}Al[Ne]$3s^2 3p^1$





Flipped

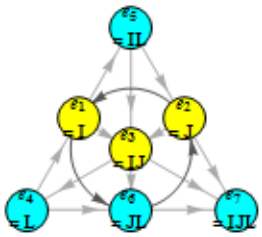
Octonion triads-fPi=23 Sign mask=4 Hex=35 L fp_sm=2

{{1, 6, 2}, {1, 3, 7}, {1, 5, 4},
{2, 3, 4}, {2, 7, 5}, {3, 6, 5}, {4, 6, 7}}

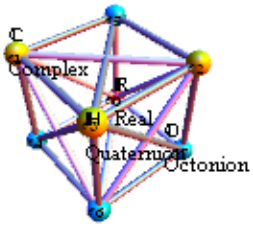
Flattened triad/mask bits
{1, 2, 6, 3, 7, 5, 4}
{1, 0, 1, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	-5	4	2	-3
2	6	-1	4	-3	-7	-1	5
3	-7	-4	-1	2	-6	5	1
4	5	3	-2	-1	-1	7	-6
5	-4	7	6	1	-1	-3	-2
6	-2	1	-5	-7	3	-1	4
7	3	-5	-1	6	2	-4	-1

multiplication table

Not Flipped

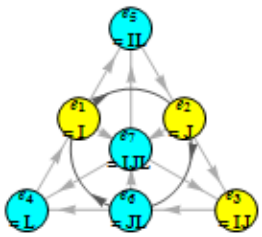
Octonion triads-fPi=24 Sign mask=4 Hex=36 L fp_sm=3

{{1, 2, 6}, {1, 7, 3}, {1, 5, 4},
{2, 3, 5}, {2, 7, 4}, {3, 6, 4}, {5, 6, 7}}

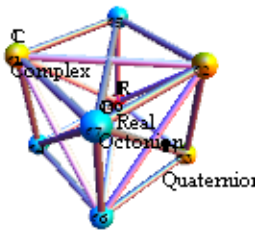
Flattened triad/mask bits
{1, 2, 6, 7, 3, 5, 4}
{0, 1, 1, 0, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	-5	4	-2	3
2	-6	-1	5	-7	-3	1	4
3	7	-5	-1	-6	2	4	-1
4	5	7	6	-1	-1	-3	-2
5	-4	3	-2	1	-1	7	-6
6	2	-1	-4	3	-7	-1	5
7	-3	-4	1	2	6	-5	-1

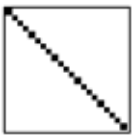
multiplication table

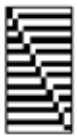
40 $\overline{e_S \Phi}$ $\overset{0}{\underset{b_d}{\vee}}$ $\overset{}{L}$ Ref. Symbols: 2D 3D

0apccssgg 011110000_2	Root{ -1 -1 -2 -1 -1 0 0 0 }	Exp. m	$1.\times 10^{-18}$ MeV
	Weight{ 0 1 -1 1 -1 0 1 0 }	Theo. m	$\frac{1_z}{\text{eVperC2 Mega}}$
	Height= 7	Exp. τ	? s

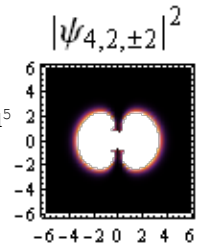
Binary{	1	1	0	0	1	0	0	0	}
E8{	-1	0	0	-1	0	0	0	0	}
Physics {	-1	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

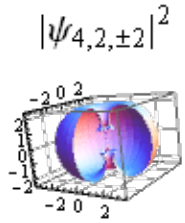
Bit NKS CA Pascal E8





^{43}Tc[Kr]5s^{2}4d^5





Flipped

Octonion triads-fPi=24 Sign mask=1 Hex=7A L fp_sm=3

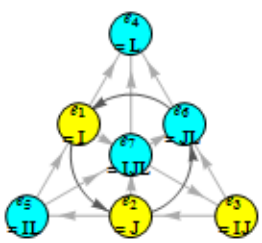
{{1, 2, 6}, {1, 7, 3}, {1, 4, 5},
{2, 5, 3}, {2, 7, 4}, {3, 6, 4}, {5, 7, 6}}

Coxeter (Cyan)

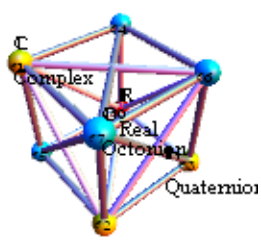
Flattened triad/mask bits

{1, **6**, **2**, 7, 3, 4, 5}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	5	-4	-2	3
2	-6	-1	-5	-7	3	1	4
3	7	5	-1	-6	-2	4	-1
4	-5	7	6	-1	1	-3	-2
5	4	-3	2	-1	-1	-7	6
6	2	-1	-4	3	7	-1	-5
7	-3	-4	1	2	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=23 Sign mask=1 Hex=79 L fp_sm=2

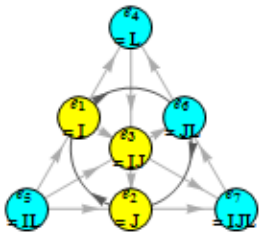
{{1, 6, 2}, {1, 3, 7}, {1, 4, 5},
{2, 4, 3}, {2, 7, 5}, {3, 6, 5}, {4, 7, 6}}

HoffmanSingleton (Yellow)

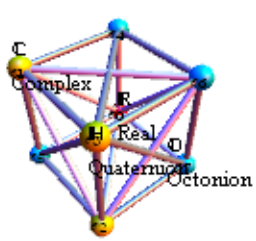
Flattened triad/mask bits

{1, 6, 2, 3, 7, 4, 5}
{1, 0, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	5	-4	2	-3
2	6	-1	-4	3	-7	-1	5
3	-7	4	-1	-2	-6	5	1
4	-5	-3	2	-1	1	-7	6
5	4	7	6	-1	-1	-3	-2
6	-2	1	-5	7	3	-1	-4
7	3	-5	-1	-6	2	4	-1

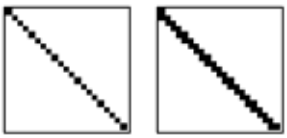
multiplication table

85 $x_3 \Phi_{m_d}^{\to \frac{1}{3}}$ Ref. Symbols: 2D 3D

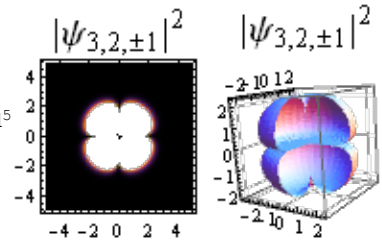
0apccssgg 000110000_2	Root{ 0 0 -1 -1 -1 -1 0 0 } Weight{ 1 -1 0 0 -1 1 0 1 } Height= 5	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{2_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	0	0	0	1	1	0	1	0	}
E8{	0	0	0	0	-1	0	0	1	}
Physics {	0	0	0	0	-1	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{24}Cr[Ar]4s^{1}3d^5



Flipped

Octonion triads-fPi=24 Sign mask=1 Hex=02 L fp_sm=3

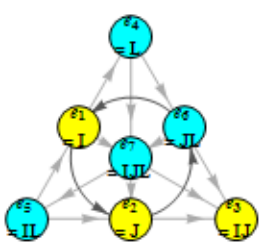
{{1, 2, 6}, {1, 7, 3}, {1, 4, 5},
{2, 3, 5}, {2, 4, 7}, {3, 4, 6}, {5, 6, 7}}

Flattened triad/mask bits

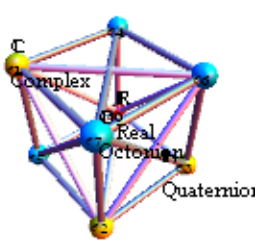
{1, 6, 2, 7, 3, 4, 5}
{0, 1, 0, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	5	-4	-2	3
2	-6	-1	5	7	-3	1	-4
3	7	-5	-1	6	2	-4	-1
4	-5	-7	-6	-1	1	3	2
5	4	3	-2	-1	-1	7	-6
6	2	-1	4	-3	-7	-1	5
7	-3	4	1	-2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=23 Sign mask=1 Hex=01 L fp_sm=2

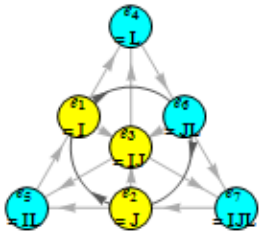
{{1, 6, 2}, {1, 3, 7}, {1, 4, 5},
{2, 3, 4}, {2, 5, 7}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

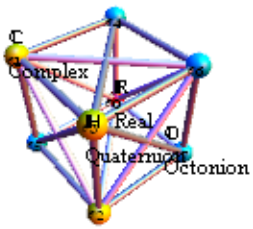
{1, 6, 2, 3, 7, 4, 5}
{1, 0, 0, 0, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	5	-4	2	-3
2	6	-1	4	-3	7	-1	-5
3	-7	-4	-1	2	6	-5	1
4	-5	3	-2	-1	1	7	-6
5	4	-7	-6	-1	-1	3	2
6	-2	1	5	-7	-3	-1	4
7	3	5	-1	6	-2	-4	-1

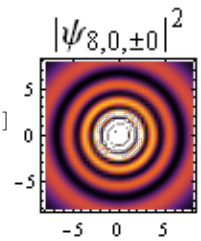
multiplication table

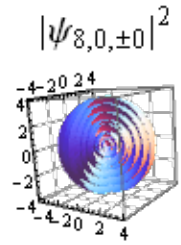
88 $x_3 \Phi_{m_1}^{\hat{R}} \to -\frac{2}{3}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-4	-3	-6	-5	-4	-3	-2	-2 }	Exp. m	$1.\times 10^{-18}$ MeV
000110100_2	Weight{	-1	0	0	0	0	0	0	0 }	Theo. m	$\frac{1_{Hg}}{\text{eVperC2 Mega}}$
	Height=	30								Exp. τ	? s
Binary{	0	0	0	1	0	1	0	1	}		
E8{	0	0	0	0	0	-1	-1	0	}		
Physics {	0	0	0	0	0	$-\frac{2}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}		

Bit NKS CA Pascal E8

Missing[Unknown] UbnMissing[Unknown]





Flipped

Octonion triads-fPi=24 Sign mask=2 Hex=1C L fp_sm=3

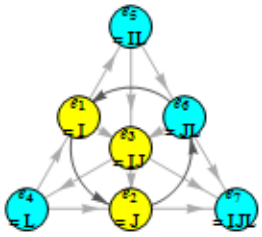
{{1, 2, 6}, {1, 3, 7}, {1, 5, 4},
{2, 5, 3}, {2, 7, 4}, {3, 4, 6}, {5, 6, 7}}

Flattened triad/mask bits

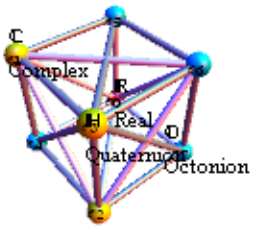
{1, 6, 2, 3, 7, 5, 4}
{0, 0, 1, 1, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	-5	4	-2	-3
2	-6	-1	-5	-7	3	1	4
3	-7	5	-1	6	-2	-4	1
4	5	7	-6	-1	-1	3	-2
5	-4	-3	2	1	-1	7	-6
6	2	-1	4	-3	-7	-1	5
7	3	-4	-1	2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=23 Sign mask=2 Hex=1F L fp_sm=2

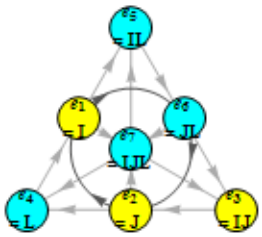
{{1, 6, 2}, {1, 7, 3}, {1, 5, 4},
{2, 4, 3}, {2, 7, 5}, {3, 5, 6}, {4, 6, 7}}

Flattened triad/mask bits

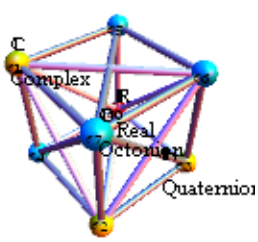
{1, 6, 2, 7, 3, 5, 4}
{1, 1, 1, 1, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	-5	4	2	3
2	6	-1	-4	3	-7	-1	5
3	7	4	-1	-2	6	-5	-1
4	5	-3	2	-1	-1	7	-6
5	-4	7	-6	1	-1	3	-2
6	-2	1	5	-7	-3	-1	4
7	-3	-5	1	6	2	-4	-1

multiplication table

208 $\overline{e_T \Phi}_{b_1}^{0}{}_{\hat{R}}$ Ref. Symbols: 2D 3D

0apccssgg
011110100_2

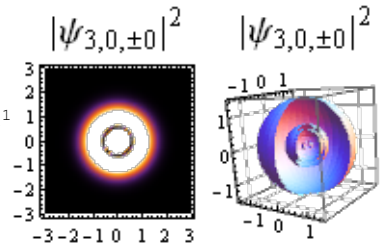
Root{ 0 0 0 -1 -1 0 0 0 }
Weight{ 0 1 -1 -1 1 0 0 0 }
Height= 3

Exp. m $1.\times 10^{-18}$ MeV
Theo. m $\frac{0_z}{\text{eVperC2 Mega}}$
Exp. τ ? s

Binary{	0	1	1	0	0	1	1	1	}
E8{	1	0	0	-1	0	0	0	0	}
Physics {	1	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	0	0	0	}

Bit NKS CA Pascal E8

^{11}Na[Ne]3s^1

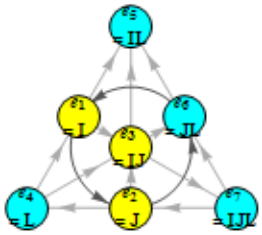


Flipped

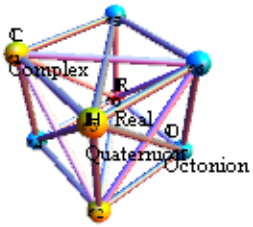
Octonion triads-fPi=24 Sign mask=2 Hex=64 L fp_sm=3
{{1, 2, 6}, {1, 3, 7}, {1, 5, 4},
{2, 3, 5}, {2, 4, 7}, {3, 6, 4}, {5, 7, 6}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 6, 2, 3, 7, 5, 4}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	-5	4	-2	-3
2	-6	-1	5	7	-3	1	-4
3	-7	-5	-1	-6	2	4	1
4	5	-7	6	-1	-1	-3	2
5	-4	3	-2	1	-1	-7	6
6	2	-1	-4	3	7	-1	-5
7	3	4	-1	-2	-6	5	-1

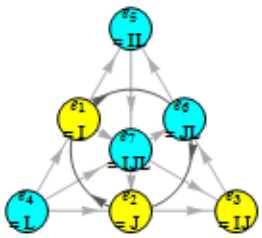
multiplication table

Not Flipped

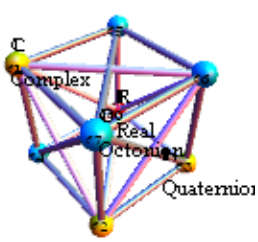
Octonion triads-fPi=23 Sign mask=2 Hex=67 L fp_sm=2
{{1, 6, 2}, {1, 7, 3}, {1, 5, 4},
{2, 3, 4}, {2, 5, 7}, {3, 6, 5}, {4, 7, 6}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 6, 2, 7, 3, 5, 4}
{1, 1, 1, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	-5	4	2	3
2	6	-1	4	-3	7	-1	-5
3	7	-4	-1	2	-6	5	-1
4	5	3	-2	-1	-1	-7	6
5	-4	-7	6	1	-1	-3	2
6	-2	1	-5	7	3	-1	-4
7	-3	5	1	-6	-2	4	-1

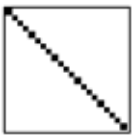
multiplication table

173 $x_3 \Phi_{m_m}^{\hat{L}} \to \frac{1}{3}$ Ref. Symbols: 2D 3D

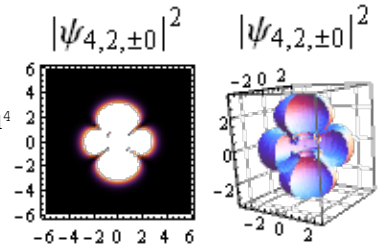
0apccssgg 000111000_2	Root{ 1 1 1 1 1 1 0 0 } Weight{ -1 1 0 0 -1 1 -1 1 } Height= 7	Exp. m Theo. m Exp. τ	$1.\times 10^{-18}$ MeV $\frac{0_{Hg}}{\text{eVperC2 Mega}}$? s

Binary{	1	1	1	0	0	0	1	1	}
E8{	0	0	0	0	1	0	0	1	}
Physics {	0	0	0	0	1	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{41}Nb[Kr]$5s^1 4d^4$



Flipped

Octonion triads-fPi=24 Sign mask=3 Hex=2F L fp_sm=3

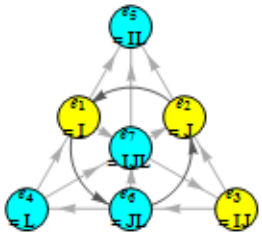
{{1, 6, 2}, {1, 7, 3}, {1, 5, 4},
{2, 5, 3}, {2, 4, 7}, {3, 6, 4}, {5, 6, 7}}

Coxeter (Cyan)

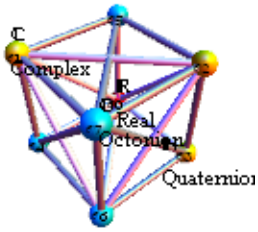
Flattened triad/mask bits

{1, 2, 6, 7, 3, 5, 4}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	-5	4	2	3
2	6	-1	-5	7	3	-1	-4
3	7	5	-1	-6	-2	4	-1
4	5	-7	6	-1	-1	-3	2
5	-4	-3	2	1	-1	7	-6
6	-2	1	-4	3	-7	-1	5
7	-3	4	1	-2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=23 Sign mask=3 Hex=2C L fp_sm=2

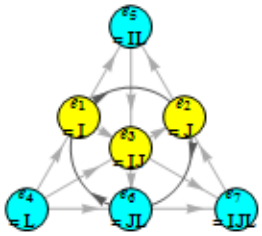
{{1, 2, 6}, {1, 3, 7}, {1, 5, 4},
{2, 4, 3}, {2, 5, 7}, {3, 6, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

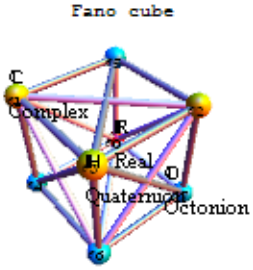
Flattened triad/mask bits

{1, 2, 6, 3, 7, 5, 4}
{0, 0, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	-5	4	-2	-3
2	-6	-1	-4	3	7	1	-5
3	-7	4	-1	-2	-6	5	1
4	5	-3	2	-1	-1	7	-6
5	-4	-7	6	1	-1	-3	2
6	2	-1	-5	-7	3	-1	4
7	3	5	-1	6	-2	-4	-1

multiplication table

184 $\overline{B}_{b_m}^{0\to 1}$ Ref. Symbols: 2D 3D

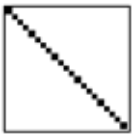
0apccssgg
011111000_2

Root{ 0 0 0 0 -1 0 0 0 }
Weight{ 0 1 -2 1 0 0 0 0 }
Height= 2

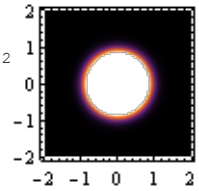
Exp. m 91187.6 MeV
Theo. m $\frac{0_z}{\text{eVperC2 Mega}}$
Exp. τ $1.\times 10^{-18}$ s

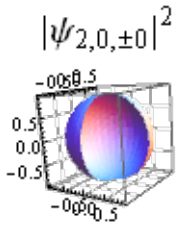
Binary{	1	0	1	1	1	1	0	0	}
E8{	0	0	1	-1	0	0	0	0	}
Physics {	0	0	$\sqrt{2}$	0	0	0	0	0	}

Bit NKS CA Pascal E8



^{4}Be[He]2s^2





Flipped

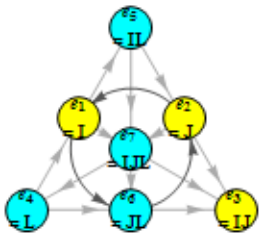
Octonion triads-fPi=24 Sign mask=3 Hex=57 L fp_sm=3

{{1, 6, 2}, {1, 7, 3}, {1, 5, 4},
{2, 3, 5}, {2, 7, 4}, {3, 4, 6}, {5, 7, 6}}

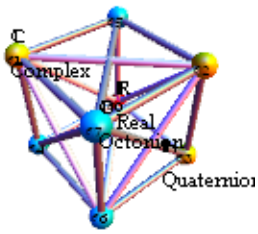
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 6, 7, 3, 5, 4}
{1, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	-7	-5	4	2	3
2	6	-1	5	-7	-3	-1	4
3	7	-5	-1	6	2	-4	-1
4	5	7	-6	-1	-1	3	-2
5	-4	3	-2	1	-1	-7	6
6	-2	1	4	-3	7	-1	-5
7	-3	-4	1	2	-6	5	-1

multiplication table

Not Flipped

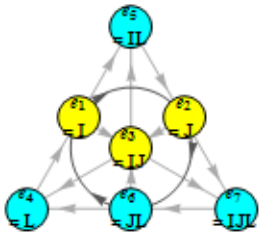
Octonion triads-fPi=23 Sign mask=3 Hex=54 L fp_sm=2

{{1, 2, 6}, {1, 3, 7}, {1, 5, 4},
{2, 3, 4}, {2, 7, 5}, {3, 5, 6}, {4, 7, 6}}

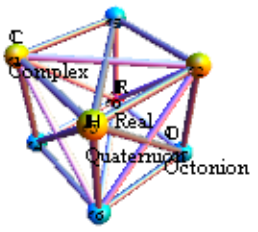
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 6, 3, 7, 5, 4}
{0, 0, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	7	-5	4	-2	-3
2	-6	-1	4	-3	-7	1	5
3	-7	-4	-1	2	6	-5	1
4	5	3	-2	-1	-1	-7	6
5	-4	7	-6	1	-1	3	-2
6	2	-1	5	7	-3	-1	-4
7	3	-5	-1	-6	2	4	-1

multiplication table

38 $\overline{W}^{0}_{b_m \vee R}$ Ref. Symbols: 2D 3D

0apccssgg
011111100_2

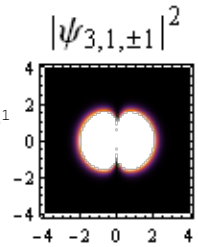
Root{ 0 -1 -1 0 0 0 0 0 }
Weight{ 0 0 0 1 -1 1 0 -1 }
Height= 3

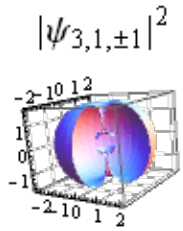
Exp. m 80403. MeV
Theo. m $\frac{0.494783}{\text{eVperC2 Mega}}$
Exp. τ $1.\times 10^{-18}$ s

Binary{	1	1	1	0	0	0	0	0	}
E8{	-1	-1	0	0	0	0	0	0	}
Physics {	-1	-1	0	0	0	0	0	0	}

Bit NKS CA Pascal E8

^{13}Al[Ne]$3s^2 3p^1$



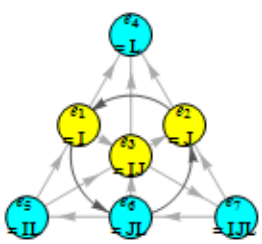


Flipped

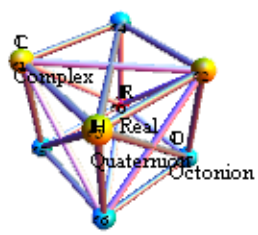
Octonion triads-fPi=24 Sign mask=4 Hex=49 L fp_sm=3
{{1, 6, 2}, {1, 3, 7}, {1, 4, 5},
{2, 5, 3}, {2, 4, 7}, {3, 4, 6}, {5, 7, 6}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 6, 3, 7, 4, 5}
{1, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	5	-4	2	-3
2	6	-1	-5	7	3	-1	-4
3	-7	5	-1	6	-2	-4	1
4	-5	-7	-6	-1	1	3	2
5	4	-3	2	-1	-1	-7	6
6	-2	1	4	-3	7	-1	-5
7	3	4	-1	-2	-6	5	-1

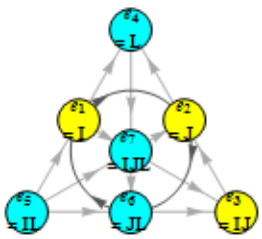
multiplication table

Not Flipped

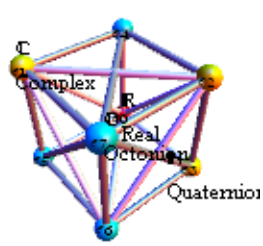
Octonion triads-fPi=23 Sign mask=4 Hex=4A L fp_sm=2
{{1, 2, 6}, {1, 7, 3}, {1, 4, 5},
{2, 4, 3}, {2, 5, 7}, {3, 5, 6}, {4, 7, 6}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 6, 7, 3, 4, 5}
{0, 1, 0, 1, 0, 0, 1}

Fano plane



Fano cube



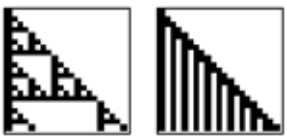
0↦1	1	2	3	4	5	6	7
1	-1	6	-7	5	-4	-2	3
2	-6	-1	-4	3	7	1	-5
3	7	4	-1	-2	6	-5	-1
4	-5	-3	2	-1	1	-7	6
5	4	-7	-6	-1	-1	3	2
6	2	-1	5	7	-3	-1	-4
7	-3	5	1	-6	-2	4	-1

multiplication table

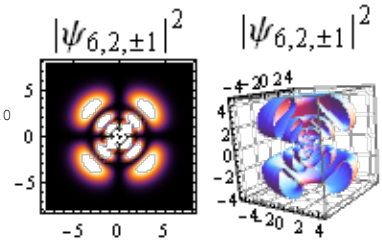
93 $g^{r\bar{g}}_{m_m} \xrightarrow[\vec{R}]{} 0$ Ref. Symbols: 2D 3D

0apccssgg 000111100_2	Root{	-3	-2	-5	-4	-3	-2	-1	-2 }	Exp. m $1.\times 10^{-18}$ MeV
	Weight{	0	0	0	0	-1	1	-1	1 }	Theo. m 2.9674×10^{-18}
	Height= 23									Exp. τ ? s
Binary{	0	0	0	0	0	1	1	1	}	
E8{	0	0	0	0	0	0	-1	1	}	
Physics {	0	0	0	0	0	0	$-\frac{1}{\sqrt{2}}$	$\sqrt{\frac{3}{2}}$	}	

Bit NKS CA Pascal E8



^{111}Rg[Rn]7s^{1}5f^{14}6d^{10}



Flipped

Octonion triads-fPi=24 Sign mask=4 Hex=31 L fp_sm=3

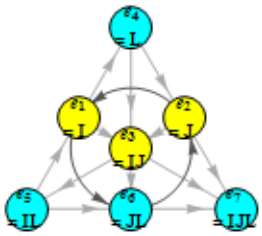
{{1, 6, 2}, {1, 3, 7}, {1, 4, 5},
{2, 3, 5}, {2, 7, 4}, {3, 6, 4}, {5, 6, 7}}

Coxeter (Cyan)

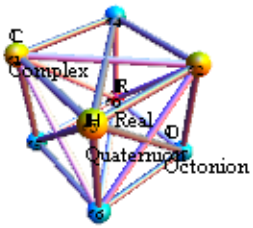
Flattened triad/mask bits

{1, 2, 6, 3, 7, 4, 5}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-6	7	5	-4	2	-3
2	6	-1	5	-7	-3	-1	4
3	-7	-5	-1	-6	2	4	1
4	-5	7	6	-1	1	-3	-2
5	4	3	-2	-1	-1	7	-6
6	-2	1	-4	3	-7	-1	5
7	3	-4	-1	2	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=23 Sign mask=4 Hex=32 L fp_sm=2

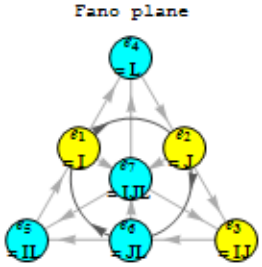
{{1, 2, 6}, {1, 7, 3}, {1, 4, 5},
{2, 3, 4}, {2, 7, 5}, {3, 6, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

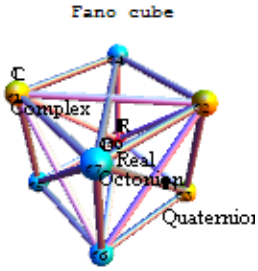
Flattened triad/mask bits

{1, 2, 6, 7, 3, 4, 5}
{0, 1, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	6	-7	5	-4	-2	3
2	-6	-1	4	-3	-7	1	5
3	7	-4	-1	2	-6	5	-1
4	-5	3	-2	-1	1	7	-6
5	4	7	6	-1	-1	-3	-2
6	2	-1	-5	-7	3	-1	4
7	-3	-5	1	6	2	-4	-1

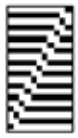
multiplication table

68 $d_{m_d}^{\frac{1}{3}\to-\frac{4}{3}}$ Ref. Symbols: 2D 3D

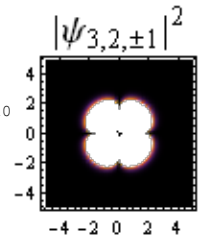
0apccssgg	Root{ -1 -1 -1 -1 0 0 0 0 }	Exp. m	5. MeV
000110001_2	Weight{ 0 0 1 -1 1 -1 1 -1 }	Theo. m	3.2107
	Height= 5	Exp. τ	? s

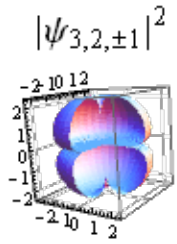
Binary{	0	1	0	0	1	1	0	0	}
E8{	0	0	-1	0	0	0	0	-1	}
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{29}Cu[Ar]4s^{1}3d^{10}





Flipped

Octonion triads-fPi=25 Sign mask=1 Hex=08 L fp_sm=5

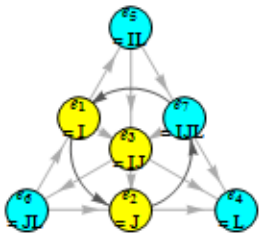
{{1, 2, 7}, {1, 3, 4}, {1, 5, 6},
{2, 5, 3}, {2, 4, 6}, {3, 6, 7}, {4, 5, 7}}

Coxeter (Cyan)

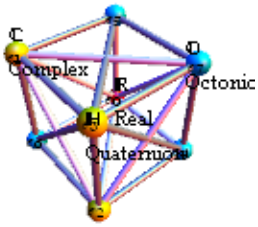
Flattened triad/mask bits

{1, 7, 2, 3, 4, 5, 6}
{0, 0, 0, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	6	-5	-2
2	-7	-1	-5	6	3	-4	1
3	-4	5	-1	1	-2	7	-6
4	3	-6	-1	-1	7	2	-5
5	-6	-3	2	-7	-1	1	4
6	5	4	-7	-2	-1	-1	3
7	2	-1	6	5	-4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=1 Hex=0B L fp_sm=8

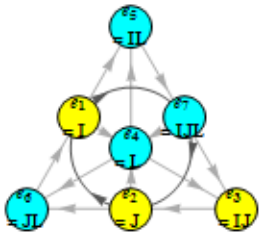
{{1, 7, 2}, {1, 4, 3}, {1, 5, 6},
{2, 6, 3}, {2, 4, 5}, {3, 5, 7}, {4, 6, 7}}

HoffmanSingleton (Yellow)

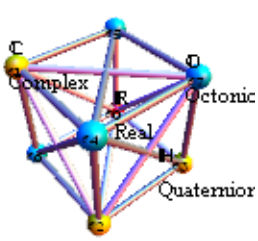
Flattened triad/mask bits

{1, 7, 2, 4, 3, 5, 6}
{1, 1, 0, 1, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	6	-5	2
2	7	-1	-6	5	-4	3	-1
3	4	6	-1	-1	7	-2	-5
4	-3	-5	1	-1	2	7	-6
5	-6	4	-7	-2	-1	1	3
6	5	-3	2	-7	-1	-1	4
7	-2	1	5	6	-3	-4	-1

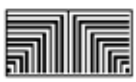
multiplication table

78 $\overline{u}_{b_d}\ \overset{-\frac{2}{3}\to\frac{1}{3}}{\underset{L}{\vee}}$ Ref. Symbols: 2D 3D

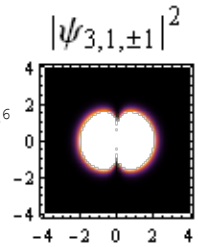
0apccssgg 011110001_2	Root{ 0 0 -1 -1 -1 0 0 0 } Weight{ 0 1 -1 0 -1 1 0 1 } Height= 4	Exp. m Theo. m Exp. τ	2.2 MeV 1.60535 ? s

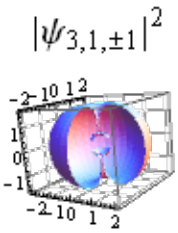
Binary{	0	0	1	0	1	1	0	0	}
E8{	0	0	0	-1	0	0	0	1	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{18}Ar[Ne]$3s^2 3p^6$





Flipped

Octonion triads-fPi=25 Sign mask=1 Hex=70 L fp_sm=5

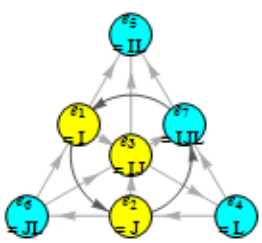
{{1, 2, 7}, {1, 3, 4}, {1, 5, 6},
{2, 3, 5}, {2, 6, 4}, {3, 7, 6}, {4, 7, 5}}

Coxeter (Cyan)

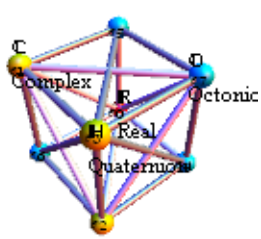
Flattened triad/mask bits

{1, 7, 2, 3, 4, 5, 6}
{0, 0, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	6	-5	-2
2	-7	-1	5	-6	-3	4	1
3	-4	-5	-1	1	2	-7	6
4	3	6	-1	-1	-7	-2	5
5	-6	3	-2	7	-1	1	-4
6	5	-4	7	2	-1	-1	-3
7	2	-1	-6	-5	4	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=1 Hex=73 L fp_sm=8

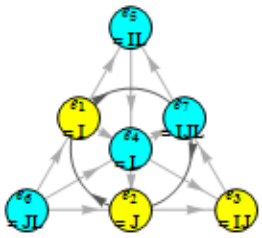
{{1, 7, 2}, {1, 4, 3}, {1, 5, 6},
{2, 3, 6}, {2, 5, 4}, {3, 7, 5}, {4, 7, 6}}

HoffmanSingleton (Yellow)

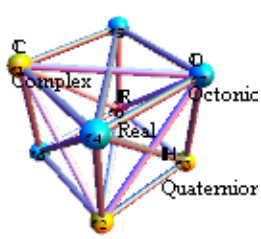
Flattened triad/mask bits

{1, 7, 2, 4, 3, 5, 6}
{1, 1, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	6	-5	2
2	7	-1	6	-5	4	-3	-1
3	4	-6	-1	-1	-7	2	5
4	-3	5	1	-1	-2	-7	6
5	-6	-4	7	2	-1	1	-3
6	5	3	-2	7	-1	-1	-4
7	-2	1	-5	-6	3	4	-1

multiplication table

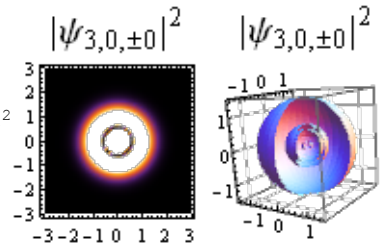
69 $\overline{u}_{b_1}\hat{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	-1	-1	0	0	0	0 }
011110101_2	Weight{	0	0	1	-1	-1	1	0	1 }
	Height=	3							
Binary{		0	1	0	0	1	0	1	0 }
E8{		0	0	-1	0	0	0	0	1 }
Physics {		0	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }

Exp. m 2.2 MeV
Theo. m 1.60535
Exp. τ ? s

Bit NKS CA Pascal E8

^{12}Mg[Ne]3s^2



Flipped

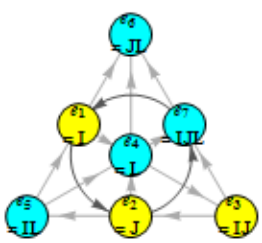
Octonion triads-fPi=25 Sign mask=2 Hex=6E L fp_sm=5

{{1, 2, 7}, {1, 4, 3}, {1, 6, 5},
{2, 5, 3}, {2, 4, 6}, {3, 7, 6}, {4, 7, 5}}

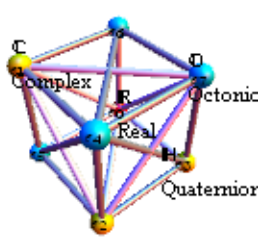
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 4, 3, 6, 5}
{0, 1, 1, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	-6	5	-2
2	-7	-1	-5	6	3	-4	1
3	4	5	-1	-1	-2	-7	6
4	-3	-6	1	-1	-7	2	5
5	6	-3	2	7	-1	-1	-4
6	-5	4	7	-2	1	-1	-3
7	2	-1	-6	-5	4	3	-1

multiplication table

Not Flipped

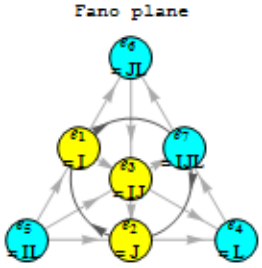
Octonion triads-fPi=26 Sign mask=2 Hex=6D L fp_sm=8

{{1, 7, 2}, {1, 3, 4}, {1, 6, 5},
{2, 6, 3}, {2, 4, 5}, {3, 7, 5}, {4, 7, 6}}

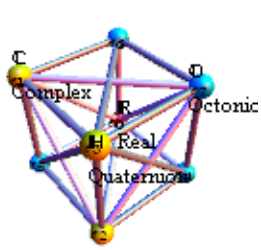
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 3, 4, 6, 5}
{1, 0, 1, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	-6	5	2
2	7	-1	-6	5	-4	3	-1
3	-4	6	-1	1	-7	-2	5
4	3	-5	-1	-1	2	-7	6
5	6	4	7	-2	-1	-1	-3
6	-5	-3	2	7	1	-1	-4
7	-2	1	-5	-6	3	4	-1

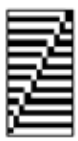
multiplication table

77 $d_{m_1 \hat{R}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

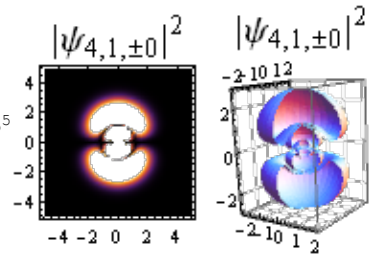
0apccssgg	Root{	-1	-1	-1	-1	-1	0	0	0 }	Exp. m	5. MeV
000110101_2	Weight{	0	1	-1	0	1	-1	1	-1 }	Theo. m	3.2107
	Height=	6								Exp. τ	? s

Binary{	0	0	1	1	0	0	0	1	}
E8{	0	0	0	-1	0	0	0	-1	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



$^{35}Br[Ar]4s^2 3d^{10} 4p^5$



Flipped

Octonion triads-fPi=25 Sign mask=2 Hex=16 L fp_sm=5

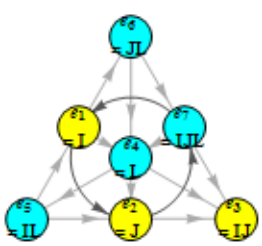
{{1, 2, 7}, {1, 4, 3}, {1, 6, 5},
{2, 3, 5}, {2, 6, 4}, {3, 6, 7}, {4, 5, 7}}

Flattened triad/mask bits

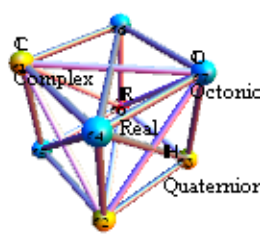
{1, 7, 2, 4, 3, 6, 5}
{0, 1, 1, 0, 1, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	-6	5	-2
2	-7	-1	5	-6	-3	4	1
3	4	-5	-1	-1	2	7	-6
4	-3	6	1	-1	7	-2	-5
5	6	3	-2	-7	-1	-1	4
6	-5	-4	-7	2	1	-1	3
7	2	-1	6	5	-4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=2 Hex=15 L fp_sm=8

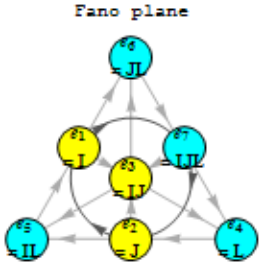
{{1, 7, 2}, {1, 3, 4}, {1, 6, 5},
{2, 3, 6}, {2, 5, 4}, {3, 5, 7}, {4, 6, 7}}

Flattened triad/mask bits

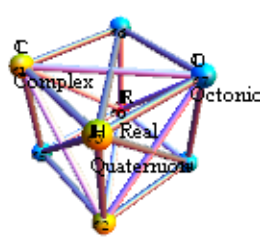
{1, 7, 2, 3, 4, 6, 5}
{1, 0, 1, 0, 1, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	-6	5	2
2	7	-1	6	-5	4	-3	-1
3	-4	-6	-1	1	7	2	-5
4	3	5	-1	-1	-2	7	-6
5	6	-4	-7	2	-1	-1	3
6	-5	3	-2	-7	1	-1	4
7	-2	1	5	6	-3	-4	-1

multiplication table

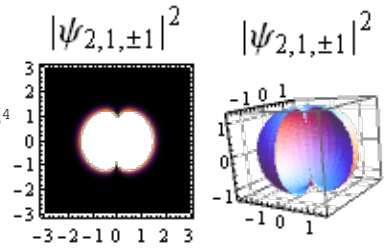
58 $\overline{u}_{b_m}\ \hat{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 011111001_2	Root{ 1 0 0 0 0 0 0 0 } Weight{ 0 0 0 0 -1 2 -1 0 } Height= 2	Exp. m Theo. m Exp. τ	2.2 MeV 1.60535 ? s

Binary{	1	0	0	0	0	0	1	1	}
E8{	0	-1	0	0	0	0	0	1	}
Physics {	0	-1	0	0	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^8O[He]2s^22p^4$



Flipped

Octonion triads-fPi=25 Sign mask=3 Hex=5D L fp_sm=5

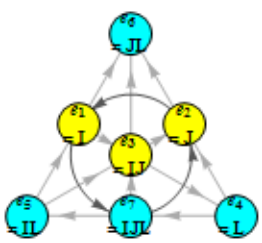
{{1, 7, 2}, {1, 3, 4}, {1, 6, 5},
{2, 5, 3}, {2, 6, 4}, {3, 6, 7}, {4, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 4, 6, 5}
{1, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	-6	5	2
2	7	-1	-5	-6	3	4	-1
3	-4	5	-1	1	-2	7	-6
4	3	6	-1	-1	-7	-2	5
5	6	-3	2	7	-1	-1	-4
6	-5	-4	-7	2	1	-1	3
7	-2	1	6	-5	4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=3 Hex=5E L fp_sm=8

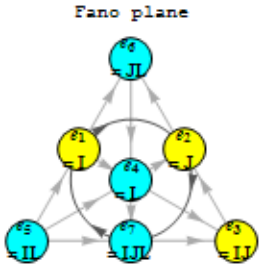
{{1, 2, 7}, {1, 4, 3}, {1, 6, 5},
{2, 6, 3}, {2, 5, 4}, {3, 5, 7}, {4, 7, 6}}

HoffmanSingleton (Yellow)

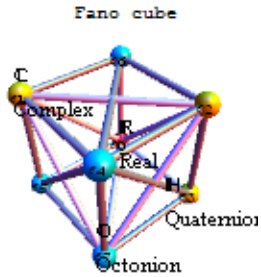
Flattened triad/mask bits

{1, 2, 7, 4, 3, 6, 5}
{0, 1, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	-6	5	-2
2	-7	-1	-6	-5	4	3	1
3	4	6	-1	-1	7	-2	-5
4	-3	5	1	-1	-2	-7	6
5	6	-4	-7	2	-1	-1	3
6	-5	-3	2	7	1	-1	-4
7	2	-1	5	-6	-3	4	-1

multiplication table

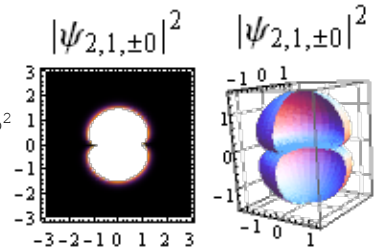
212 $d_{m_m \hat{L}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	1	0	0	0	0	0 }	Exp. m	5. MeV
000111001_2	Weight{	0	0	0	-1	2	-1	0	-1 }	Theo. m	3.2107
	Height=	2								Exp. τ	? s

Binary{	0	1	0	1	0	1	1	1	}
E8{	1	0	0	0	0	0	0	-1	}
Physics {	1	0	0	0	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^6C[He]2s^22p^2$



Flipped

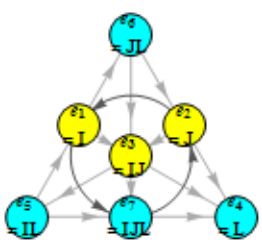
Octonion triads-fPi=25 Sign mask=3 Hex=25 L fp_sm=5

{{1, 7, 2}, {1, 3, 4}, {1, 6, 5},
{2, 3, 5}, {2, 4, 6}, {3, 7, 6}, {4, 5, 7}}

Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 7, 3, 4, 6, 5}
{1, 0, 1, 0, 0, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	-6	5	2
2	7	-1	5	6	-3	-4	-1
3	-4	-5	-1	1	2	-7	6
4	3	-6	-1	-1	7	2	-5
5	6	3	-2	-7	-1	-1	4
6	-5	4	7	-2	1	-1	-3
7	-2	1	-6	5	-4	3	-1

multiplication table

Not Flipped

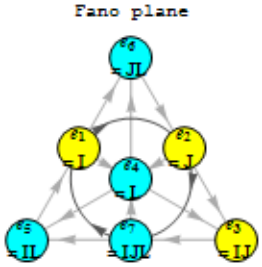
Octonion triads-fPi=26 Sign mask=3 Hex=26 L fp_sm=8

{{1, 2, 7}, {1, 4, 3}, {1, 6, 5},
{2, 3, 6}, {2, 4, 5}, {3, 7, 5}, {4, 6, 7}}

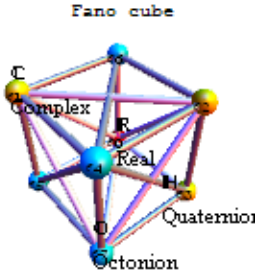
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 7, 4, 3, 6, 5}
{0, 1, 1, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	-6	5	-2
2	-7	-1	6	5	-4	-3	1
3	4	-6	-1	-1	-7	2	5
4	-3	-5	1	-1	2	7	-6
5	6	4	7	-2	-1	-1	-3
6	-5	3	-2	-7	1	-1	4
7	2	-1	-5	6	3	-4	-1

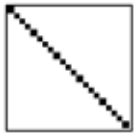
multiplication table

57 $d_{m_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

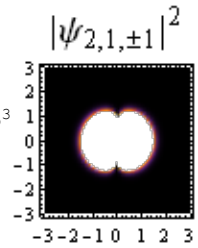
0apccssgg	Root{	0	-1	0	0	0	0	0	0 }	Exp. m	5. MeV
000111101_2	Weight{	0	0	0	0	1	0	0	-2 }	Theo. m	3.2107
	Height=	2								Exp. τ	? s

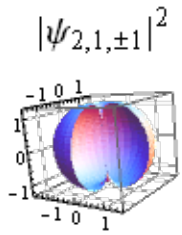
Binary{	1	0	0	0	0	1	0	1	}
E8{	0	-1	0	0	0	0	0	-1	}
Physics {	0	-1	0	0	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{7}N[He]$2s^2 2p^3$





Flipped

Octonion triads-fPi=25 Sign mask=4 Hex=3B L fp_sm=5

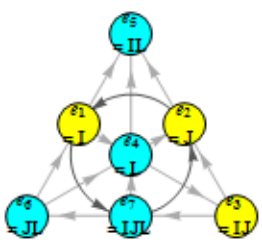
{{1, 7, 2}, {1, 4, 3}, {1, 5, 6},
{2, 5, 3}, {2, 6, 4}, {3, 7, 6}, {4, 5, 7}}

Coxeter (Cyan)

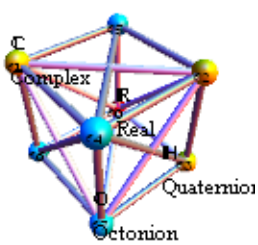
Flattened triad/mask bits

{1, 2, 7, 4, 3, 5, 6}
{1, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	6	-5	2
2	7	-1	-5	-6	3	4	-1
3	4	5	-1	-1	-2	-7	6
4	-3	6	1	-1	7	-2	-5
5	-6	-3	2	-7	-1	1	4
6	5	-4	7	2	-1	-1	-3
7	-2	1	-6	5	-4	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=4 Hex=38 L fp_sm=8

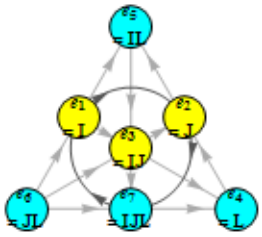
{{1, 2, 7}, {1, 3, 4}, {1, 5, 6},
{2, 6, 3}, {2, 5, 4}, {3, 7, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

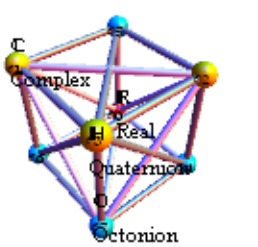
Flattened triad/mask bits

{1, 2, 7, 3, 4, 5, 6}
{0, 0, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	6	-5	-2
2	-7	-1	-6	-5	4	3	1
3	-4	6	-1	1	-7	-2	5
4	3	5	-1	-1	-2	7	-6
5	-6	-4	7	2	-1	1	-3
6	5	-3	2	-7	-1	-1	4
7	2	-1	-5	6	3	-4	-1

multiplication table

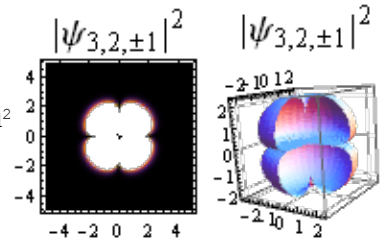
213 $\overline{u}_{b_m}^{\,-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 1 1 1 0 0 0 0 0 }	Exp. m	2.2 MeV
011111101_2	Weight{ 0 0 0 -1 0 1 -1 1 }	Theo. m	1.60535
	Height= 4	Exp. τ	? s

Binary{	0	1	0	0	1	1	1	1 }
E8{	1	0	0	0	0	0	0	1 }
Physics {	1	0	0	0	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }

Bit NKS CA Pascal E8

^{22}Ti[Ar]4s^{2}3d^2



Flipped

Octonion triads-fPi=25 Sign mask=4 Hex=43 L fp_sm=5

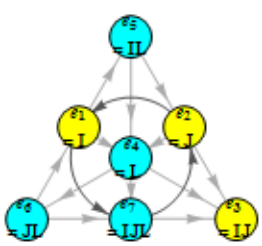
{{1, 7, 2}, {1, 4, 3}, {1, 5, 6},
{2, 3, 5}, {2, 4, 6}, {3, 6, 7}, {4, 7, 5}}

Coxeter (Cyan)

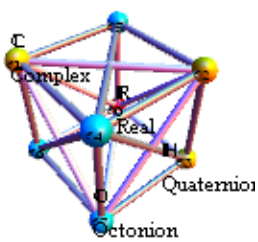
Flattened triad/mask bits

{1, **2**, **7**, 4, 3, 5, 6}
{1, 1, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	6	-5	2
2	7	-1	5	6	-3	-4	-1
3	4	-5	-1	-1	2	7	-6
4	-3	-6	1	-1	-7	2	5
5	-6	3	-2	7	-1	1	-4
6	5	4	-7	-2	-1	-1	3
7	-2	1	6	-5	4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=26 Sign mask=4 Hex=40 L fp_sm=8

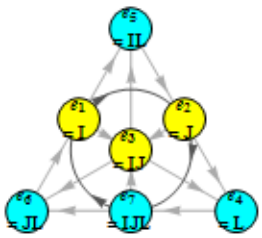
{{1, 2, 7}, {1, 3, 4}, {1, 5, 6},
{2, 3, 6}, {2, 4, 5}, {3, 5, 7}, {4, 7, 6}}

HoffmanSingleton (Yellow)

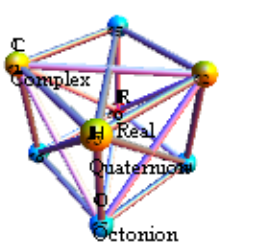
Flattened triad/mask bits

{1, 2, 7, 3, 4, 5, 6}
{0, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	6	-5	-2
2	-7	-1	6	5	-4	-3	1
3	-4	-6	-1	1	7	2	-5
4	3	-5	-1	-1	2	-7	6
5	-6	4	-7	-2	-1	1	3
6	5	3	-2	7	-1	-1	-4
7	2	-1	5	-6	-3	4	-1

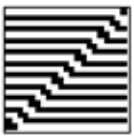
multiplication table

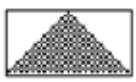
179 $u_{b_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	1	1	1	0	0	0 }	Exp. m	2.2 MeV
001110001_2	Weight{	0	-1	1	0	1	-1	0	-1 }	Theo. m	1.60535
	Height=	4								Exp. τ	? s

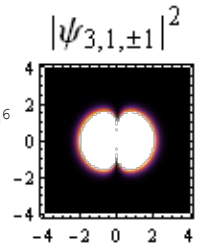
Binary{	1	1	0	1	0	0	1	1	}
E8{	0	0	0	1	0	0	0	-1	}
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

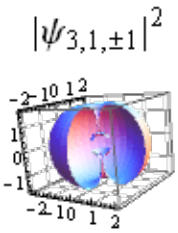
Bit NKS CA Pascal E8





^{18}Ar[Ne]3s^{2}3p^6





Flipped

Octonion triads-fPi=26 Sign mask=1 Hex=0C L fp_sm=8

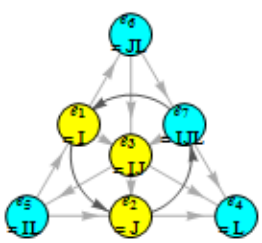
{{1, 2, 7}, {1, 3, 4}, {1, 6, 5},
{2, 6, 3}, {2, 4, 5}, {3, 5, 7}, {4, 6, 7}}

Flattened triad/mask bits

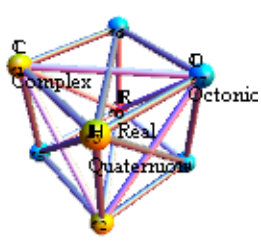
{1, 7, 2, 3, 4, 6, 5}
{0, 0, 1, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	-6	5	-2
2	-7	-1	-6	5	-4	3	1
3	-4	6	-1	1	7	-2	-5
4	3	-5	-1	-1	2	7	-6
5	6	4	-7	-2	-1	-1	3
6	-5	-3	2	-7	1	-1	4
7	2	-1	5	6	-3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=25 Sign mask=1 Hex=0F L fp_sm=5

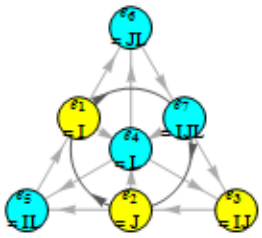
{{1, 7, 2}, {1, 4, 3}, {1, 6, 5},
{2, 5, 3}, {2, 4, 6}, {3, 6, 7}, {4, 5, 7}}

Flattened triad/mask bits

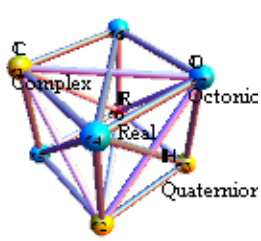
{1, 7, 2, 4, 3, 6, 5}
{1, 1, 1, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	-6	5	2
2	7	-1	-5	6	3	-4	-1
3	4	5	-1	-1	-2	7	-6
4	-3	-6	1	-1	7	2	-5
5	6	-3	2	-7	-1	-1	4
6	-5	4	-7	-2	1	-1	3
7	-2	1	6	5	-4	-3	-1

multiplication table

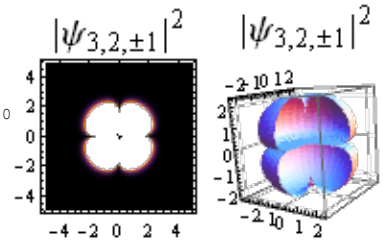
189 $\overline{d}_{m_d}^{\frac{1}{3}\to\frac{4}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	1	1	1	1	0	0	0	0 }	Exp. m	5. MeV
010110001_2	Weight{	0	0	-1	1	-1	1	-1	1 }	Theo. m	3.2107
	Height=	5								Exp. τ	? s

Binary{	1	0	1	1	0	0	1	1	}
E8{	0	0	1	0	0	0	0	1	}
Physics {	0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{29}Cu[Ar]4s^{1}3d^{10}



Flipped

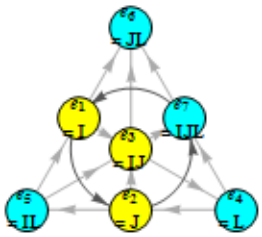
Octonion triads-fPi=26 Sign mask=1 Hex=74 L fp_sm=8

{{1, 2, 7}, {1, 3, 4}, {1, 6, 5},
{2, 3, 6}, {2, 5, 4}, {3, 7, 5}, {4, 7, 6}}

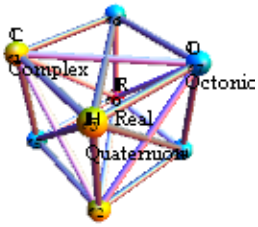
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 3, 4, 6, 5}
{0, 0, 1, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	-6	5	-2
2	-7	-1	6	-5	4	-3	1
3	-4	-6	-1	1	-7	2	5
4	3	5	-1	-1	-2	-7	6
5	6	-4	7	2	-1	-1	-3
6	-5	3	-2	7	1	-1	-4
7	2	-1	-5	-6	3	4	-1

multiplication table

Not Flipped

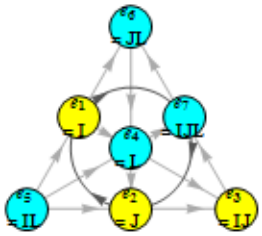
Octonion triads-fPi=25 Sign mask=1 Hex=77 L fp_sm=5

{{1, 7, 2}, {1, 4, 3}, {1, 6, 5},
{2, 3, 5}, {2, 6, 4}, {3, 7, 6}, {4, 7, 5}}

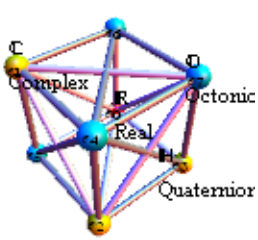
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 4, 3, 6, 5}
{1, 1, 1, 0, 1, 1, 1}

Fano plane



Fano cube



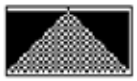
0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	-6	5	2
2	7	-1	5	-6	-3	4	-1
3	4	-5	-1	-1	2	-7	6
4	-3	6	1	-1	-7	-2	5
5	6	3	-2	7	-1	-1	-4
6	-5	-4	7	2	1	-1	-3
7	-2	1	-6	-5	4	3	-1

multiplication table

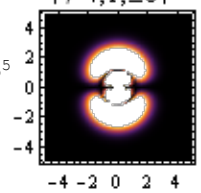
180 $\overline{d}_{m_1}^{\frac{1}{3}}$ Ref. Symbols: 2D 3D

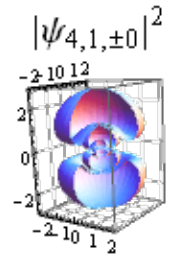
0apccssgg	Root{	1	1	1	1	1	0	0	0 }	Exp. m	5. MeV
010110101_2	Weight{	0	-1	1	0	-1	1	-1	1 }	Theo. m	3.2107
	Height=	6								Exp. τ	? s
Binary{	1	1	0	0	1	1	1	0	}		
E8{	0	0	0	1	0	0	0	1	}		
Physics {	0	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}		

Bit NKS CA Pascal E8



^{35}Br[Ar]$4s^2 3d^{10} 4p^5$





Flipped

Octonion triads-fPi=26 Sign mask=2 Hex=6A L fp_sm=8

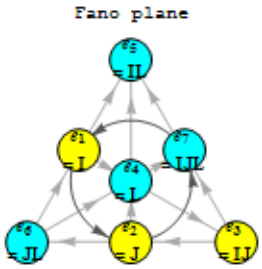
{{1, 2, 7}, {1, 4, 3}, {1, 5, 6},
{2, 6, 3}, {2, 4, 5}, {3, 7, 5}, {4, 7, 6}}

Flattened triad/mask bits

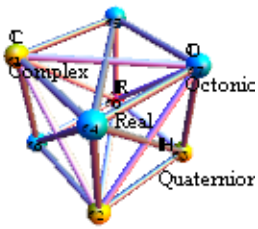
{1, 7, 2, 4, 3, 5, 6}
{0, 1, 0, 1, 0, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	6	-5	-2
2	-7	-1	-6	5	-4	3	1
3	4	6	-1	-1	-7	-2	5
4	-3	-5	1	-1	2	-7	6
5	-6	4	7	-2	-1	1	-3
6	5	-3	2	7	-1	-1	-4
7	2	-1	-5	-6	3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=25 Sign mask=2 Hex=69 L fp_sm=5

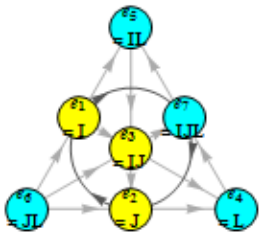
{{1, 7, 2}, {1, 3, 4}, {1, 5, 6},
{2, 5, 3}, {2, 4, 6}, {3, 7, 6}, {4, 7, 5}}

Flattened triad/mask bits

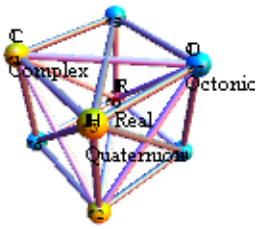
{1, 7, 2, 3, 4, 5, 6}
{1, 0, 0, 1, 0, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	6	-5	2
2	7	-1	-5	6	3	-4	-1
3	-4	5	-1	1	-2	-7	6
4	3	-6	-1	-1	-7	2	5
5	-6	-3	2	7	-1	1	-4
6	5	4	7	-2	-1	-1	-3
7	-2	1	-6	-5	4	3	-1

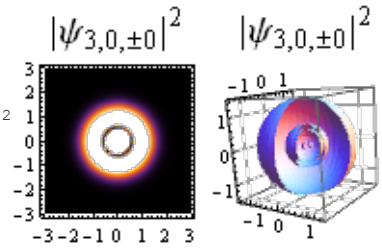
multiplication table

188 $u_{b_1}^{\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	0	1	1	0	0	0	0 }	Exp. m	2.2 MeV
001110101_2	Weight{	0	0	-1	1	1	-1	0	-1 }	Theo. m	1.60535
	Height=	3								Exp. τ	? s
Binary{		1	0	1	1	0	1	0	1 }		
E8{		0	0	1	0	0	0	0	-1 }		
Physics {		0	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$ }		

Bit NKS CA Pascal E8

^{12}Mg[Ne]3s^2



Flipped

Octonion triads-fPi=26 Sign mask=2 Hex=12 L fp_sm=8

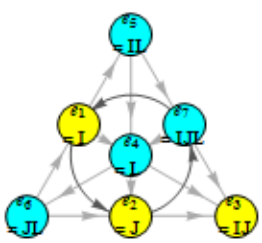
{{1, 2, 7}, {1, 4, 3}, {1, 5, 6},
{2, 3, 6}, {2, 5, 4}, {3, 5, 7}, {4, 6, 7}}

HoffmanSingleton (Yellow)

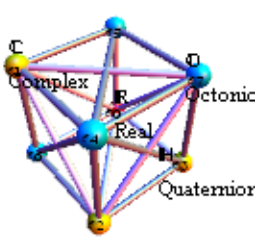
Flattened triad/mask bits

{1, 7, 2, 4, 3, 5, 6}
{0, 1, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	6	-5	-2
2	-7	-1	6	-5	4	-3	1
3	4	-6	-1	-1	7	2	-5
4	-3	5	1	-1	-2	7	-6
5	-6	-4	-7	2	-1	1	3
6	5	3	-2	-7	-1	-1	4
7	2	-1	5	6	-3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=25 Sign mask=2 Hex=11 L fp_sm=5

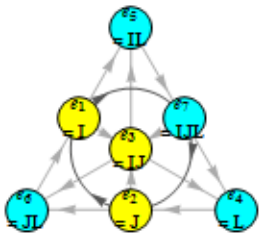
{{1, 7, 2}, {1, 3, 4}, {1, 5, 6},
{2, 3, 5}, {2, 6, 4}, {3, 6, 7}, {4, 5, 7}}

Coxeter (Cyan)

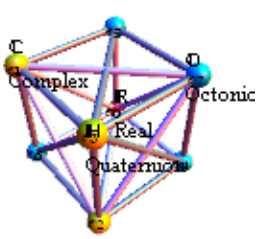
Flattened triad/mask bits

{1, 7, 2, 3, 4, 5, 6}
{1, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	6	-5	2
2	7	-1	5	-6	-3	4	-1
3	-4	-5	-1	1	2	7	-6
4	3	6	-1	-1	7	-2	-5
5	-6	3	-2	-7	-1	1	4
6	5	-4	-7	2	-1	-1	3
7	-2	1	6	5	-4	-3	-1

multiplication table

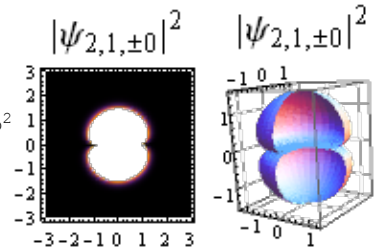
45 $\overline{d}_{m_m}^{\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{ 0 0 -1 0 0 0 0 0 }	Exp. m	5. MeV
010111001_2	Weight{ 0 0 0 1 -2 1 0 1 }	Theo. m	3.2107
	Height= 2	Exp. τ	? s

Binary{	1	0	1	0	1	0	0	0	}
E8{	-1	0	0	0	0	0	0	1	}
Physics {	-1	0	0	0	0	$\frac{1}{\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^6C[He]2s^22p^2$



Flipped

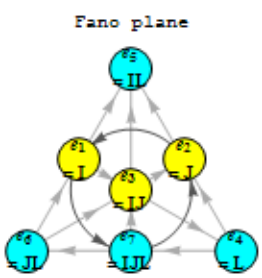
Octonion triads-fPi=26 Sign mask=3 Hex=59 L fp_sm=8

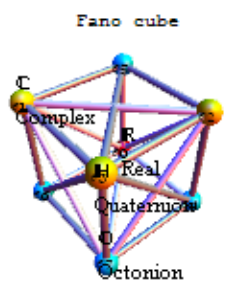
{{1, 7, 2}, {1, 3, 4}, {1, 5, 6},
{2, 6, 3}, {2, 5, 4}, {3, 5, 7}, {4, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 7, 3, 4, 5, 6}
{1, 0, 0, 1, 1, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	6	-5	2
2	7	-1	-6	-5	4	3	-1
3	-4	6	-1	1	7	-2	-5
4	3	5	-1	-1	-2	-7	6
5	-6	-4	-7	2	-1	1	3
6	5	-3	2	7	-1	-1	-4
7	-2	1	5	-6	-3	4	-1

multiplication table

Not Flipped

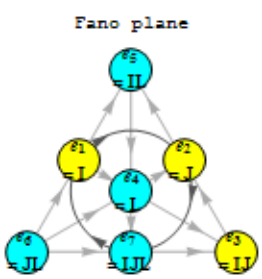
Octonion triads-fPi=25 Sign mask=3 Hex=5A L fp_sm=5

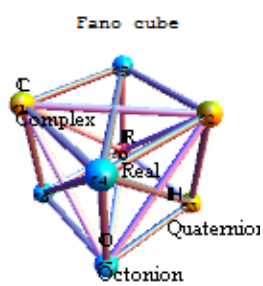
{{1, 2, 7}, {1, 4, 3}, {1, 5, 6},
{2, 5, 3}, {2, 6, 4}, {3, 6, 7}, {4, 7, 5}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 4, 3, 5, 6}
{0, 1, 0, 1, 1, 0, 1}





0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	6	-5	-2
2	-7	-1	-5	-6	3	4	1
3	4	5	-1	-1	-2	7	-6
4	-3	6	1	-1	-7	-2	5
5	-6	-3	2	7	-1	1	-4
6	5	-4	-7	2	-1	-1	3
7	2	-1	6	-5	4	-3	-1

multiplication table

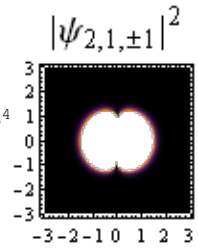
199 $u_{b_m \hat{L}}^{\frac{2}{3} \to -\frac{1}{3}}$ Ref. Symbols: 2D 3D

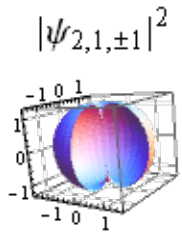
0apccssgg	Root{ -1 0 0 0 0 0 0 0 }	Exp. m	2.2 MeV
001111001_2	Weight{ 0 0 0 0 1 -2 1 0 }	Theo. m	1.60535
	Height= 2	Exp. τ	? s

Binary{	0	1	1	1	1	1	0	0 }
E8{	0	1	0	0	0	0	0	-1 }
Physics {	0	1	0	0	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$ }

Bit NKS CA Pascal E8

$^8O[He]2s^2 2p^4$





Flipped

Octonion triads-fPi=26 Sign mask=3 Hex=21 L fp_sm=8

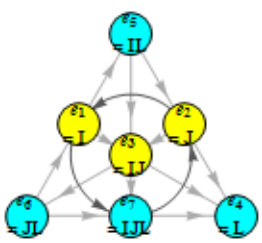
{{1, 7, 2}, {1, 3, 4}, {1, 5, 6},
{2, 3, 6}, {2, 4, 5}, {3, 7, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, **2**, **7**, 3, 4, 5, 6}
{1, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	4	-3	6	-5	2
2	7	-1	6	5	-4	-3	-1
3	-4	-6	-1	1	-7	2	5
4	3	-5	-1	-1	2	7	-6
5	-6	4	7	-2	-1	1	-3
6	5	3	-2	-7	-1	-1	4
7	-2	1	-5	6	3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=25 Sign mask=3 Hex=22 L fp_sm=5

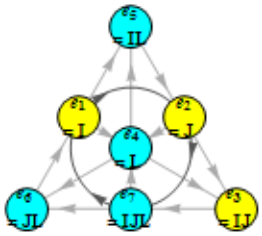
{{1, 2, 7}, {1, 4, 3}, {1, 5, 6},
{2, 3, 5}, {2, 4, 6}, {3, 7, 6}, {4, 5, 7}}

Coxeter (Cyan)

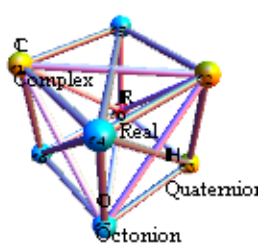
Flattened triad/mask bits

{1, 2, 7, 4, 3, 5, 6}
{0, 1, 0, 0, 0, 1, 0}

Fano plane



Fano cube



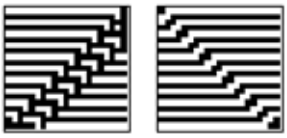
0↦1	1	2	3	4	5	6	7
1	-1	7	-4	3	6	-5	-2
2	-7	-1	5	6	-3	-4	1
3	4	-5	-1	-1	2	-7	6
4	-3	-6	1	-1	7	2	-5
5	-6	3	-2	-7	-1	1	4
6	5	4	7	-2	-1	-1	-3
7	2	-1	-6	5	-4	3	-1

multiplication table

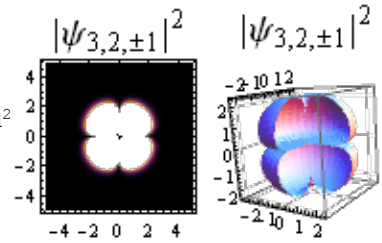
44 $u_{b_m}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-1	0	0	0	0	0 }	Exp. m	2.2 MeV
001111101_2	Weight{	0	0	0	1	0	-1	1	-1 }	Theo. m	1.60535
	Height=	4								Exp. τ	? s
Binary{		1		0		1		1	0	0	0	0	}
E8{		-1		0		0		0	0	0	0	-1	}
Physics {		-1		0		0		0	0	$-\frac{1}{\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{22}Ti[Ar]4s^{2}3d^2



Flipped

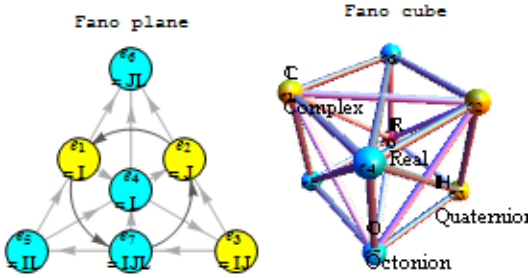
Octonion triads-fPi=26 Sign mask=4 Hex=3F L fp_sm=8

{{1, 7, 2}, {1, 4, 3}, {1, 6, 5},
{2, 6, 3}, {2, 5, 4}, {3, 7, 5}, {4, 6, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 7, 4, 3, 6, 5}
{1, 1, 1, 1, 1, 1, 0}



0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	-6	5	2
2	7	-1	-6	-5	4	3	-1
3	4	6	-1	-1	-7	-2	5
4	-3	5	1	-1	-2	7	-6
5	6	-4	7	2	-1	-1	-3
6	-5	-3	2	-7	1	-1	4
7	-2	1	-5	6	3	-4	-1

multiplication table

Not Flipped

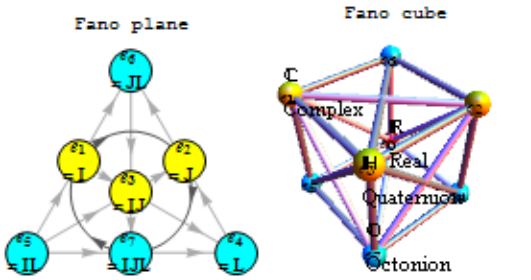
Octonion triads-fPi=25 Sign mask=4 Hex=3C L fp_sm=5

{{1, 2, 7}, {1, 3, 4}, {1, 6, 5},
{2, 5, 3}, {2, 6, 4}, {3, 7, 6}, {4, 5, 7}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 4, 6, 5}
{0, 0, 1, 1, 1, 1, 0}



0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	-6	5	-2
2	-7	-1	-5	-6	3	4	1
3	-4	5	-1	1	-2	-7	6
4	3	6	-1	-1	7	-2	-5
5	6	-3	2	-7	-1	-1	4
6	-5	-4	7	2	1	-1	-3
7	2	-1	-6	5	-4	3	-1

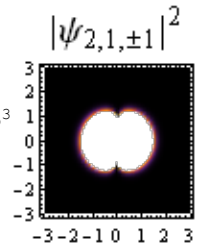
multiplication table

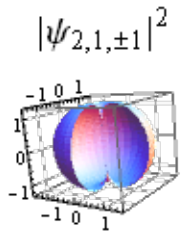
200 $\overline{d}_{m_m}^{\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	0	1	0	0	0	0	0	0 }	Exp. m		5. MeV				
010111101_2	Weight{	0	0	0	0	-1	0	0	2 }	Theo. m		3.2107				
	Height=	2								Exp. τ		? s				
Binary{	0		1		1		1			1	0		1		0	}
E8{	0		1		0		0			0	0		0		1	}
Physics {	0		1		0		0			0	$\frac{1}{\sqrt{3}}$		0		$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{7}N[He]$2s^2 2p^3$





Flipped

Octonion triads-fPi=26 Sign mask=4 Hex=47 L fp_sm=8

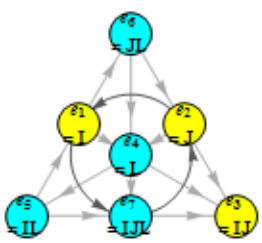
{{1, 7, 2}, {1, 4, 3}, {1, 6, 5},
{2, 3, 6}, {2, 4, 5}, {3, 5, 7}, {4, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 7, 4, 3, 6, 5}
{1, 1, 1, 0, 0, 0, 1}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	-4	3	-6	5	2
2	7	-1	6	5	-4	-3	-1
3	4	-6	-1	-1	7	2	-5
4	-3	-5	1	-1	2	-7	6
5	6	4	-7	-2	-1	-1	3
6	-5	3	-2	7	1	-1	-4
7	-2	1	5	-6	-3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=25 Sign mask=4 Hex=44 L fp_sm=5

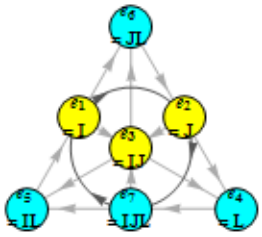
{{1, 2, 7}, {1, 3, 4}, {1, 6, 5},
{2, 3, 5}, {2, 4, 6}, {3, 6, 7}, {4, 7, 5}}

Coxeter (Cyan)

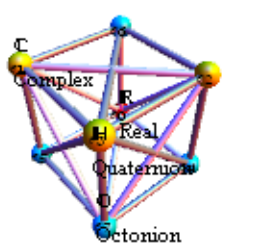
Flattened triad/mask bits

{1, 2, 7, 3, 4, 6, 5}
{0, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube



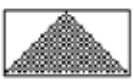
0↦1	1	2	3	4	5	6	7
1	-1	7	4	-3	-6	5	-2
2	-7	-1	5	6	-3	-4	1
3	-4	-5	-1	1	2	7	-6
4	3	-6	-1	-1	-7	2	5
5	6	3	-2	7	-1	-1	-4
6	-5	4	-7	-2	1	-1	3
7	2	-1	6	-5	4	-3	-1

multiplication table

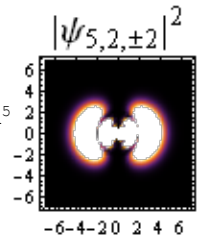
112 $\overline{\underset{b_d}{C}}\,\underset{\vee}{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

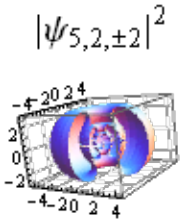
0apccssgg 011110010_2	Root{	-1	-1	-2	-2	-2	-2	-1	-1 }	Exp. m 1250. MeV
	Weight{	0	-1	0	0	0	1	-1	0 }	Theo. m 1319.95
	Height= 13									Exp. τ ? s
Binary{	1	0	1	1	0	0	0	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8



^{75}Re[Xe]$6s^2 4f^{14} 5d^5$





Flipped

Octonion triads-fPi=27 Sign mask=1 Hex=7B R fp_sm=4

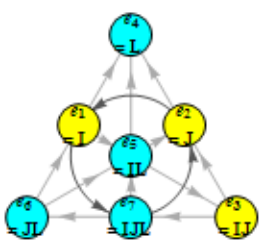
{{1, 7, 2}, {1, 5, 3}, {1, 4, 6},
{2, 4, 3}, {2, 6, 5}, {3, 7, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

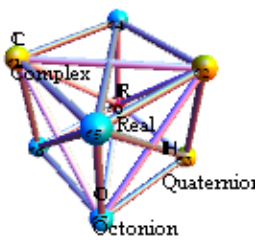
Flattened triad/mask bits

{1, 2, 7, 5, 3, 4, 6}
{1, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	6	3	-4	2
2	7	-1	-4	3	-6	5	-1
3	5	4	-1	-2	-1	-7	6
4	-6	-3	2	-1	-7	1	5
5	-3	6	1	7	-1	-2	-4
6	4	-5	7	-1	2	-1	-3
7	-2	1	-6	-5	4	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=29 Sign mask=1 Hex=72 R fp_sm=7

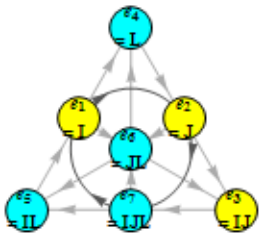
{{1, 2, 7}, {1, 6, 3}, {1, 4, 5},
{2, 3, 4}, {2, 6, 5}, {3, 7, 5}, {4, 7, 6}}

Coxeter (Cyan)

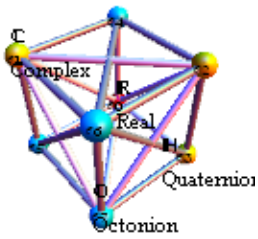
Flattened triad/mask bits

{1, 2, 7, 6, 3, 4, 5}
{0, 1, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	5	-4	3	-2
2	-7	-1	4	-3	-6	5	1
3	6	-4	-1	2	-7	-1	5
4	-5	3	-2	-1	1	-7	6
5	4	6	7	-1	-1	-2	-3
6	-3	-5	1	7	2	-1	-4
7	2	-1	-5	-6	3	4	-1

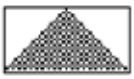
multiplication table

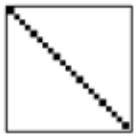
241 $s_{m_d}^{\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	4	4	3	2	1	1 }	Exp. m	95. MeV
000110010_2	Weight{	0	0	0	1	0	-1	0	0 }	Theo. m	98.1056
	Height= 20									Exp. τ	? s

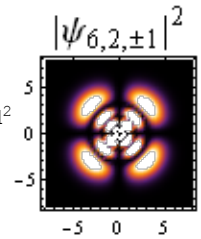
Binary{	0	1	1	1	1	1	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

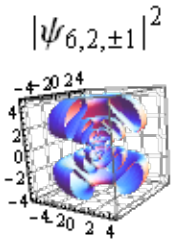
Bit NKS CA Pascal E8





^{104}Rf[Rn]$7s^2 5f^{14} 6d^2$





Flipped

Octonion triads-fPi=27 Sign mask=1 Hex=03 R fp_sm=4

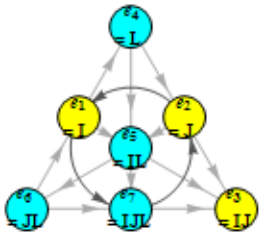
{{1, 7, 2}, {1, 5, 3}, {1, 4, 6},
{2, 3, 4}, {2, 5, 6}, {3, 6, 7}, {4, 5, 7}}

Flattened triad/mask bits

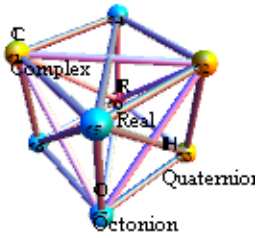
{1, 2, 7, 5, 3, 4, 6}
{1, 1, 0, 0, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	6	3	-4	2
2	7	-1	4	-3	6	-5	-1
3	5	-4	-1	2	-1	7	-6
4	-6	3	-2	-1	7	1	-5
5	-3	-6	1	-7	-1	2	4
6	4	5	-7	-1	-2	-1	3
7	-2	1	6	5	-4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=29 Sign mask=1 Hex=0A R fp_sm=7

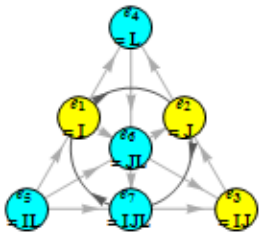
{{1, 2, 7}, {1, 6, 3}, {1, 4, 5},
{2, 4, 3}, {2, 5, 6}, {3, 5, 7}, {4, 6, 7}}

Flattened triad/mask bits

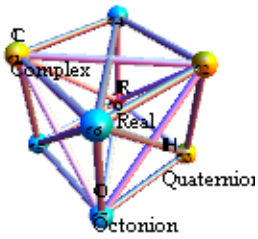
{1, 2, 7, 6, 3, 4, 5}
{0, 1, 0, 1, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	5	-4	3	-2
2	-7	-1	-4	3	6	-5	1
3	6	4	-1	-2	7	-1	-5
4	-5	-3	2	-1	1	7	-6
5	4	-6	-7	-1	-1	2	3
6	-3	5	1	-7	-2	-1	4
7	2	-1	5	6	-3	-4	-1

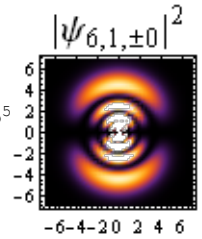
multiplication table

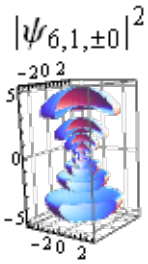
132 $\overline{\underset{b_1}{C}}\ \hat{R}$ $-\frac{2}{3}\to\frac{1}{3}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-1	-3	-2	-2	-2	-1	-1 }	Exp. m 1250. MeV
011110110_2	Weight{	0	-1	0	1	-1	0	0	1 }	Theo. m 1319.95
	Height=	15								Exp. τ ? s
Binary{		0	1	1	1	0	0	0	1 }	
E8{		$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }	

Bit NKS CA Pascal E8

^{85}At[Xe]$6s^2 4f^{14} 5d^{10} 6p^5$





Flipped

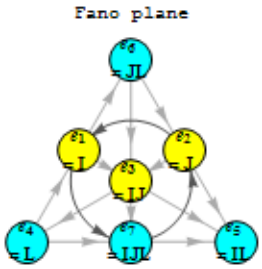
Octonion triads-fPi=27 Sign mask=2 Hex=65 R fp_sm=4

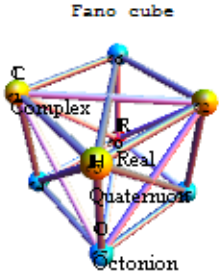
{{1, 7, 2}, {1, 3, 5}, {1, 6, 4},
{2, 3, 4}, {2, 5, 6}, {3, 7, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 7, 3, 5, 6, 4}
{1, 0, 1, 0, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	-7	5	-6	-3	4	2
2	7	-1	4	-3	6	-5	-1
3	-5	-4	-1	2	1	-7	6
4	6	3	-2	-1	-7	-1	5
5	3	-6	-1	7	-1	2	-4
6	-4	5	7	1	-2	-1	-3
7	-2	1	-6	-5	4	3	-1

multiplication table

Not Flipped

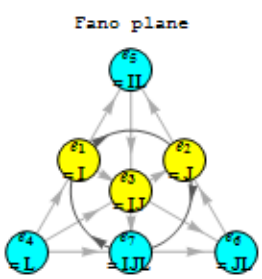
Octonion triads-fPi=29 Sign mask=2 Hex=6C R fp_sm=7

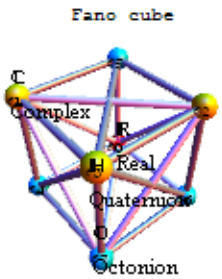
{{1, 2, 7}, {1, 3, 6}, {1, 5, 4},
{2, 4, 3}, {2, 5, 6}, {3, 7, 5}, {4, 7, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 6, 5, 4}
{0, 0, 1, 1, 0, 1, 1}





0↦1	1	2	3	4	5	6	7
1	-1	7	6	-5	4	-3	-2
2	-7	-1	-4	3	6	-5	1
3	-6	4	-1	-2	-7	1	5
4	5	-3	2	-1	-1	-7	6
5	-4	-6	7	1	-1	2	-3
6	3	5	-1	7	-2	-1	-4
7	2	-1	-5	-6	3	4	-1

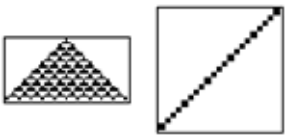
multiplication table

235 $s_{m_1 \hat{R}}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

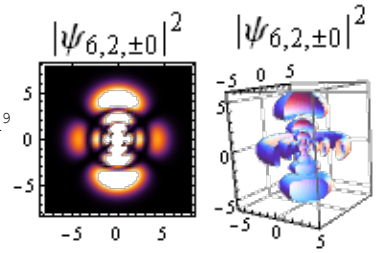
0apccssgg	Root{	3	2	5	4	3	2	1	1 }	Exp. m	95. MeV
000110110_2	Weight{	0	0	0	0	1	0	-1	-1 }	Theo. m	98.1056
	Height= 22									Exp. τ	? s

Binary{	1	0	1	1	1	1	1	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{110}Ds[Rn]7s^{1}5f^{14}6d^{9}



Flipped

Octonion triads-fPi=27 Sign mask=2 Hex=1D R fp_sm=4

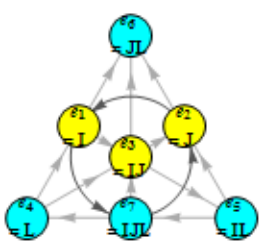
{{1, 7, 2}, {1, 3, 5}, {1, 6, 4},
{2, 4, 3}, {2, 6, 5}, {3, 6, 7}, {4, 5, 7}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 2, 7, 3, 5, 6, 4}
{1, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	5	-6	-3	4	2
2	7	-1	-4	3	-6	5	-1
3	-5	4	-1	-2	1	7	-6
4	6	-3	2	-1	7	-1	-5
5	3	6	-1	-7	-1	-2	4
6	-4	-5	-7	1	2	-1	3
7	-2	1	6	5	-4	-3	-1

multiplication table

Not Flipped

Octonion triads-fPi=29 Sign mask=2 Hex=14 R fp_sm=7

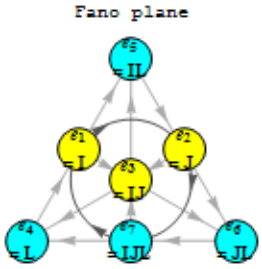
{{1, 2, 7}, {1, 3, 6}, {1, 5, 4},
{2, 3, 4}, {2, 6, 5}, {3, 5, 7}, {4, 6, 7}}

Coxeter (Cyan)

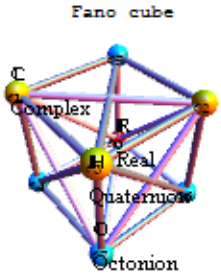
Flattened triad/mask bits

{1, 2, 7, 3, 6, 5, 4}
{0, 0, 1, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	-5	4	-3	-2
2	-7	-1	4	-3	-6	5	1
3	-6	-4	-1	2	7	1	-5
4	5	3	-2	-1	-1	7	-6
5	-4	6	-7	1	-1	-2	3
6	3	-5	-1	-7	2	-1	4
7	2	-1	5	6	-3	-4	-1

multiplication table

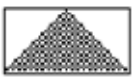
98 $\overline{C}_{b_m}\hat{L}^{-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 011111010_2	Root{	-2	-1	-3	-3	-2	-1	-1	}
	Weight{	0	0	-1	0	0	0	0	1 }
	Height=	17							

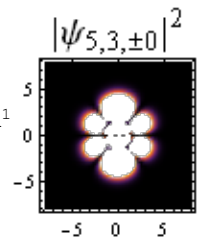
Exp. m 1250. MeV
Theo. m 1319.95
Exp. τ ? s

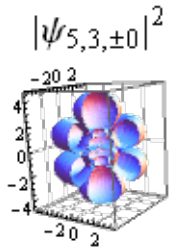
Binary{	1	1	1	0	0	0	0	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{93}Np[Rn]$7s^2 5f^4 6d^1$





Flipped

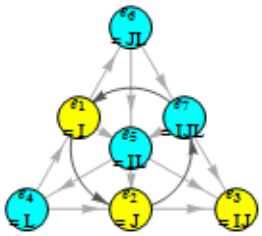
Octonion triads-fPi=27 Sign mask=3 Hex=56 R fp_sm=4

{{1, 2, 7}, {1, 5, 3}, {1, 6, 4},
{2, 3, 4}, {2, 6, 5}, {3, 6, 7}, {4, 7, 5}}

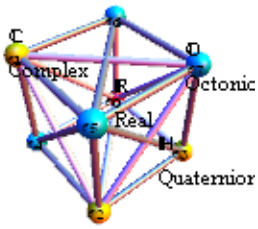
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 5, 3, 6, 4}
{0, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	-6	3	4	-2
2	-7	-1	4	-3	-6	5	1
3	5	-4	-1	2	-1	7	-6
4	6	3	-2	-1	-7	-1	5
5	-3	6	1	7	-1	-2	-4
6	-4	-5	-7	1	2	-1	3
7	2	-1	6	-5	4	-3	-1

multiplication table

Not Flipped

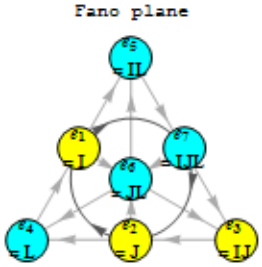
Octonion triads-fPi=29 Sign mask=3 Hex=5F R fp_sm=7

{{1, 7, 2}, {1, 6, 3}, {1, 5, 4},
{2, 4, 3}, {2, 6, 5}, {3, 5, 7}, {4, 7, 6}}

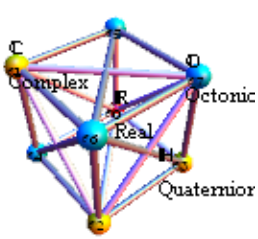
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 6, 3, 5, 4}
{1, 1, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	-5	4	3	2
2	7	-1	-4	3	-6	5	-1
3	6	4	-1	-2	7	-1	-5
4	5	-3	2	-1	-1	-7	6
5	-4	6	-7	1	-1	-2	3
6	-3	-5	1	7	2	-1	-4
7	-2	1	5	-6	-3	4	-1

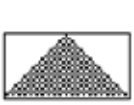
multiplication table

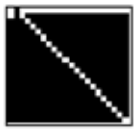
230 $s_{m_m \hat{L}}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	4	3	3	2	1	1 }	Exp. m	95. MeV
000111010_2	Weight{	0	0	1	-1	1	-1	0	0 }	Theo. m	98.1056
	Height= 19									Exp. τ	? s

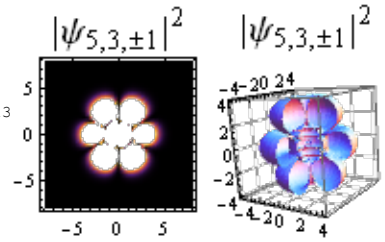
Binary{	1	1	0	1	1	1	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8





^{101}Md[Rn]$7s^2 5f^{13}$



Flipped

Octonion triads-fPi=27 Sign mask=3 Hex=2E R fp_sm=4

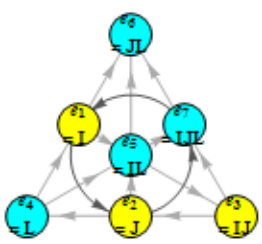
{{1, 2, 7}, {1, 5, 3}, {1, 6, 4},
{2, 4, 3}, {2, 5, 6}, {3, 7, 6}, {4, 5, 7}}

HoffmanSingleton (Yellow)

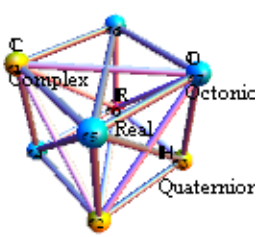
Flattened triad/mask bits

{1, 7, 2, 5, 3, 6, 4}
{0, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	-6	3	4	-2
2	-7	-1	-4	3	6	-5	1
3	5	4	-1	-2	-1	-7	6
4	6	-3	2	-1	7	-1	-5
5	-3	-6	1	-7	-1	2	4
6	-4	5	7	1	-2	-1	-3
7	2	-1	-6	5	-4	3	-1

multiplication table

Not Flipped

Octonion triads-fPi=29 Sign mask=3 Hex=27 R fp_sm=7

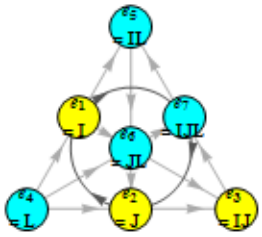
{{1, 7, 2}, {1, 6, 3}, {1, 5, 4},
{2, 3, 4}, {2, 5, 6}, {3, 7, 5}, {4, 6, 7}}

Coxeter (Cyan)

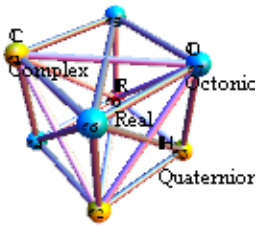
Flattened triad/mask bits

{1, 7, 2, 6, 3, 5, 4}
{1, 1, 1, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	-5	4	3	2
2	7	-1	4	-3	6	-5	-1
3	6	-4	-1	2	-7	-1	5
4	5	3	-2	-1	-1	7	-6
5	-4	-6	7	1	-1	2	-3
6	-3	5	1	-7	-2	-1	4
7	-2	1	-5	6	3	-4	-1

multiplication table

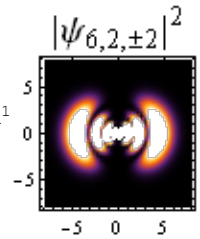
102 $\frac{\overline{C}}{b_m}\sqrt{R}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

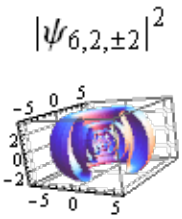
0apccssgg 011111110_2	Root{	-2	-1	-3	-3	-2	-2	-1	-1 }
	Weight{	0	-1	1	-1	0	0	0	1 }
	Height=	16							
Binary{		1	1	0	1	0	0	0	1 }
E8{		$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }
Physics {		$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }

Exp. m 1250. MeV
Theo. m 1319.95
Exp. τ ? s

Bit NKS CA Pascal E8

^{89}Ac[Rn]7s^{2}6d^1





Flipped

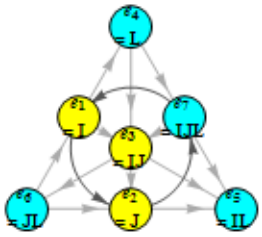
Octonion triads-fPi=27 Sign mask=4 Hex=48 R fp_sm=4

{{1, 2, 7}, {1, 3, 5}, {1, 4, 6},
{2, 4, 3}, {2, 5, 6}, {3, 6, 7}, {4, 7, 5}}

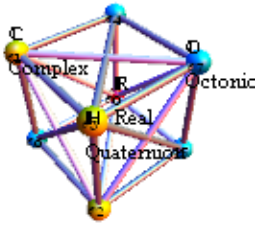
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 3, 5, 4, 6}
{0, 0, 0, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	6	-3	-4	-2
2	-7	-1	-4	3	6	-5	1
3	-5	4	-1	-2	1	7	-6
4	-6	-3	2	-1	-7	1	5
5	3	-6	-1	7	-1	2	-4
6	4	5	-7	-1	-2	-1	3
7	2	-1	6	-5	4	-3	-1

multiplication table

Not Flipped

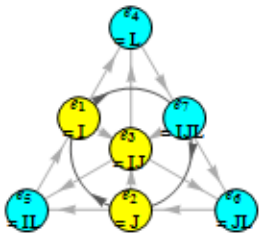
Octonion triads-fPi=29 Sign mask=4 Hex=41 R fp_sm=7

{{1, 7, 2}, {1, 3, 6}, {1, 4, 5},
{2, 3, 4}, {2, 5, 6}, {3, 5, 7}, {4, 7, 6}}

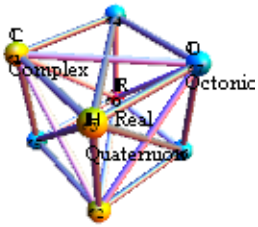
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 3, 6, 4, 5}
{1, 0, 0, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	6	5	-4	-3	2
2	7	-1	4	-3	6	-5	-1
3	-6	-4	-1	2	7	1	-5
4	-5	3	-2	-1	1	-7	6
5	4	-6	-7	-1	-1	2	3
6	3	5	-1	7	-2	-1	-4
7	-2	1	5	-6	-3	4	-1

multiplication table

226 $s_{m_m}^{\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

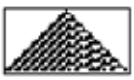
0apccssgg
000111110_2

	Root{	2	2	4	3	2	2	1	1 }
	Weight{	0	1	-1	0	1	-1	0	0 }
	Height=	18							

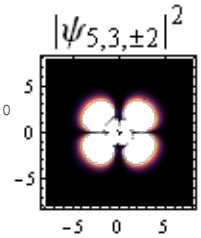
Exp. m 95. MeV
Theo. m 98.1056
Exp. τ ? s

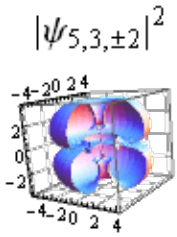
Binary{	1	1	1	0	1	1	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{98}Cf[Rn]$7s^2 5f^{10}$



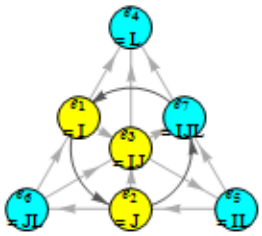


Flipped

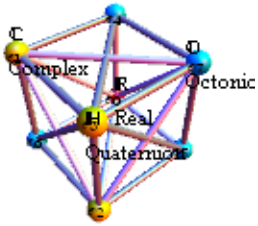
Octonion triads-fPi=27 Sign mask=4 Hex=30 R fp_sm=4
{{1, 2, 7}, {1, 3, 5}, {1, 4, 6},
{2, 3, 4}, {2, 6, 5}, {3, 7, 6}, {4, 5, 7}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 3, 5, 4, 6}
{0, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	6	-3	-4	-2
2	-7	-1	4	-3	-6	5	1
3	-5	-4	-1	2	1	-7	6
4	-6	3	-2	-1	7	1	-5
5	3	6	-1	-7	-1	-2	4
6	4	-5	7	-1	2	-1	-3
7	2	-1	-6	5	-4	3	-1

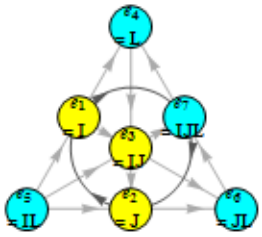
multiplication table

Not Flipped

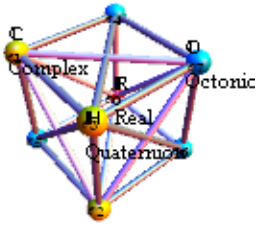
Octonion triads-fPi=29 Sign mask=4 Hex=39 R fp_sm=7
{{1, 7, 2}, {1, 3, 6}, {1, 4, 5},
{2, 4, 3}, {2, 6, 5}, {3, 7, 5}, {4, 6, 7}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 3, 6, 4, 5}
{1, 0, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	6	5	-4	-3	2
2	7	-1	-4	3	-6	5	-1
3	-6	4	-1	-2	-7	1	5
4	-5	-3	2	-1	1	7	-6
5	4	6	7	-1	-1	-2	-3
6	3	-5	-1	-7	2	-1	4
7	-2	1	-5	6	3	-4	-1

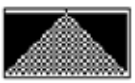
multiplication table

34 $\overline{b}_{m_d}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

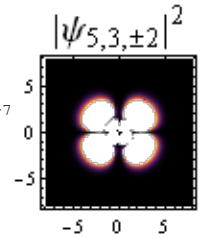
0apccssgg 010110011_2	Root{ -2 -2 -4 -3 -2 -1 -1 -1 } Weight{ -1 1 0 0 -1 1 0 0 } Height= 17	Exp. m Theo. m Exp. τ	4200. MeV 3270.13 ? s

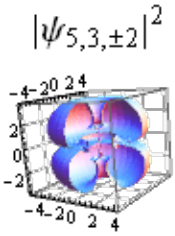
Binary{	0	0	0	0	1	0	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{95}Am[Rn]7s^{2}5f^7





Flipped

Octonion triads-fPi=28 Sign mask=1 Hex=7D L fp_sm=3

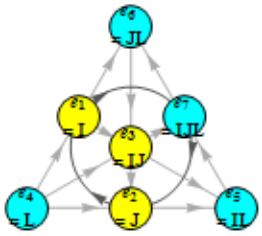
{{1, 7, 2}, {1, 3, 5}, {1, 6, 4},
{2, 6, 3}, {2, 5, 4}, {3, 7, 4}, {5, 7, 6}}

Coxeter (Cyan)

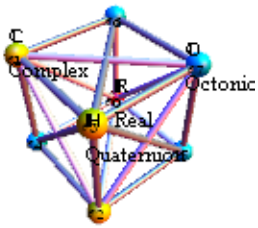
Flattened triad/mask bits

{1, 7, 2, 3, 5, 6, 4}
{1, 0, 1, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	5	-6	-3	4	2
2	7	-1	-6	-5	4	3	-1
3	-5	6	-1	-7	1	-2	4
4	6	5	7	-1	-2	-1	-3
5	3	-4	-1	2	-1	-7	6
6	-4	-3	2	1	7	-1	-5
7	-2	1	-4	3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=1 Hex=76 R fp_sm=6

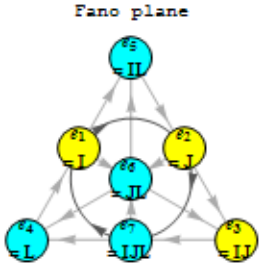
{{1, 2, 7}, {1, 6, 3}, {1, 5, 4},
{2, 3, 5}, {2, 6, 4}, {3, 7, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

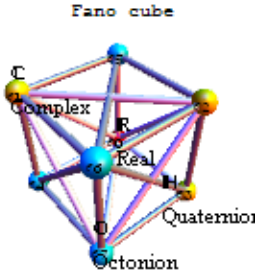
Flattened triad/mask bits

{1, 2, 7, 6, 3, 5, 4}
{0, 1, 1, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	-5	4	3	-2
2	-7	-1	5	-6	-3	4	1
3	6	-5	-1	-7	2	-1	4
4	5	6	7	-1	-1	-2	-3
5	-4	3	-2	1	-1	-7	6
6	-3	-4	1	2	7	-1	-5
7	2	-1	-4	3	-6	5	-1

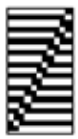
multiplication table

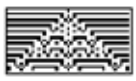
106 $t_{b_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	1	1	2	1	1	1	1	1 }	Exp. m	174200. MeV
001110011_2	Weight{	1	0	0	-1	1	-1	1	0 }	Theo. m	175 990.
	Height= 10									Exp. τ	? s

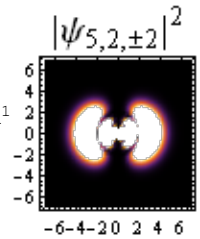
Binary{	1	1	0	0	0	1	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

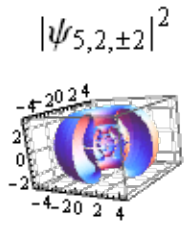
Bit NKS CA Pascal E8





^{57}La[Xe]6s^{2}5d^1





Flipped

Octonion triads-fPi=28 Sign mask=1 Hex=05 L fp_sm=3

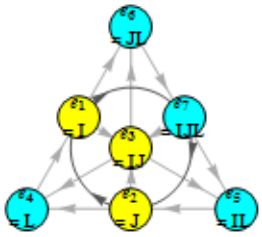
{{1, 7, 2}, {1, 3, 5}, {1, 6, 4},
{2, 3, 6}, {2, 4, 5}, {3, 4, 7}, {5, 6, 7}}

Flattened triad/mask bits

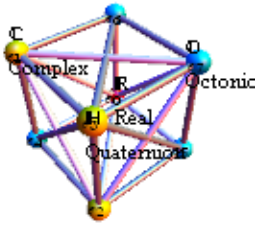
{1, 7, 2, 3, 5, 6, 4}
{1, 0, 1, 0, 0, 0, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	5	-6	-3	4	2
2	7	-1	6	5	-4	-3	-1
3	-5	-6	-1	7	1	2	-4
4	6	-5	-7	-1	2	-1	3
5	3	4	-1	-2	-1	7	-6
6	-4	3	-2	1	-7	-1	5
7	-2	1	4	-3	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=1 Hex=0E R fp_sm=6

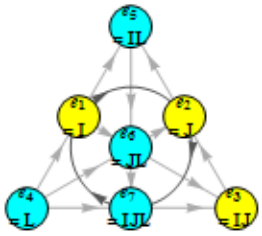
{{1, 2, 7}, {1, 6, 3}, {1, 5, 4},
{2, 5, 3}, {2, 4, 6}, {3, 4, 7}, {5, 6, 7}}

Flattened triad/mask bits

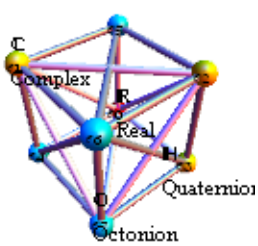
{1, 2, 7, 6, 3, 5, 4}
{0, 1, 1, 1, 0, 0, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	-5	4	3	-2
2	-7	-1	-5	6	3	-4	1
3	6	5	-1	7	-2	-1	-4
4	5	-6	-7	-1	-1	2	3
5	-4	-3	2	1	-1	7	-6
6	-3	4	1	-2	-7	-1	5
7	2	-1	4	-3	6	-5	-1

multiplication table

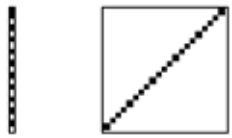
35 $t_{b_1}^{\frac{2}{3}\to-\frac{1}{3}}$ $\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg
001110111_2

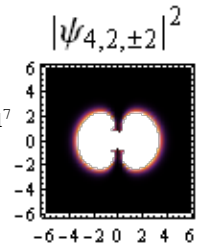
Root{	1 0 1 1 1 1 1 1 }	Exp. m	174200. MeV
Weight{	1 0 0 0 0 0 1 -1 }	Theo. m	175990.
Height=	8	Exp. τ	? s

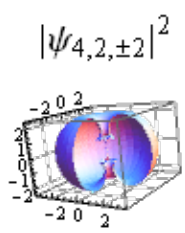
Binary{	0	0	0	0	0	1	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



^{44}Ru[Kr]5s^{1}4d^7



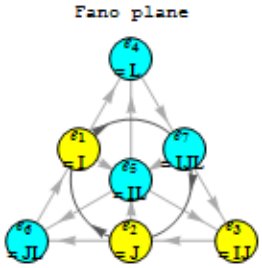


Flipped

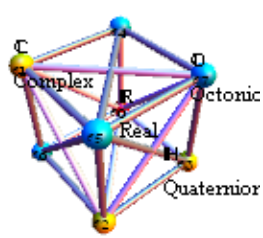
Octonion triads-fPi=28 Sign mask=2 Hex=1B L fp_sm=3
{{1, 7, 2}, {1, 5, 3}, {1, 4, 6},
{2, 6, 3}, {2, 5, 4}, {3, 4, 7}, {5, 6, 7}}
Coxeter (Cyan)

Flattened triad/mask bits
{1, 7, 2, 5, 3, 4, 6}
{1, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	6	3	-4	2
2	7	-1	-6	-5	4	3	-1
3	5	6	-1	7	-1	-2	-4
4	-6	5	-7	-1	-2	1	3
5	-3	-4	1	2	-1	7	-6
6	4	-3	2	-1	-7	-1	5
7	-2	1	4	-3	6	-5	-1

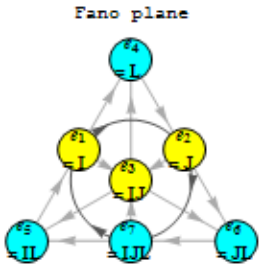
multiplication table

Not Flipped

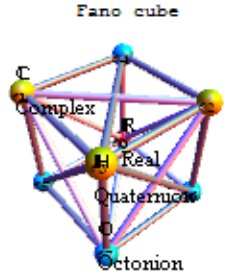
Octonion triads-fPi=30 Sign mask=2 Hex=10 R fp_sm=6
{{1, 2, 7}, {1, 3, 6}, {1, 4, 5},
{2, 3, 5}, {2, 6, 4}, {3, 4, 7}, {5, 6, 7}}
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 2, 7, 3, 6, 4, 5}
{0, 0, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	5	-4	-3	-2
2	-7	-1	5	-6	-3	4	1
3	-6	-5	-1	7	2	1	-4
4	-5	6	-7	-1	1	-2	3
5	4	3	-2	-1	-1	7	-6
6	3	-4	-1	2	-7	-1	5
7	2	-1	4	-3	6	-5	-1

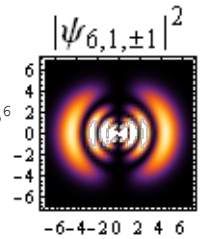
multiplication table

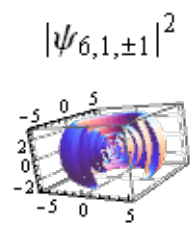
105 $\overline{b}_{m_1 \hat{R}}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 010110111_2	Root{	-2	-1	-3	-3	-2	-1	-1	-1 }	Exp. m 4200. MeV
	Weight{	-1	1	0	-1	0	0	0	1 }	Theo. m 3270.13
	Height=	15								Exp. τ ? s
Binary{		1	1	0	0	1	0	0	1 }	
E8{		$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }	

Bit NKS CA Pascal E8

^{86}Rn[Xe]$6s^2 4f^{14} 5d^{10} 6p^6$





Flipped

Octonion triads-fPi=28 Sign mask=2 Hex=63 L fp_sm=3

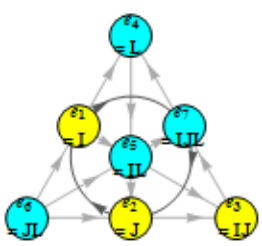
{{1, 7, 2}, {1, 5, 3}, {1, 4, 6},
{2, 3, 6}, {2, 4, 5}, {3, 7, 4}, {5, 7, 6}}

Coxeter (Cyan)

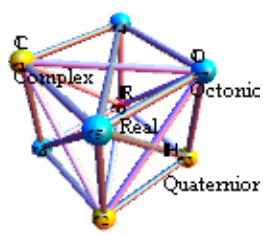
Flattened triad/mask bits

{1, 7, 2, 5, 3, 4, 6}
{1, 1, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	6	3	-4	2
2	7	-1	6	5	-4	-3	-1
3	5	-6	-1	-7	-1	2	4
4	-6	-5	7	-1	2	1	-3
5	-3	4	1	-2	-1	-7	6
6	4	3	-2	-1	7	-1	-5
7	-2	1	-4	3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=2 Hex=68 R fp_sm=6

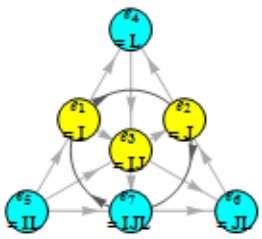
{{1, 2, 7}, {1, 3, 6}, {1, 4, 5},
{2, 5, 3}, {2, 4, 6}, {3, 7, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

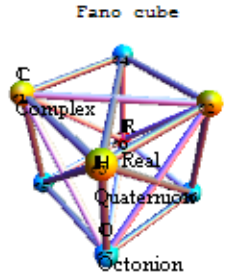
Flattened triad/mask bits

{1, 2, 7, 3, 6, 4, 5}
{0, 0, 0, 1, 0, 1, 1}

Fano plane



Fano cube



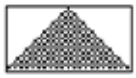
0↦1	1	2	3	4	5	6	7
1	-1	7	6	5	-4	-3	-2
2	-7	-1	-5	6	3	-4	1
3	-6	5	-1	-7	-2	1	4
4	-5	-6	7	-1	1	2	-3
5	4	-3	2	-1	-1	-7	6
6	3	4	-1	-2	7	-1	-5
7	2	-1	-4	3	-6	5	-1

multiplication table

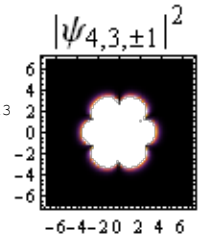
115 $\overline{b}_{m_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

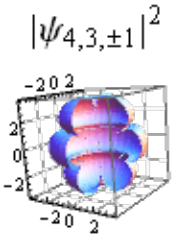
0apccssgg	Root{	-1	-1	-2	-2	-2	-1	-1	-1 }	Exp. m 4200. MeV
010111011_2	Weight{	-1	1	-1	0	0	1	-1	0 }	Theo. m 3270.13
	Height= 12									Exp. τ ? s
Binary{	1	0	1	0	1	0	0	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8



^{69}Tm[Xe]$6s^2 4f^{13}$





Flipped

Octonion triads-fPi=28 Sign mask=3 Hex=50 L fp_sm=3

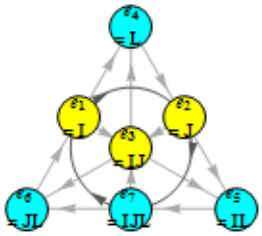
{{1, 2, 7}, {1, 3, 5}, {1, 4, 6},
{2, 3, 6}, {2, 5, 4}, {3, 4, 7}, {5, 7, 6}}

Coxeter (Cyan)

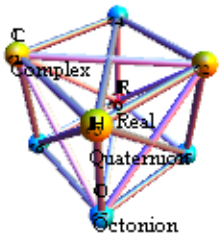
Flattened triad/mask bits

{1, 2, 7, 3, 5, 4, 6}
{0, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	6	-3	-4	-2
2	-7	-1	6	-5	4	-3	1
3	-5	-6	-1	7	1	2	-4
4	-6	5	-7	-1	-2	1	3
5	3	-4	-1	2	-1	-7	6
6	4	3	-2	-1	7	-1	-5
7	2	-1	4	-3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=3 Hex=5B R fp_sm=6

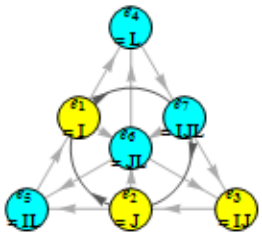
{{1, 7, 2}, {1, 6, 3}, {1, 4, 5},
{2, 5, 3}, {2, 6, 4}, {3, 4, 7}, {5, 7, 6}}

HoffmanSingleton (Yellow)

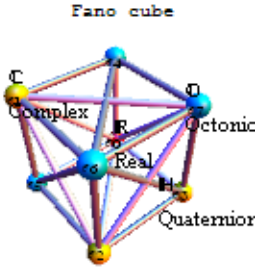
Flattened triad/mask bits

{1, 7, 2, 6, 3, 4, 5}
{1, 1, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	5	-4	3	2
2	7	-1	-5	-6	3	4	-1
3	6	5	-1	7	-2	-1	-4
4	-5	6	-7	-1	1	-2	3
5	4	-3	2	-1	-1	-7	6
6	-3	-4	1	2	7	-1	-5
7	-2	1	4	-3	-6	5	-1

multiplication table

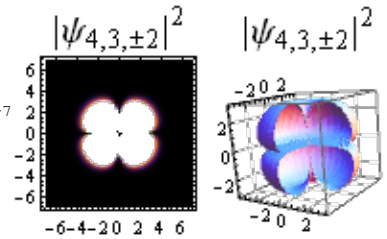
136 $t_{b_m}^{\frac{2}{3}} \hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	1	1	2	2	1	1	1	1 }	Exp. m 174200. MeV
001111011_2	Weight{	1	0	-1	1	0	-1	1	0 }	Theo. m 175 990.
	Height= 11									Exp. τ ? s

Binary{	0	1	1	0	0	1	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{63}Eu[Xe]$6s^2 4f^7$



Flipped

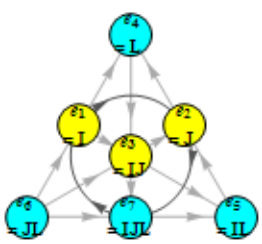
Octonion triads-fPi=28 Sign mask=3 Hex=28 L fp_sm=3

{{1, 2, 7}, {1, 3, 5}, {1, 4, 6},
{2, 6, 3}, {2, 4, 5}, {3, 7, 4}, {5, 6, 7}}

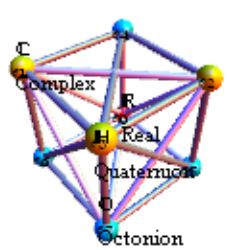
Coxeter (Cyan)

Flattened triad/mask bits
{1, 2, 7, 3, 5, 4, 6}
{0, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	6	-3	-4	-2
2	-7	-1	-6	5	-4	3	1
3	-5	6	-1	-7	1	-2	4
4	-6	-5	7	-1	2	1	-3
5	3	4	-1	-2	-1	7	-6
6	4	-3	2	-1	-7	-1	5
7	2	-1	-4	3	6	-5	-1

multiplication table

Not Flipped

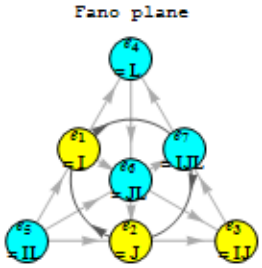
Octonion triads-fPi=30 Sign mask=3 Hex=23 R fp_sm=6

{{1, 7, 2}, {1, 6, 3}, {1, 4, 5},
{2, 3, 5}, {2, 4, 6}, {3, 7, 4}, {5, 6, 7}}

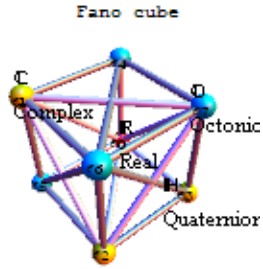
HoffmanSingleton (Yellow)

Flattened triad/mask bits
{1, 7, 2, 6, 3, 4, 5}
{1, 1, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	5	-4	3	2
2	7	-1	5	6	-3	-4	-1
3	6	-5	-1	-7	2	-1	4
4	-5	-6	7	-1	1	2	-3
5	4	3	-2	-1	-1	7	-6
6	-3	4	1	-2	-7	-1	5
7	-2	1	-4	3	6	-5	-1

multiplication table

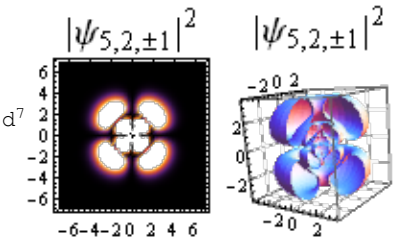
116 $t_{b_m}^{\frac{2}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	1	3	2	1	1	1	1 }	Exp. m	174200. MeV
001111111_2	Weight{	1	0	-1	0	1	0	0	-1 }	Theo. m	175 990.
	Height= 13									Exp. τ	? s

Binary{	1	0	1	0	0	1	1	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{77}Ir[Xe]$6s^2 4f^{14} 5d^7$



Flipped

Octonion triads-fPi=28 Sign mask=4 Hex=36 L fp_sm=3

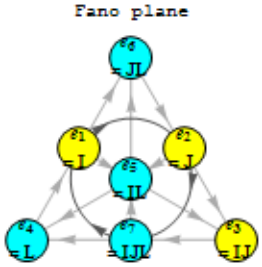
{{1, 2, 7}, {1, 5, 3}, {1, 6, 4},
{2, 3, 6}, {2, 5, 4}, {3, 7, 4}, {5, 6, 7}}

Coxeter (Cyan)

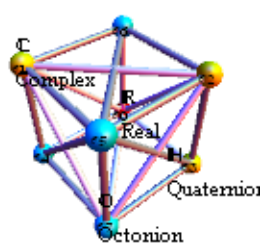
Flattened triad/mask bits

{1, 2, 7, 5, 3, 6, 4}
{0, 1, 1, 0, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	-6	3	4	-2
2	-7	-1	6	-5	4	-3	1
3	5	-6	-1	-7	-1	2	4
4	6	5	7	-1	-2	-1	-3
5	-3	-4	1	2	-1	7	-6
6	-4	3	-2	1	-7	-1	5
7	2	-1	-4	3	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=4 Hex=3D R fp_sm=6

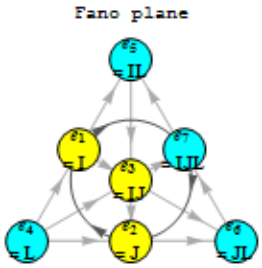
{{1, 7, 2}, {1, 3, 6}, {1, 5, 4},
{2, 5, 3}, {2, 6, 4}, {3, 7, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

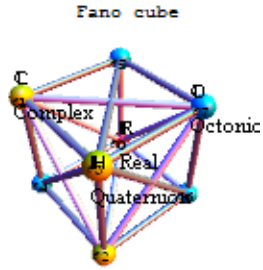
Flattened triad/mask bits

{1, 7, 2, 3, 6, 5, 4}
{1, 0, 1, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	6	-5	4	-3	2
2	7	-1	-5	-6	3	4	-1
3	-6	5	-1	-7	-2	1	4
4	5	6	7	-1	-1	-2	-3
5	-4	-3	2	1	-1	7	-6
6	3	-4	-1	2	-7	-1	5
7	-2	1	-4	3	6	-5	-1

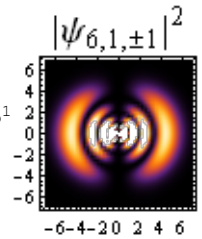
multiplication table

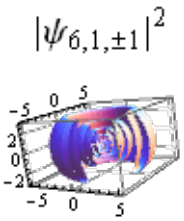
135 $\overline{b}_{m_m}^{\frac{1}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

0apccssgg 010111111_2	Root{	-2	-1	-3	-2	-2	-1	-1	-1 }	Exp. m 4200. MeV
	Weight{	-1	1	-1	1	-1	0	0	1 }	Theo. m 3270.13
	Height= 14									Exp. τ ? s
Binary{	0	1	1	0	1	0	0	1	}	
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8

$^{81}Tl[Xe]6s^2 4f^{14} 5d^{10} 6p^1$





Flipped

Octonion triads-fPi=28 Sign mask=4 Hex=4E L fp_sm=3

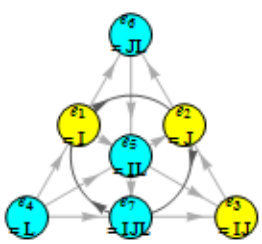
{{1, 2, 7}, {1, 5, 3}, {1, 6, 4},
{2, 6, 3}, {2, 4, 5}, {3, 4, 7}, {5, 7, 6}}

Coxeter (Cyan)

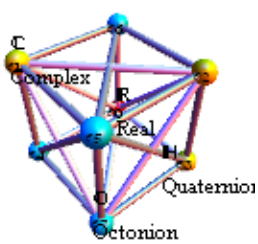
Flattened triad/mask bits

{1, 2, 7, 5, 3, 6, 4}
{0, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	-6	3	4	-2
2	-7	-1	-6	5	-4	3	1
3	5	6	-1	7	-1	-2	-4
4	6	-5	-7	-1	2	-1	3
5	-3	4	1	-2	-1	-7	6
6	-4	-3	2	1	7	-1	-5
7	2	-1	4	-3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=30 Sign mask=4 Hex=45 R fp_sm=6

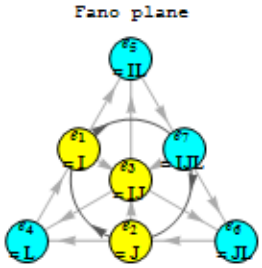
{{1, 7, 2}, {1, 3, 6}, {1, 5, 4},
{2, 3, 5}, {2, 4, 6}, {3, 4, 7}, {5, 7, 6}}

HoffmanSingleton (Yellow)

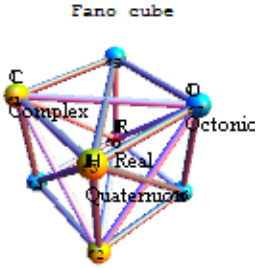
Flattened triad/mask bits

{1, 7, 2, 3, 6, 5, 4}
{1, 0, 1, 0, 0, 0, 1}

Fano plane



Fano cube



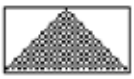
0↦1	1	2	3	4	5	6	7
1	-1	-7	6	-5	4	-3	2
2	7	-1	5	6	-3	-4	-1
3	-6	-5	-1	7	2	1	-4
4	5	-6	-7	-1	-1	2	3
5	-4	3	-2	1	-1	-7	6
6	3	4	-1	-2	7	-1	-5
7	-2	1	4	-3	-6	5	-1

multiplication table

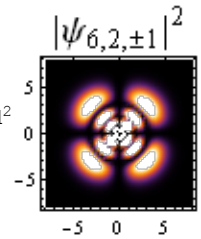
16 $\overline{s}_{m_d}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

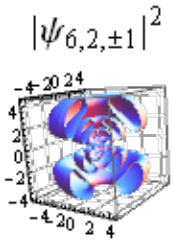
0apccssgg	Root{	-2	-2	-4	-4	-3	-2	-1	-1 }	Exp. m 95. MeV
010110010_2	Weight{	0	0	0	-1	0	1	0	0 }	Theo. m 98.1056
	Height=	20								Exp. τ ? s
Binary{	1	0	0	0	0	0	0	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8



^{104}Rf[Rn]$7s^2 5f^{14} 6d^2$





Flipped

Octonion triads-fPi=29 Sign mask=1 Hex=75 R fp_sm=7

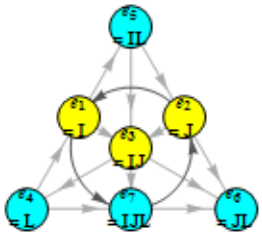
{{1, 7, 2}, {1, 3, 6}, {1, 5, 4},
{2, 3, 4}, {2, 6, 5}, {3, 7, 5}, {4, 7, 6}}

Flattened triad/mask bits

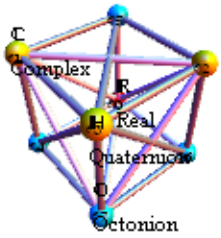
{1, 2, 7, 3, 6, 5, 4}
{1, 0, 1, 0, 1, 1, 1}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	6	-5	4	-3	2
2	7	-1	4	-3	-6	5	-1
3	-6	-4	-1	2	-7	1	5
4	5	3	-2	-1	-1	-7	6
5	-4	6	7	1	-1	-2	-3
6	3	-5	-1	7	2	-1	-4
7	-2	1	-5	-6	3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=1 Hex=7C R fp_sm=4

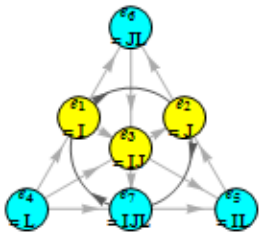
{{1, 2, 7}, {1, 3, 5}, {1, 6, 4},
{2, 4, 3}, {2, 6, 5}, {3, 7, 6}, {4, 7, 5}}

Flattened triad/mask bits

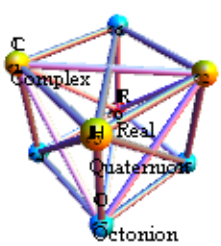
{1, 2, 7, 3, 5, 6, 4}
{0, 0, 1, 1, 1, 1, 1}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



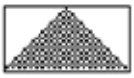
0↦1	1	2	3	4	5	6	7
1	-1	7	5	-6	-3	4	-2
2	-7	-1	-4	3	-6	5	1
3	-5	4	-1	-2	1	-7	6
4	6	-3	2	-1	-7	-1	5
5	3	6	-1	7	-1	-2	-4
6	-4	-5	7	1	2	-1	-3
7	2	-1	-6	-5	4	3	-1

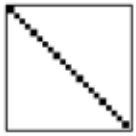
multiplication table

145 $c_{b_d}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

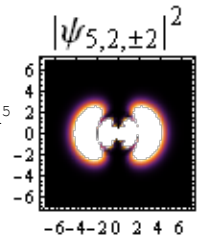
0apccssgg	Root{	1	1	2	2	2	2	1	1 }	Exp. m	1250. MeV					
001110010_2	Weight{	0	1	0	0	0	-1	1	0 }	Theo. m	1319.95					
	Height= 13									Exp. τ	? s					
Binary{	0	1	0	0	1	1	1	0	}							
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}							
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}							

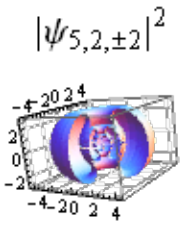
Bit NKS CA Pascal E8





^{75}Re[Xe]$6s^2 4f^{14} 5d^5$





Flipped

Octonion triads-fPi=29 Sign mask=1 Hex=0D R fp_sm=7

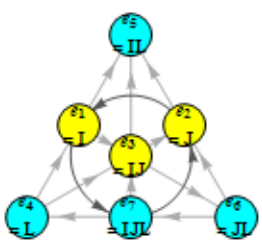
{{1, 7, 2}, {1, 3, 6}, {1, 5, 4},
{2, 4, 3}, {2, 5, 6}, {3, 5, 7}, {4, 6, 7}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 6, 5, 4}
{1, 0, 1, 1, 0, 0, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	6	-5	4	-3	2
2	7	-1	-4	3	6	-5	-1
3	-6	4	-1	-2	7	1	-5
4	5	-3	2	-1	-1	7	-6
5	-4	-6	-7	1	-1	2	3
6	3	5	-1	-7	-2	-1	4
7	-2	1	5	6	-3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=1 Hex=04 R fp_sm=4

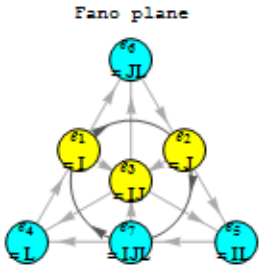
{{1, 2, 7}, {1, 3, 5}, {1, 6, 4},
{2, 3, 4}, {2, 5, 6}, {3, 6, 7}, {4, 5, 7}}

HoffmanSingleton (Yellow)

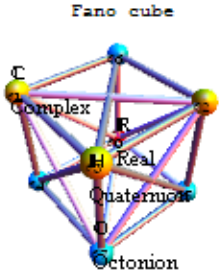
Flattened triad/mask bits

{1, 2, 7, 3, 5, 6, 4}
{0, 0, 1, 0, 0, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	-6	-3	4	-2
2	-7	-1	4	-3	6	-5	1
3	-5	-4	-1	2	1	7	-6
4	6	3	-2	-1	7	-1	-5
5	3	-6	-1	-7	-1	2	4
6	-4	5	-7	1	-2	-1	3
7	2	-1	6	5	-4	-3	-1

multiplication table

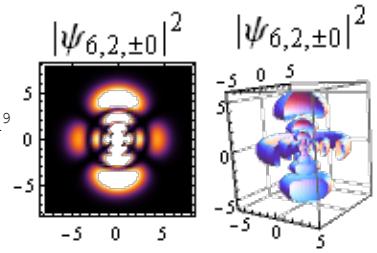
22 $\overline{s}_{m_1}^{\frac{1}{3}\to-\frac{2}{3}}$ $\hat{R}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-3	-2	-5	-4	-3	-2	-1	-1 }	Exp. m 95. MeV
010110110_2	Weight{	0	0	0	0	-1	0	1	1 }	Theo. m 98.1056
	Height=	22								Exp. τ ? s

Binary{	0	1	0	0	0	0	0	1	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{110}Ds[Rn]7s^{1}5f^{14}6d^{9}



Flipped

Octonion triads-fPi=29 Sign mask=2 Hex=6B R fp_sm=7

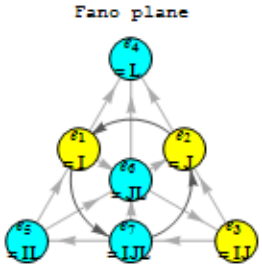
{{1, 7, 2}, {1, 6, 3}, {1, 4, 5},
{2, 4, 3}, {2, 5, 6}, {3, 7, 5}, {4, 7, 6}}

Coxeter (Cyan)

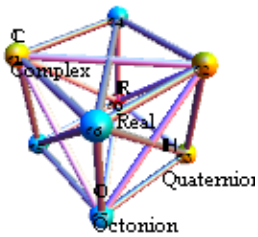
Flattened triad/mask bits

{1, 2, 7, 6, 3, 4, 5}
{1, 1, 0, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	5	-4	3	2
2	7	-1	-4	3	6	-5	-1
3	6	4	-1	-2	-7	-1	5
4	-5	-3	2	-1	1	-7	6
5	4	-6	7	-1	-1	2	-3
6	-3	5	1	7	-2	-1	-4
7	-2	1	-5	-6	3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=2 Hex=62 R fp_sm=4

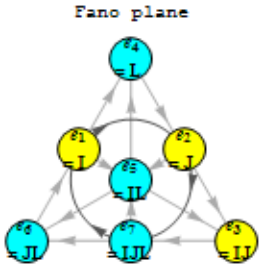
{{1, 2, 7}, {1, 5, 3}, {1, 4, 6},
{2, 3, 4}, {2, 5, 6}, {3, 7, 6}, {4, 7, 5}}

HoffmanSingleton (Yellow)

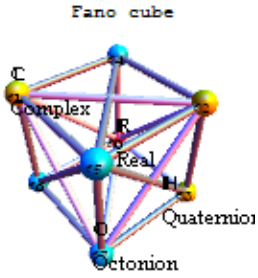
Flattened triad/mask bits

{1, 2, 7, 5, 3, 4, 6}
{0, 1, 0, 0, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	6	3	-4	-2
2	-7	-1	4	-3	6	-5	1
3	5	-4	-1	2	-1	-7	6
4	-6	3	-2	-1	-7	1	5
5	-3	-6	1	7	-1	2	-4
6	4	5	7	-1	-2	-1	-3
7	2	-1	-6	-5	4	3	-1

multiplication table

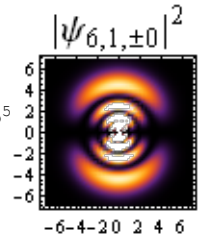
125 $\overset{\frac{2}{3}\to-\frac{1}{3}}{\underset{b_1\ \hat{R}}{c}}$ Ref. Symbols: 2D 3D

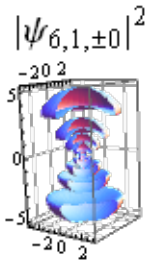
0apccssgg	Root{	2	1	3	2	2	2	1	1 }	Exp. m	1250. MeV
001110110_2	Weight{	0	1	0	-1	1	0	0	-1 }	Theo. m	1319.95
	Height= 15									Exp. τ	? s

Binary{	1	0	0	0	1	1	1	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	0	$-\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^{85}At[Xe]6s^2 4f^{14} 5d^{10} 6p^5$





Flipped

Octonion triads-fPi=29 Sign mask=2 Hex=13 R fp_sm=7

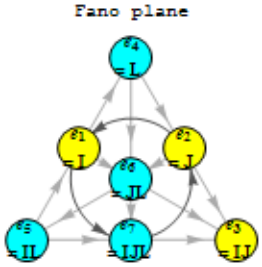
{{1, 7, 2}, {1, 6, 3}, {1, 4, 5},
{2, 3, 4}, {2, 6, 5}, {3, 5, 7}, {4, 6, 7}}

Coxeter (Cyan)

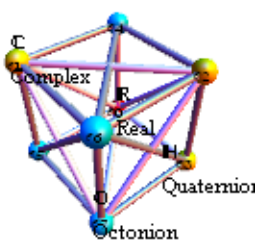
Flattened triad/mask bits

{1, 2, 7, 6, 3, 4, 5}
{1, 1, 0, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	5	-4	3	2
2	7	-1	4	-3	-6	5	-1
3	6	-4	-1	2	7	-1	-5
4	-5	3	-2	-1	1	7	-6
5	4	6	-7	-1	-1	-2	3
6	-3	-5	1	-7	2	-1	4
7	-2	1	5	6	-3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=2 Hex=1A R fp_sm=4

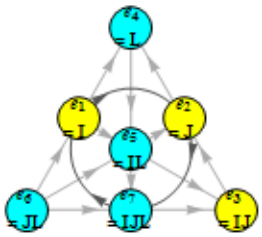
{{1, 2, 7}, {1, 5, 3}, {1, 4, 6},
{2, 4, 3}, {2, 6, 5}, {3, 6, 7}, {4, 5, 7}}

HoffmanSingleton (Yellow)

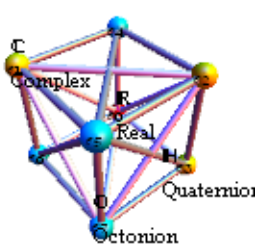
Flattened triad/mask bits

{1, 2, 7, 5, 3, 4, 6}
{0, 1, 0, 1, 1, 0, 0}

Fano plane



Fano cube



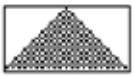
0↦1	1	2	3	4	5	6	7
1	-1	7	-5	6	3	-4	-2
2	-7	-1	-4	3	-6	5	1
3	5	4	-1	-2	-1	7	-6
4	-6	-3	2	-1	7	1	-5
5	-3	6	1	-7	-1	-2	4
6	4	-5	-7	-1	2	-1	3
7	2	-1	6	5	-4	-3	-1

multiplication table

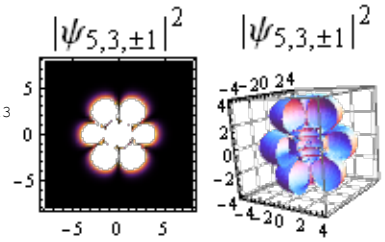
27 $\overline{s}_{m_m}^{\frac{1}{3}}\hat{L}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-2	-2	-4	-3	-3	-2	-1	-1 }	Exp. m 95. MeV
010111010_2	Weight{	0	0	-1	1	-1	1	0	0 }	Theo. m 98.1056
	Height= 19									Exp. τ ? s
Binary{		0	0	1	0	0	0	0	1 }	
E8{		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }	

Bit NKS CA Pascal E8



^{101}Md[Rn]$7s^2 5f^{13}$



Flipped

Octonion triads-fPi=29 Sign mask=3 Hex=58 R fp_sm=7

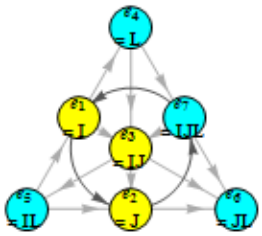
{{1, 2, 7}, {1, 3, 6}, {1, 4, 5},
{2, 4, 3}, {2, 6, 5}, {3, 5, 7}, {4, 7, 6}}

Coxeter (Cyan)

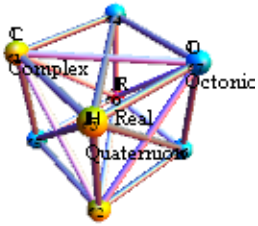
Flattened triad/mask bits

{1, 7, 2, 3, 6, 4, 5}
{0, 0, 0, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	5	-4	-3	-2
2	-7	-1	-4	3	-6	5	1
3	-6	4	-1	-2	7	1	-5
4	-5	-3	2	-1	1	-7	6
5	4	6	-7	-1	-1	-2	3
6	3	-5	-1	7	2	-1	-4
7	2	-1	5	-6	-3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=3 Hex=51 R fp_sm=4

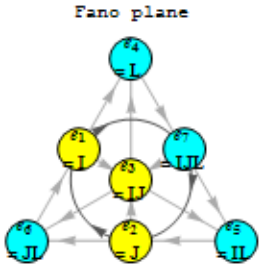
{{1, 7, 2}, {1, 3, 5}, {1, 4, 6},
{2, 3, 4}, {2, 6, 5}, {3, 6, 7}, {4, 7, 5}}

HoffmanSingleton (Yellow)

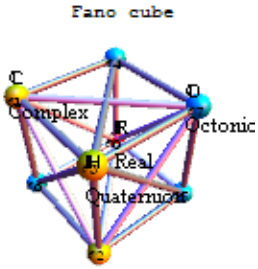
Flattened triad/mask bits

{1, 7, 2, 3, 5, 4, 6}
{1, 0, 0, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	5	6	-3	-4	2
2	7	-1	4	-3	-6	5	-1
3	-5	-4	-1	2	1	7	-6
4	-6	3	-2	-1	-7	1	5
5	3	6	-1	7	-1	-2	-4
6	4	-5	-7	-1	2	-1	3
7	-2	1	6	-5	4	-3	-1

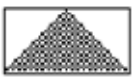
multiplication table

159 $c_{b_m}^{\frac{2}{3}\to-\frac{1}{3}}$ Ref. Symbols: 2D 3D

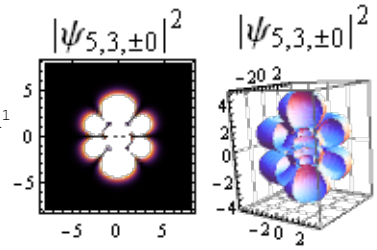
0apccssgg	Root{	2	1	3	3	3	2	1	1 }	Exp. m	1250. MeV
001111010_2	Weight{	0	0	1	0	0	0	0	-1 }	Theo. m	1319.95
	Height= 17									Exp. τ	? s

Binary{	0	0	0	1	1	1	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8



$^{93}Np[Rn]7s^2 5f^4 6d^1$



Flipped

Octonion triads-fPi=29 Sign mask=3 Hex=20 R fp_sm=7

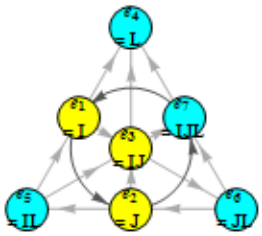
{{1, 2, 7}, {1, 3, 6}, {1, 4, 5},
{2, 3, 4}, {2, 5, 6}, {3, 7, 5}, {4, 6, 7}}

Coxeter (Cyan)

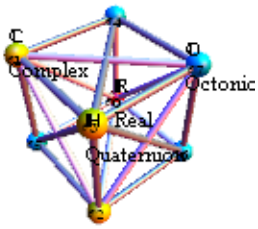
Flattened triad/mask bits

{1, 7, 2, 3, 6, 4, 5}
{0, 0, 0, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	5	-4	-3	-2
2	-7	-1	4	-3	6	-5	1
3	-6	-4	-1	2	-7	1	5
4	-5	3	-2	-1	1	7	-6
5	4	-6	7	-1	-1	2	-3
6	3	5	-1	-7	-2	-1	4
7	2	-1	-5	6	3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=3 Hex=29 R fp_sm=4

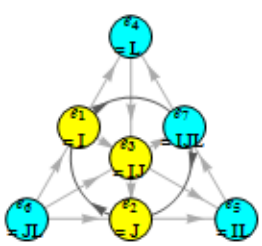
{{1, 7, 2}, {1, 3, 5}, {1, 4, 6},
{2, 4, 3}, {2, 5, 6}, {3, 7, 6}, {4, 5, 7}}

HoffmanSingleton (Yellow)

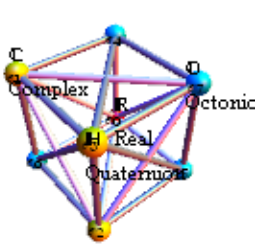
Flattened triad/mask bits

{1, 7, 2, 3, 5, 4, 6}
{1, 0, 0, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	5	6	-3	-4	2
2	7	-1	-4	3	6	-5	-1
3	-5	4	-1	-2	1	-7	6
4	-6	-3	2	-1	7	1	-5
5	3	-6	-1	-7	-1	2	4
6	4	5	7	-1	-2	-1	-3
7	-2	1	-6	5	-4	3	-1

multiplication table

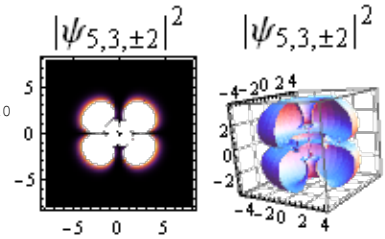
31 $\overline{s}_{m_m}^{\frac{1}{3}\to-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 010111110_2	Root{ -2 -2 -4 -3 -2 -2 -1 -1 } Weight{ 0 -1 1 0 -1 1 0 0 } Height= 18	Exp. m Theo. m Exp. τ	95. MeV 98.1056 ? s

Binary{	0	0	0	1	0	0	0	1	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^{98}Cf[Rn]7s^2 5f^{10}$



Flipped

Octonion triads-fPi=29 Sign mask=4 Hex=46 R fp_sm=7

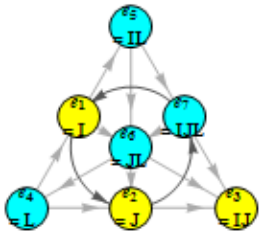
{{1, 2, 7}, {1, 6, 3}, {1, 5, 4},
{2, 3, 4}, {2, 5, 6}, {3, 5, 7}, {4, 7, 6}}

Coxeter (Cyan)

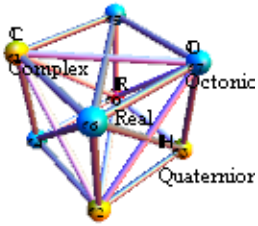
Flattened triad/mask bits

{1, 7, 2, 6, 3, 5, 4}
{0, 1, 1, 0, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	-5	4	3	-2
2	-7	-1	4	-3	6	-5	1
3	6	-4	-1	2	7	-1	-5
4	5	3	-2	-1	-1	-7	6
5	-4	-6	-7	1	-1	2	3
6	-3	5	1	7	-2	-1	-4
7	2	-1	5	-6	-3	4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=4 Hex=4F R fp_sm=4

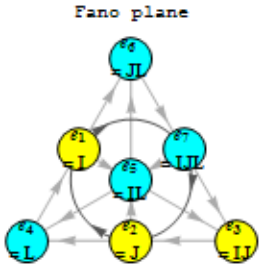
{{1, 7, 2}, {1, 5, 3}, {1, 6, 4},
{2, 4, 3}, {2, 5, 6}, {3, 6, 7}, {4, 7, 5}}

HoffmanSingleton (Yellow)

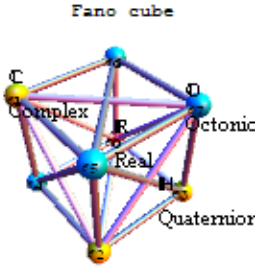
Flattened triad/mask bits

{1, 7, 2, 5, 3, 6, 4}
{1, 1, 1, 1, 0, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	-6	3	4	2
2	7	-1	-4	3	6	-5	-1
3	5	4	-1	-2	-1	7	-6
4	6	-3	2	-1	-7	-1	5
5	-3	-6	1	7	-1	2	-4
6	-4	5	-7	1	-2	-1	3
7	-2	1	6	-5	4	-3	-1

multiplication table

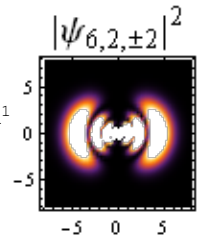
155 $c_{b_m}^{\frac{2}{3}\sqrt{R}}$ Ref. Symbols: 2D 3D

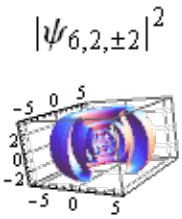
0apccssgg	Root{	2	1	3	3	2	2	1	1 }	Exp. m	1250. MeV
001111110_2	Weight{	0	1	-1	1	0	0	0	-1 }	Theo. m	1319.95
	Height= 16									Exp. τ	? s

Binary{	0	0	1	0	1	1	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

$^{89}Ac[Rn]7s^2 6d^1$





Flipped

Octonion triads-fPi=29 Sign mask=4 Hex=3E R fp_sm=7

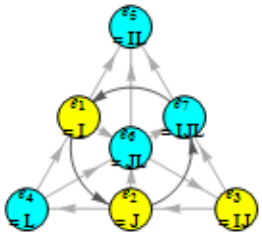
{{1, 2, 7}, {1, 6, 3}, {1, 5, 4},
{2, 4, 3}, {2, 6, 5}, {3, 7, 5}, {4, 6, 7}}

Flattened triad/mask bits

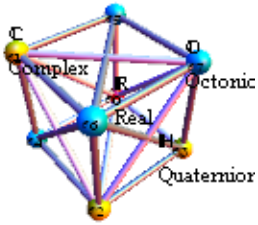
{1, 7, 2, 6, 3, 5, 4}
{0, 1, 1, 1, 1, 1, 0}

Coxeter (Cyan)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	-5	4	3	-2
2	-7	-1	-4	3	-6	5	1
3	6	4	-1	-2	-7	-1	5
4	5	-3	2	-1	-1	7	-6
5	-4	6	7	1	-1	-2	-3
6	-3	-5	1	-7	2	-1	4
7	2	-1	-5	6	3	-4	-1

multiplication table

Not Flipped

Octonion triads-fPi=27 Sign mask=4 Hex=37 R fp_sm=4

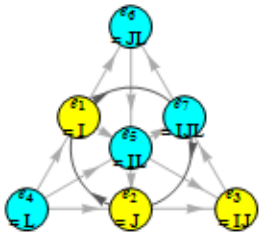
{{1, 7, 2}, {1, 5, 3}, {1, 6, 4},
{2, 3, 4}, {2, 6, 5}, {3, 7, 6}, {4, 5, 7}}

Flattened triad/mask bits

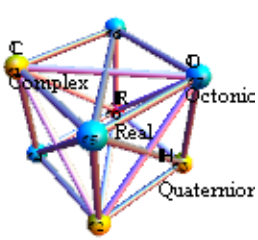
{1, 7, 2, 5, 3, 6, 4}
{1, 1, 1, 0, 1, 1, 0}

HoffmanSingleton (Yellow)

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	-6	3	4	2
2	7	-1	4	-3	-6	5	-1
3	5	-4	-1	2	-1	-7	6
4	6	3	-2	-1	7	-1	-5
5	-3	6	1	-7	-1	-2	4
6	-4	-5	7	1	2	-1	-3
7	-2	1	-6	5	-4	3	-1

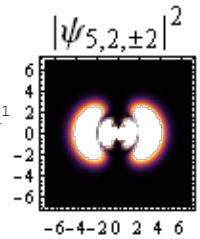
multiplication table

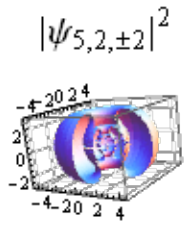
151 $\bar{t}_{b_d\,\check{L}}^{\,-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	-1	-1	-2	-1	-1	-1	-1	-1 }	Exp. m 174200. MeV
011110011_2	Weight{	-1	0	0	1	-1	1	-1	0 }	Theo. m 175990.
	Height= 10									Exp. τ ? s
Binary{		0	0	1	1	1	0	0	1 }	
E8{		$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$ }	
Physics {		$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$ }	

Bit NKS CA Pascal E8

^{57}La[Xe]6s^{2}5d^1





Flipped

Octonion triads-fPi=30 Sign mask=1 Hex=71 R fp_sm=6

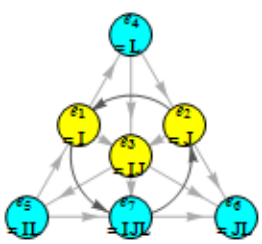
{{1, 7, 2}, {1, 3, 6}, {1, 4, 5},
{2, 3, 5}, {2, 6, 4}, {3, 7, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

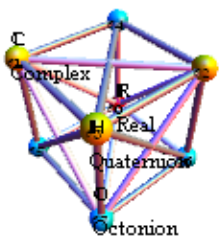
Flattened triad/mask bits

{1, 2, 7, 3, 6, 4, 5}
{1, 0, 0, 0, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	6	5	-4	-3	2
2	7	-1	5	-6	-3	4	-1
3	-6	-5	-1	-7	2	1	4
4	-5	6	7	-1	1	-2	-3
5	4	3	-2	-1	-1	-7	6
6	3	-4	-1	2	7	-1	-5
7	-2	1	-4	3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=1 Hex=7A L fp_sm=3

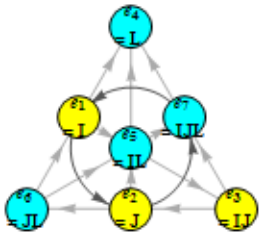
{{1, 2, 7}, {1, 5, 3}, {1, 4, 6},
{2, 6, 3}, {2, 5, 4}, {3, 7, 4}, {5, 7, 6}}

Coxeter (Cyan)

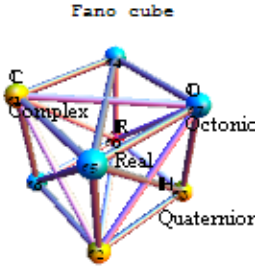
Flattened triad/mask bits

{1, 7, 2, 5, 3, 4, 6}
{0, 1, 0, 1, 1, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-5	6	3	-4	-2
2	-7	-1	-6	-5	4	3	1
3	5	6	-1	-7	-1	-2	4
4	-6	5	7	-1	-2	1	-3
5	-3	-4	1	2	-1	-7	6
6	4	-3	2	-1	7	-1	-5
7	2	-1	-4	3	-6	5	-1

multiplication table

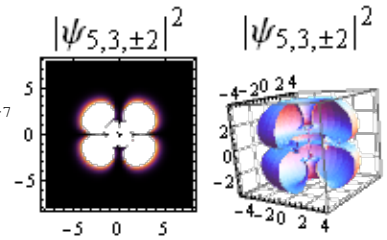
223 $\underset{m_d}{b}\ \overset{-\frac{1}{3}\to\frac{2}{3}}{\underset{L}{}}$ Ref. Symbols: 2D 3D

0apccssgg	Root{	2	2	4	3	2	1	1	1 }	Exp. m 4200. MeV
000110011_2	Weight{	1	-1	0	0	1	-1	0	0 }	Theo. m 3270.13
	Height= 17									Exp. τ ? s

Binary{	1	1	1	1	0	1	1	0	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{95}Am[Rn]7s^{2}5f^7



Flipped

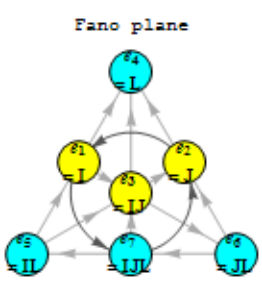
Octonion triads-fPi=30 Sign mask=1 Hex=09 R fp_sm=6

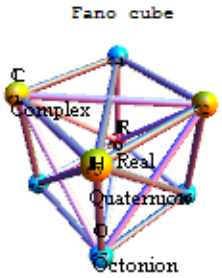
{{1, 7, 2}, {1, 3, 6}, {1, 4, 5},
{2, 5, 3}, {2, 4, 6}, {3, 4, 7}, {5, 6, 7}}

Flattened triad/mask bits

{1, 2, 7, 3, 6, 4, 5}
{1, 0, 0, 1, 0, 0, 0}

HoffmanSingleton (Yellow)





0↦1	1	2	3	4	5	6	7
1	-1	-7	6	5	-4	-3	2
2	7	-1	-5	6	3	-4	-1
3	-6	5	-1	7	-2	1	-4
4	-5	-6	-7	-1	1	2	3
5	4	-3	2	-1	-1	7	-6
6	3	4	-1	-2	-7	-1	5
7	-2	1	4	-3	6	-5	-1

multiplication table

Not Flipped

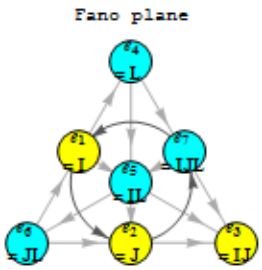
Octonion triads-fPi=28 Sign mask=1 Hex=02 L fp_sm=3

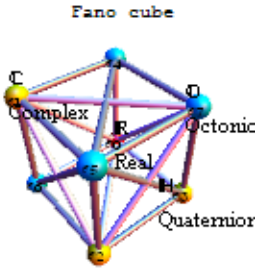
{{1, 2, 7}, {1, 5, 3}, {1, 4, 6},
{2, 3, 6}, {2, 4, 5}, {3, 4, 7}, {5, 6, 7}}

Flattened triad/mask bits

{1, 7, 2, 5, 3, 4, 6}
{0, 1, 0, 0, 0, 0, 0}

Coxeter (Cyan)





0↦1	1	2	3	4	5	6	7
1	-1	7	-5	6	3	-4	-2
2	-7	-1	6	5	-4	-3	1
3	5	-6	-1	7	-1	2	-4
4	-6	-5	-7	-1	2	1	3
5	-3	4	1	-2	-1	7	-6
6	4	3	-2	-1	-7	-1	5
7	2	-1	4	-3	6	-5	-1

multiplication table

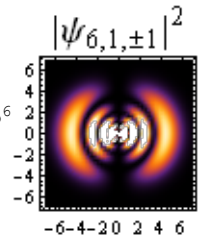
152 $\underset{m_1\ \hat{R}}{b}^{-\frac{1}{3}\to\frac{2}{3}}$ Ref. Symbols: 2D 3D

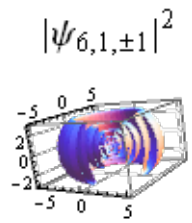
0apccssgg 000110111_2	Root{ 2 1 3 3 2 1 1 1 } Weight{ 1 -1 0 1 0 0 0 -1 } Height= 15	Exp. m Theo. m Exp. τ	4200. MeV 3270.13 ? s

Binary{	0	0	1	1	0	1	1	0	}
E8{	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{86}Rn[Xe]$6s^2 4f^{14} 5d^{10} 6p^6$





Flipped

Octonion triads-fPi=30 Sign mask=2 Hex=17 R fp_sm=6

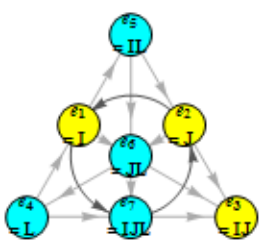
{{1, 7, 2}, {1, 6, 3}, {1, 5, 4},
{2, 3, 5}, {2, 6, 4}, {3, 4, 7}, {5, 6, 7}}

HoffmanSingleton (Yellow)

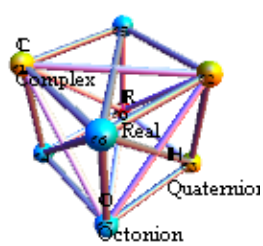
Flattened triad/mask bits

{1, 2, 7, 6, 3, 5, 4}
{1, 1, 1, 0, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	-5	4	3	2
2	7	-1	5	-6	-3	4	-1
3	6	-5	-1	7	2	-1	-4
4	5	6	-7	-1	-1	-2	3
5	-4	3	-2	1	-1	7	-6
6	-3	-4	1	2	-7	-1	5
7	-2	1	4	-3	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=2 Hex=1C L fp_sm=3

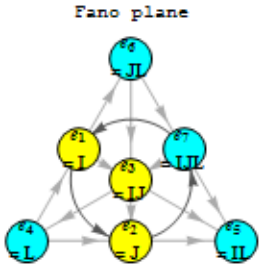
{{1, 2, 7}, {1, 3, 5}, {1, 6, 4},
{2, 6, 3}, {2, 5, 4}, {3, 4, 7}, {5, 6, 7}}

Coxeter (Cyan)

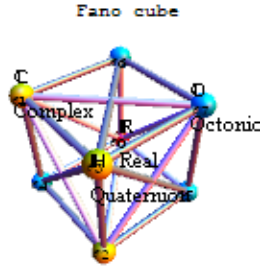
Flattened triad/mask bits

{1, 7, 2, 3, 5, 6, 4}
{0, 0, 1, 1, 1, 0, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	5	-6	-3	4	-2
2	-7	-1	-6	-5	4	3	1
3	-5	6	-1	7	1	-2	-4
4	6	5	-7	-1	-2	-1	3
5	3	-4	-1	2	-1	7	-6
6	-4	-3	2	1	-7	-1	5
7	2	-1	4	-3	6	-5	-1

multiplication table

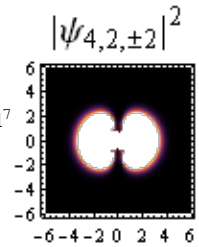
222 $\overline{t}_{b_1\hat{R}}^{\,-\frac{2}{3}\to\frac{1}{3}}$ Ref. Symbols: 2D 3D

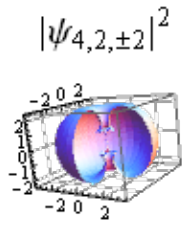
0apccssgg	Root{ -1 0 -1 -1 -1 -1 -1 -1 }	Exp. m	174200. MeV
011110111_2	Weight{ -1 0 0 0 0 0 -1 1 }	Theo. m	175990.
	Height= 8	Exp. τ	? s

Binary{	1	1	1	1	1	0	0	1	}
E8{	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{44}Ru[Kr]5s^{1}4d^7





Flipped

Octonion triads-fPi=30 Sign mask=2 Hex=6F R fp_sm=6

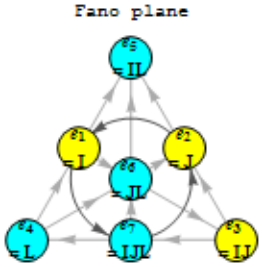
{{1, 7, 2}, {1, 6, 3}, {1, 5, 4},
{2, 5, 3}, {2, 4, 6}, {3, 7, 4}, {5, 7, 6}}

HoffmanSingleton (Yellow)

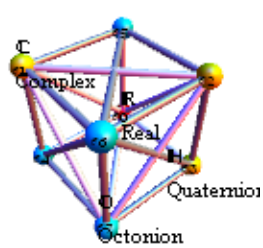
Flattened triad/mask bits

{1, 2, 7, 6, 3, 5, 4}
{1, 1, 1, 1, 0, 1, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-6	-5	4	3	2
2	7	-1	-5	6	3	-4	-1
3	6	5	-1	-7	-2	-1	4
4	5	-6	7	-1	-1	2	-3
5	-4	-3	2	1	-1	-7	6
6	-3	4	1	-2	7	-1	-5
7	-2	1	-4	3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=2 Hex=64 L fp_sm=3

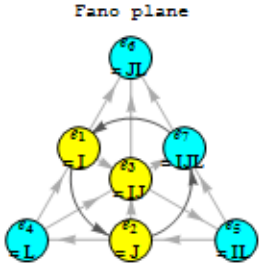
{{1, 2, 7}, {1, 3, 5}, {1, 6, 4},
{2, 3, 6}, {2, 4, 5}, {3, 7, 4}, {5, 7, 6}}

Coxeter (Cyan)

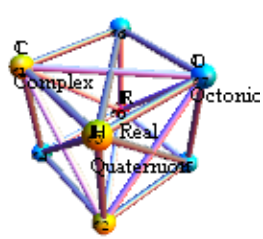
Flattened triad/mask bits

{1, 7, 2, 3, 5, 6, 4}
{0, 0, 1, 0, 0, 1, 1}

Fano plane



Fano cube



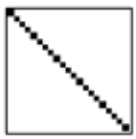
0↦1	1	2	3	4	5	6	7
1	-1	7	5	-6	-3	4	-2
2	-7	-1	6	5	-4	-3	1
3	-5	-6	-1	-7	1	2	4
4	6	-5	7	-1	2	-1	-3
5	3	4	-1	-2	-1	-7	6
6	-4	3	-2	1	7	-1	-5
7	2	-1	-4	3	-6	5	-1

multiplication table

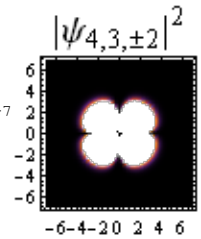
121 $\overline{t}_{b_m \hat{L}}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

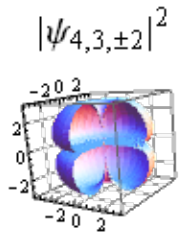
0apccssgg 011111011_2	Root{	-1	-1	-2	-2	-1	-1	-1	-1 }	Exp. m 174200. MeV
	Weight{	-1	0	1	-1	0	1	-1	0 }	Theo. m 175990.
	Height= 11									Exp. τ ? s
Binary{	1	0	0	1	1	0	0	1	}	
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8



^{63}Eu[Xe]$6s^2 4f^7$





Flipped

Octonion triads-fPi=30 Sign mask=3 Hex=5C R fp_sm=6

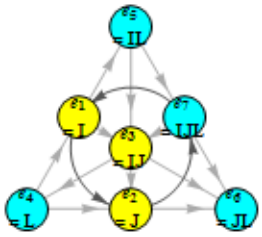
{{1, 2, 7}, {1, 3, 6}, {1, 5, 4},
{2, 5, 3}, {2, 6, 4}, {3, 4, 7}, {5, 7, 6}}

HoffmanSingleton (Yellow)

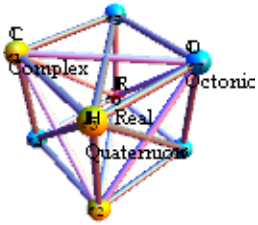
Flattened triad/mask bits

{1, 7, 2, 3, 6, 5, 4}
{0, 0, 1, 1, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	-5	4	-3	-2
2	-7	-1	-5	-6	3	4	1
3	-6	5	-1	7	-2	1	-4
4	5	6	-7	-1	-1	-2	3
5	-4	-3	2	1	-1	-7	6
6	3	-4	-1	2	7	-1	-5
7	2	-1	4	-3	-6	5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=3 Hex=57 L fp_sm=3

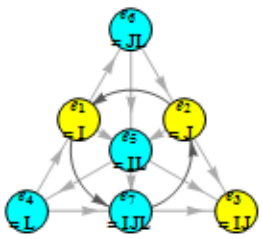
{{1, 7, 2}, {1, 5, 3}, {1, 6, 4},
{2, 3, 6}, {2, 5, 4}, {3, 4, 7}, {5, 7, 6}}

Coxeter (Cyan)

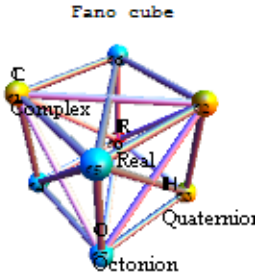
Flattened triad/mask bits

{1, 2, 7, 5, 3, 6, 4}
{1, 1, 1, 0, 1, 0, 1}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	-6	3	4	2
2	7	-1	6	-5	4	-3	-1
3	5	-6	-1	7	-1	2	-4
4	6	5	-7	-1	-2	-1	3
5	-3	-4	1	2	-1	-7	6
6	-4	3	-2	1	7	-1	-5
7	-2	1	4	-3	-6	5	-1

multiplication table

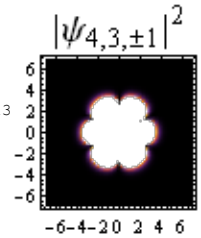
142 $b_{m_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

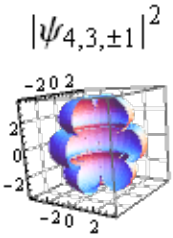
0apccssgg	Root{	1	1	2	2	2	1	1	1 }	Exp. m	4200. MeV
000111011_2	Weight{	1	-1	1	0	0	-1	1	0 }	Theo. m	3270.13
	Height= 12									Exp. τ	? s

Binary{	0	1	0	1	0	1	1	0	}
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{69}Tm[Xe]6s^{2}4f^{13}





Flipped

Octonion triads-fPi=30 Sign mask=3 Hex=24 R fp_sm=6

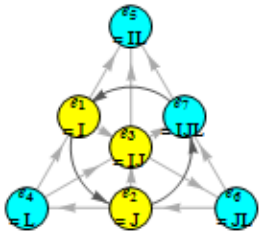
{{1, 2, 7}, {1, 3, 6}, {1, 5, 4},
{2, 3, 5}, {2, 4, 6}, {3, 7, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

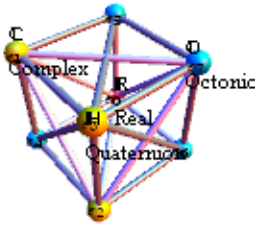
Flattened triad/mask bits

{1, 7, 2, 3, 6, 5, 4}
{0, 0, 1, 0, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	6	-5	4	-3	-2
2	-7	-1	5	6	-3	-4	1
3	-6	-5	-1	-7	2	1	4
4	5	-6	7	-1	-1	2	-3
5	-4	3	-2	1	-1	7	-6
6	3	4	-1	-2	-7	-1	5
7	2	-1	-4	3	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=3 Hex=2F L fp_sm=3

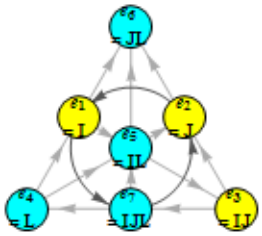
{{1, 7, 2}, {1, 5, 3}, {1, 6, 4},
{2, 6, 3}, {2, 4, 5}, {3, 7, 4}, {5, 6, 7}}

Coxeter (Cyan)

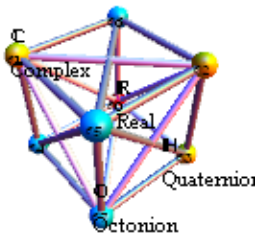
Flattened triad/mask bits

{1, 2, 7, 5, 3, 6, 4}
{1, 1, 1, 1, 0, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	-7	-5	-6	3	4	2
2	7	-1	-6	5	-4	3	-1
3	5	6	-1	-7	-1	-2	4
4	6	-5	7	-1	2	-1	-3
5	-3	4	1	-2	-1	7	-6
6	-4	-3	2	1	-7	-1	5
7	-2	1	-4	3	6	-5	-1

multiplication table

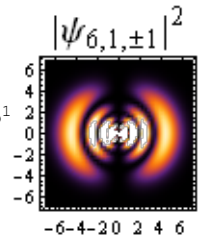
122 $b_{m_m}^{-\frac{1}{3}}$ Ref. Symbols: 2D 3D

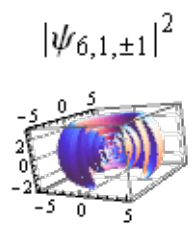
0apccssgg 000111111_2	Root{ 2 1 3 2 2 1 1 1 } Weight{ 1 -1 1 -1 1 0 0 -1 } Height= 14	Exp. m Theo. m Exp. τ	4200. MeV 3270.13 ? s

Binary{	1	0	0	1	0	1	1	0	}
E8{	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	}
Physics {	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$-\frac{1}{2}$	$\frac{1}{2\sqrt{3}}$	0	$-\sqrt{\frac{2}{3}}$	}

Bit NKS CA Pascal E8

^{81}Tl[Xe]$6s^2 4f^{14} 5d^{10} 6p^1$





Flipped

Octonion triads-fPi=30 Sign mask=4 Hex=3A R fp_sm=6

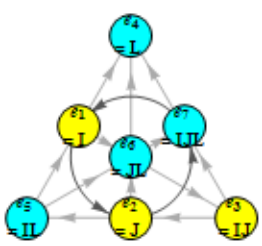
{{1, 2, 7}, {1, 6, 3}, {1, 4, 5},
{2, 5, 3}, {2, 6, 4}, {3, 7, 4}, {5, 6, 7}}

HoffmanSingleton (Yellow)

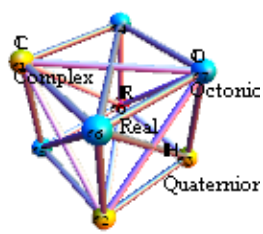
Flattened triad/mask bits

{1, 7, 2, 6, 3, 4, 5}
{0, 1, 0, 1, 1, 1, 0}

Fano plane



Fano cube



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	5	-4	3	-2
2	-7	-1	-5	-6	3	4	1
3	6	5	-1	-7	-2	-1	4
4	-5	6	7	-1	1	-2	-3
5	4	-3	2	-1	-1	7	-6
6	-3	-4	1	2	-7	-1	5
7	2	-1	-4	3	6	-5	-1

multiplication table

Not Flipped

Octonion triads-fPi=28 Sign mask=4 Hex=31 L fp_sm=3

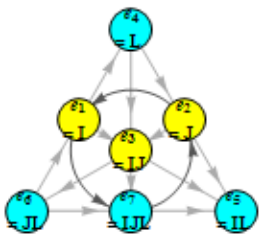
{{1, 7, 2}, {1, 3, 5}, {1, 4, 6},
{2, 3, 6}, {2, 5, 4}, {3, 7, 4}, {5, 6, 7}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 5, 4, 6}
{1, 0, 0, 0, 1, 1, 0}

Fano plane



Fano cube

0↦1	1	2	3	4	5	6	7
1	-1	-7	5	6	-3	-4	2
2	7	-1	6	-5	4	-3	-1
3	-5	-6	-1	-7	1	2	4
4	-6	5	7	-1	-2	1	-3
5	3	-4	-1	2	-1	7	-6
6	4	3	-2	-1	-7	-1	5
7	-2	1	-4	3	6	-5	-1

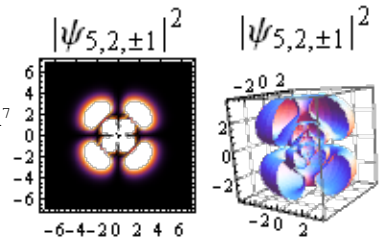
multiplication table

141 $\overline{t}_{b_m}^{-\frac{2}{3}}$ Ref. Symbols: 2D 3D

0apccssgg 011111111_2	Root{	-2	-1	-3	-2	-1	-1	-1	-1 }	Exp. m 174200. MeV
	Weight{	-1	0	1	0	-1	0	0	1 }	Theo. m 175990.
	Height= 13									Exp. τ ? s
Binary{	0	1	0	1	1	0	0	1	}	
E8{	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{2}$	$-\frac{1}{2}$	$\frac{1}{2}$	}	
Physics {	$-\frac{1}{2}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	0	$\frac{1}{2}$	$-\frac{1}{2\sqrt{3}}$	0	$\sqrt{\frac{2}{3}}$	}	

Bit NKS CA Pascal E8

^{77}Ir[Xe]$6s^2 4f^{14} 5d^7$



Flipped

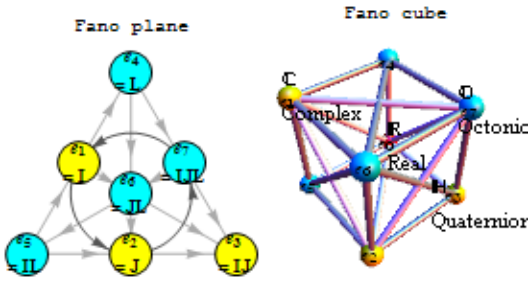
Octonion triads-fPi=30 Sign mask=4 Hex=42 R fp_sm=6

{{1, 2, 7}, {1, 6, 3}, {1, 4, 5},
{2, 3, 5}, {2, 4, 6}, {3, 4, 7}, {5, 7, 6}}

HoffmanSingleton (Yellow)

Flattened triad/mask bits

{1, 7, 2, 6, 3, 4, 5}
{0, 1, 0, 0, 0, 0, 1}



0↦1	1	2	3	4	5	6	7
1	-1	7	-6	5	-4	3	-2
2	-7	-1	5	6	-3	-4	1
3	6	-5	-1	7	2	-1	-4
4	-5	-6	-7	-1	1	2	3
5	4	3	-2	-1	-1	-7	6
6	-3	4	1	-2	7	-1	-5
7	2	-1	4	-3	-6	5	-1

multiplication table

Not Flipped

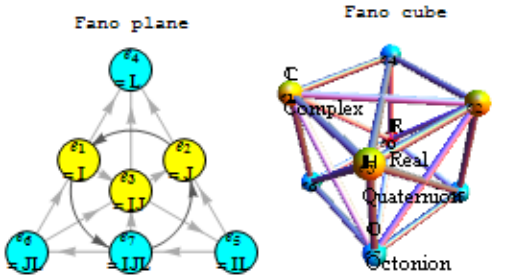
Octonion triads-fPi=28 Sign mask=4 Hex=49 L fp_sm=3

{{1, 7, 2}, {1, 3, 5}, {1, 4, 6},
{2, 6, 3}, {2, 4, 5}, {3, 4, 7}, {5, 7, 6}}

Coxeter (Cyan)

Flattened triad/mask bits

{1, 2, 7, 3, 5, 4, 6}
{1, 0, 0, 1, 0, 0, 1}



0↦1	1	2	3	4	5	6	7
1	-1	-7	5	6	-3	-4	2
2	7	-1	-6	5	-4	3	-1
3	-5	6	-1	7	1	-2	-4
4	-6	-5	-7	-1	2	1	3
5	3	4	-1	-2	-1	-7	6
6	4	-3	2	-1	7	-1	-5
7	-2	1	4	-3	-6	5	-1

multiplication table