

What is Fundamental ? NOTHING is Fundamental !!!

Frank Dodd (Tony) Smith, Jr. - 2017

Fundamental = Starting Point of a Process Describing Realistic Physics
including **Lagrangian** and **Algebraic Quantum Field Theory (AQFT)**.
The Starting Point of Our Universe was a Fundamental Spinor Void
Void = NOTHING so NOTHING is Fundamental

This paper explores the Process,
which allows calculation of Standard Model Particle Masses and Force Strengths.

Page 2 is a Graphic Overview.

Pages 3-13 **What is Fundamental? NOTHING is Fundamental !!!**

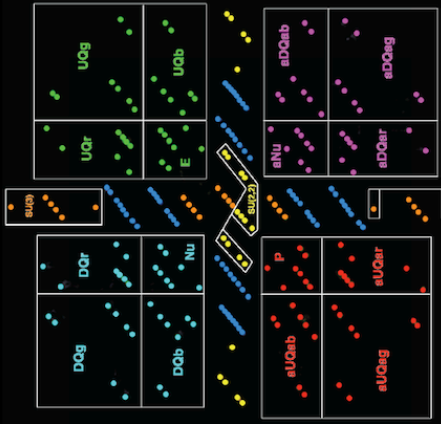
Pages 14-117 are my 2018-2019 Calendar with Red Book appendix.

Pages 118-121 are about Leonardo DaVinci's Salvator Mundi and E8.

Void \rightarrow C(Void) \rightarrow C(0) \rightarrow C(1) \rightarrow C(2) \rightarrow C(4) \rightarrow C(16)

Kaluza-Klein Spacetime M4 x CP2	
C(8) that contains 28 = D4 for CP2	1
C(8) that contains 28 = D4 for Gravity	16
	120
	560
	1820
	4368
	8008
	11440
	12870
	11440
	8008
	4368
	1820
	560
	120
	16
	1

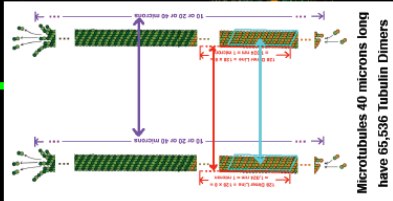
$C(8) \times C(8) = C(16)$
 Spinors: $(8s, 8s) + (8s, 8c)$
 $(8s+8c) \times (8s+8c) = (8c, 8s) + (8c, 8c)$



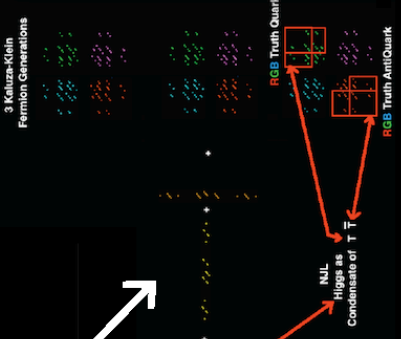
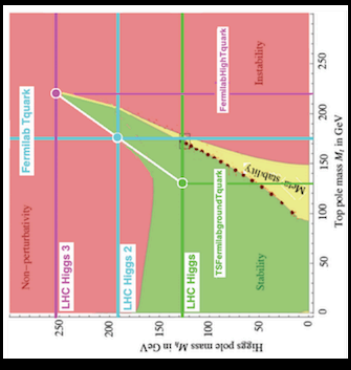
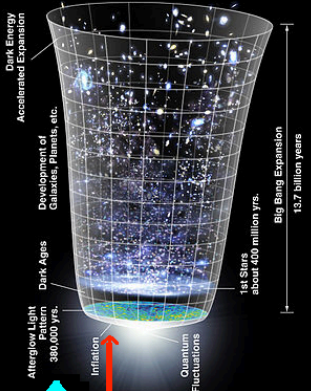
$C(0, 16) \times C(0, 8) = C(0, 24)$
 $M(2, C(0, 24)) = C(1, 25)$

Completion of Union of All Tensor Products of C(1,25) = AQFT

Quantum Resonant Connection

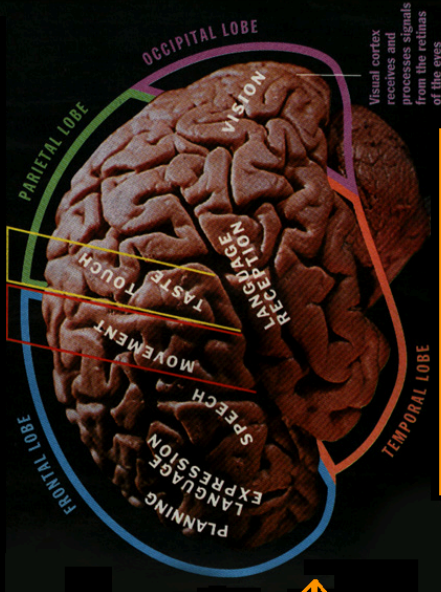


10^19 E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation



NuL Quantum Condensate

Penrose-Hameroff Quantum Condensate



10^19 Tubulin Dimers in a Human Brain

What is Fundamental ? NOTHING

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Fundamental = Starting Point of a Process Describing Realistic Physics

including Lagrangian and Algebraic Quantum Field Theory (AQFT).

This paper explores the Process through detailed worked examples.

(for further details and calculations see Smith references)

The Starting Point of Our Universe was a Fundamental Spinor Void

Void = NOTHING so NOTHING is Fundamental



Fundamental Spinor Void based on 0-dim Real Clifford Algebra Cl(Void)

from which emerged by Finkelstein's process of Iterating Clifford Algebra Formation

(Finkelstein, Int. J. Theor. Phys. 2017 56 : 2-39)

$$Cl(0) = 2^0 = 1\text{-dim}$$

$$Cl(1) = 2^1 = 2\text{-dim}$$

$$Cl(2) = 2^2 = 4\text{-dim with } 2^1 = 1+1 \text{ half-spinor fermions/antifermions}$$



and

$$Cl(4) = 2^4 = 16\text{-dim with } 2^2 = 2+2 \text{ half-spinor fermions/antifermions}$$



and

$$Cl(16) = 2^{16} = 65,536\text{-dim with } 2^8 = 128 + 128 \text{ half-spinor fermions/antifermions}$$

128-dim Cl(16) Half-Spinors = 2 copies of Geoffrey Dixon's 64-dim RxCxHxO

where R = Real, C = Complex, H = Quaternion, O = Octonion Division Algebras

(Dixon, Division Algebras (O, H, C, and R) and Windmill Tilting)

248-dim E8 = 128-dim Cl(16) Half-Spinors + 120-dim Cl(16) BiVectors

By 8-Periodicity of Real Clifford Algebras

$$Cl(8) \times \dots (N \text{ times tensor product}) \dots \times Cl(8) = Cl(8N)$$

$$Cl(16) \text{ can be factored into the tensor product } Cl(8) \times Cl(8)$$

Each of the $Cl(8) = 2^8 = 256\text{-dim with } 2^4 = 8+8 \text{ } Cl(8) \text{ half-spinor fermions/antifermions}$



and



By Triality half-spinors (8 fermions and 8 antifermions) are isomorphic to each other and to 8 vectors



By 8-Periodicity Cl(8) and Cl(16) have basic structure underlying all Real Clifford Algebras.

The Iterated Clifford Algebra Creation Sequence begins with a Compact Quantum Fluctuation in a Parent Universe (Real Form E8(-248)) that Unfolds into an Octonionic Inflation of Our Universe (Real Form E8(8))

(Smith, viXra 1709.0265)

The Creation Sequence can also be seen in terms of Spinor/Clifford Algebra Doubling

$$\text{Cl}(0,0) \rightarrow \text{Cl}(0,2) \rightarrow \text{Cl}(0,4) \rightarrow \text{Cl}(0,6) \rightarrow \text{Cl}(0,8) \rightarrow$$

that goes to $\text{Cl}(0,8)$ which has Vector - Half-Spinor Triality and by 8-Periodicity is the Basic Building Block of Real Clifford Algebras. The Creation Sequence continues by Tensor Product

$$\rightarrow \text{Cl}(0,8) \times \text{Cl}(0,8) = \text{Cl}(0,16) \rightarrow \text{Cl}(0,16) \times \text{Cl}(0,8) = \text{Cl}(0,24) \rightarrow$$

$\text{Cl}(0,16)$ contains the Maximal Exceptional E8 Lie Algebra

$\text{Cl}(0,24)$ contains the Vector Space of the 24-dim Leech Lattice Λ_{24} that is composed of 3 copies of E8 Lattices (2 being Integral Domains and 1 not Algebraically closed)

The Creation Sequence continues by constructing the Conformal Structure of 2x2 matrices with entries in $\text{Cl}(0,24) = M(2, \text{Cl}(0,24))$

(Porteous, Clifford Algebras and the Classical Groups and Lounesto and Porteous, Lectures on Clifford (Geometric) Algebras and Applications)

$$\rightarrow M(2, \text{Cl}(0,24)) = \text{Cl}(1,25) \rightarrow$$

Since all the matrix entries are $\text{Cl}(0,24) =$ tensor product of 3 copies of $\text{Cl}(0,8)$ 8-Periodicity allows formation of the tensor products of copies of $\text{Cl}(1,25)$

\rightarrow Completion of Union of All Tensor Products of $\text{Cl}(1,25) =$ hyperfinite AQFT

The hyperfinite AQFT has Real / Octonionic structure inherited from $\text{Cl}(0,8)$ and it also has Quaternionic structure due to

$\text{Cl}(1,25) = \text{Cl}(1,9) \times \text{Cl}(0,8) \times \text{Cl}(0,8)$ and $\text{Cl}(1,9) = \text{Cl}(1,5) \times \text{Cl}(0,4) = \text{Cl}(2,4) \times \text{Cl}(0,4)$ where

the vector space of $\text{Cl}(2,4)$ is 6-dim Conformal Spacetime which contains 4-dim Minkowski Spacetime M_4 of $\text{Cl}(1,3)$ and

the vector space of $\text{Cl}(0,4)$ corresponds to $\text{CP}^2 = \text{SU}(3) / \text{SU}(2) \times \text{U}(1)$

so that **before breaking Octonionic symmetry non-unitarity of Octonion Quantum Processes allows particle creation during the Inflation Era**

(Adler, Quaternionic Quantum Mechanics and Quantum Fields, pages 50-52, 561)

and **after breaking non-unitary Octonionic 8-dim Spacetime**

to unitary Quaternionic Spacetime, thus ending the Inflation Era,

the Spacetime of the hyperfinite AQFT is (4+4)-dim $M_4 \times \text{CP}^2$ Kaluza-Klein (Real Form E8(-24))

**The E8 contained in Cl(0,16) is not a conventional Gauge Group
but
is a Recipe for a Realistic Physics Lagrangian:**

Fermion Terms:

E8 / D8 = 128-dim = 8-dim Spacetime Components of 8 Fermion Particles
+
8-dim Spacetime Components of 8 Fermion AntiParticles

Spacetime Base Manifold Terms:

D8 / D4 x D4 = 64-dim = 8-dim Spacetime Position x 8-dim Spacetime Momentum

Gauge Boson and Ghost Terms:

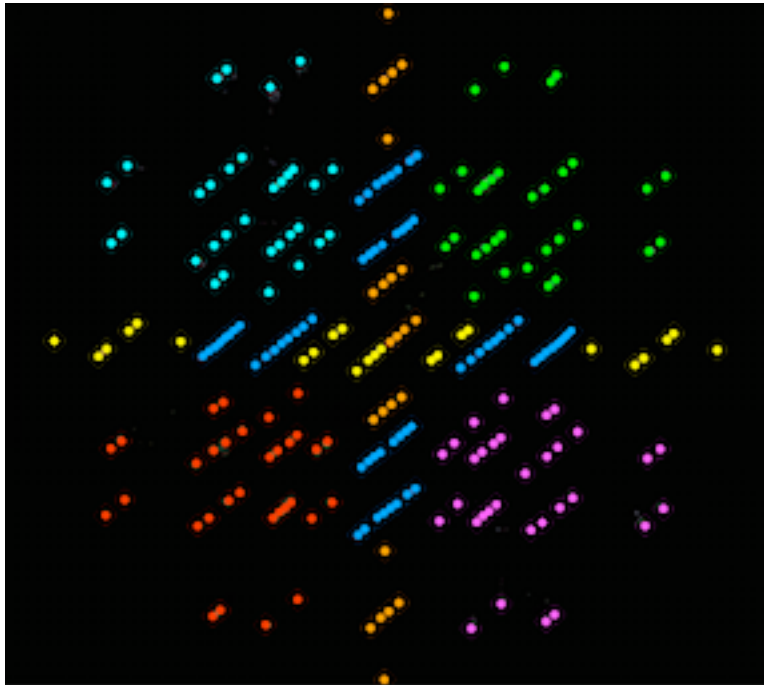
The two 28-dim D4 correspond to the M4 and CP2 of M4 x CP2 Kaluza-Klein

D4_M4 = 16-dim U(2,2) containing SU(2,2) = Spin(2,4) Conformal Gravity
and 12 Standard Model Ghosts

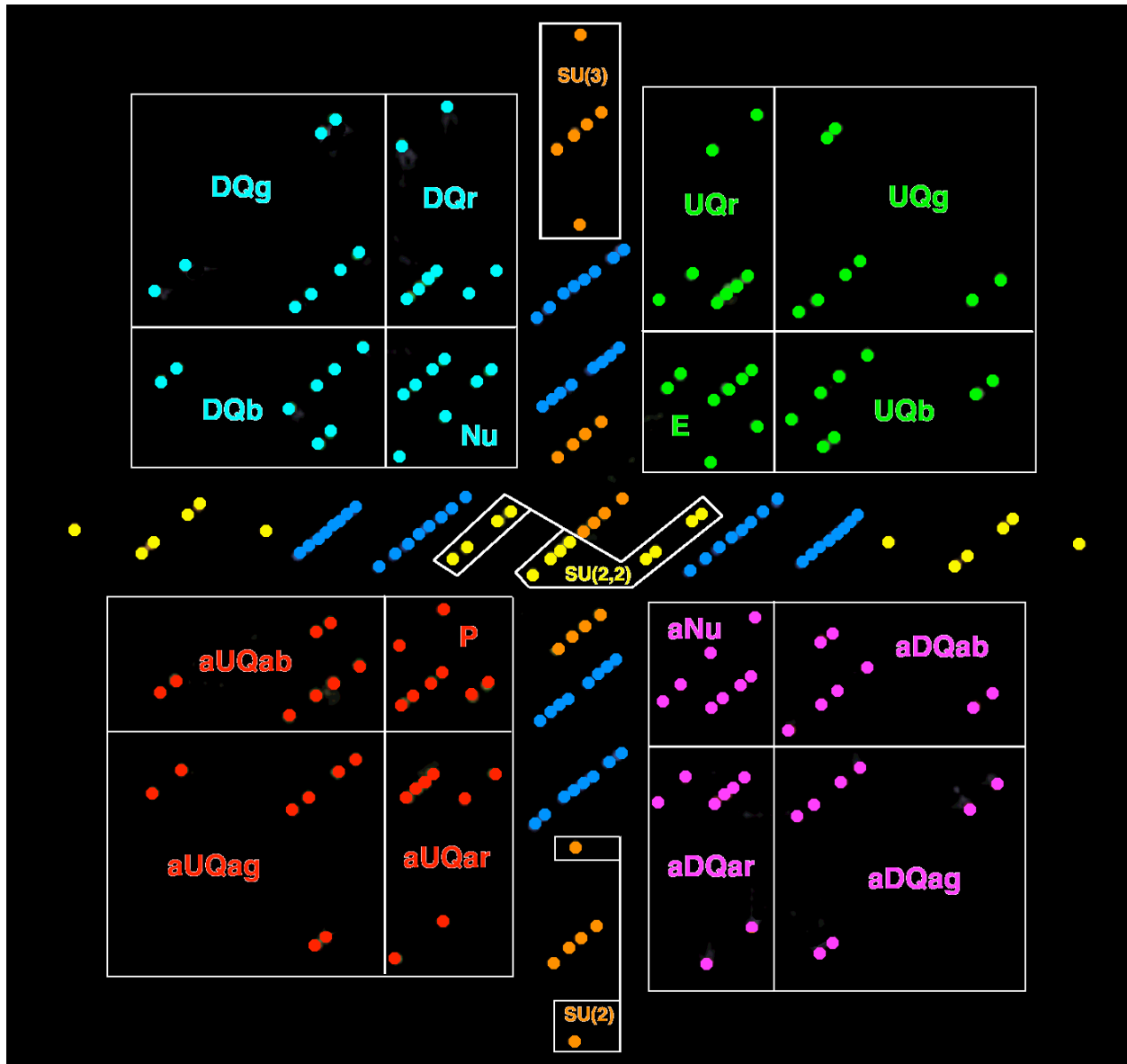
D4_CP2 = 8-dim SU(3) Color Force plus 4 Translation Gravity Ghosts
and 12 Conformal Gravity Ghosts

Electroweak SU(2) x U(1) come from Little Group of CP2 = SU(3) / SU(2) x U(1)
(Batakis, Class. Quantum Grav.3 (1986) L99-L105)

This E8 Structure can be seen in terms of its 240 Root Vectors



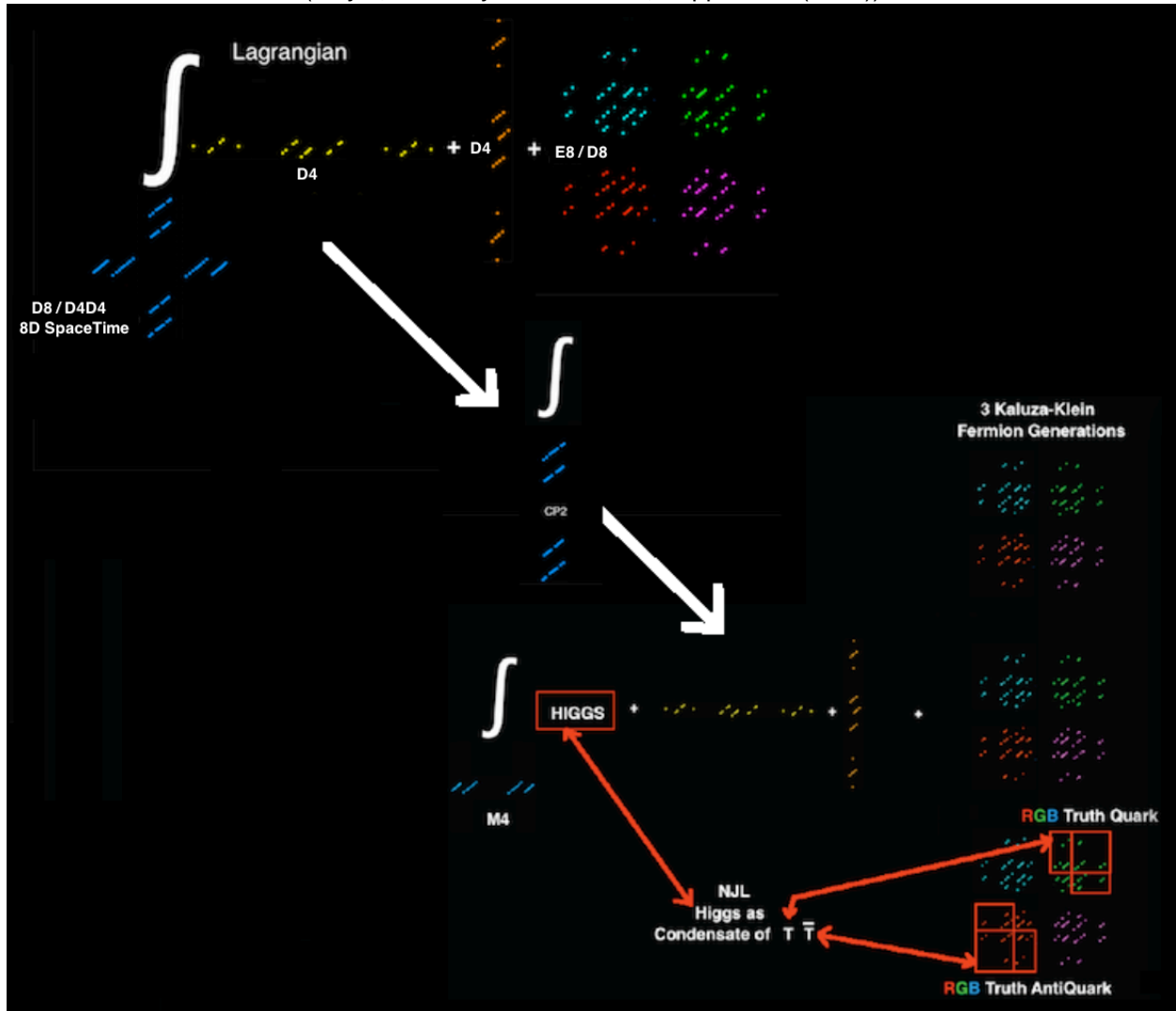
each of which has a realistic Physics Interpretation:



E = electron, UQr = red up quark, UQg = green up quark, UQb = blue up quark
 Nu = neutrino, DQr = red down quark, DQg = green down quark, DQb = blue down quark
 P = positron, aUQar = anti-red up antiquark,
 aUQag = anti-green up antiquark, aUQab = anti-blue up antiquark
 aNu = antineutrino, aDQar = anti-red down antiquark,
 aDQag = anti-green down antiquark, aDQab = anti-blue down antiquark

Each Lepton and Quark has 8 components with respect to 4+4 dim Kaluza-Klein
 6 orange SU(3) and 2 orange SU(2) represent Standard Model root vectors
 24-6-2 = 16 orange represent U(2,2) Conformal Gravity Ghosts
 12 yellow SU(2,2) represent Conformal Gravity SU(2,2) root vectors
 24-12 = 12 yellow represent Standard Model Ghosts
 32+32 = 64 blue represent 4+4 dim Kaluza-Klein M4 x CP2 Spacetime Base Manifold
 32 for M4 position x 8 momentum and 32 for CP2 position x 8 momentum

Higgs and Second and Third Generation Fermions emerge from breaking Octonionic Symmetry of the Inflation Era to Quaternionic Symmetry of Present Era.
(Mayer, Acta Physica Austriaca, Suppl. XXIII (1981))



The Higgs is a Condensate of Tquark and Tanti-quark resulting in 3 mass states for the Higgs and the Tquark
(Smith, viXra 1701.0496)

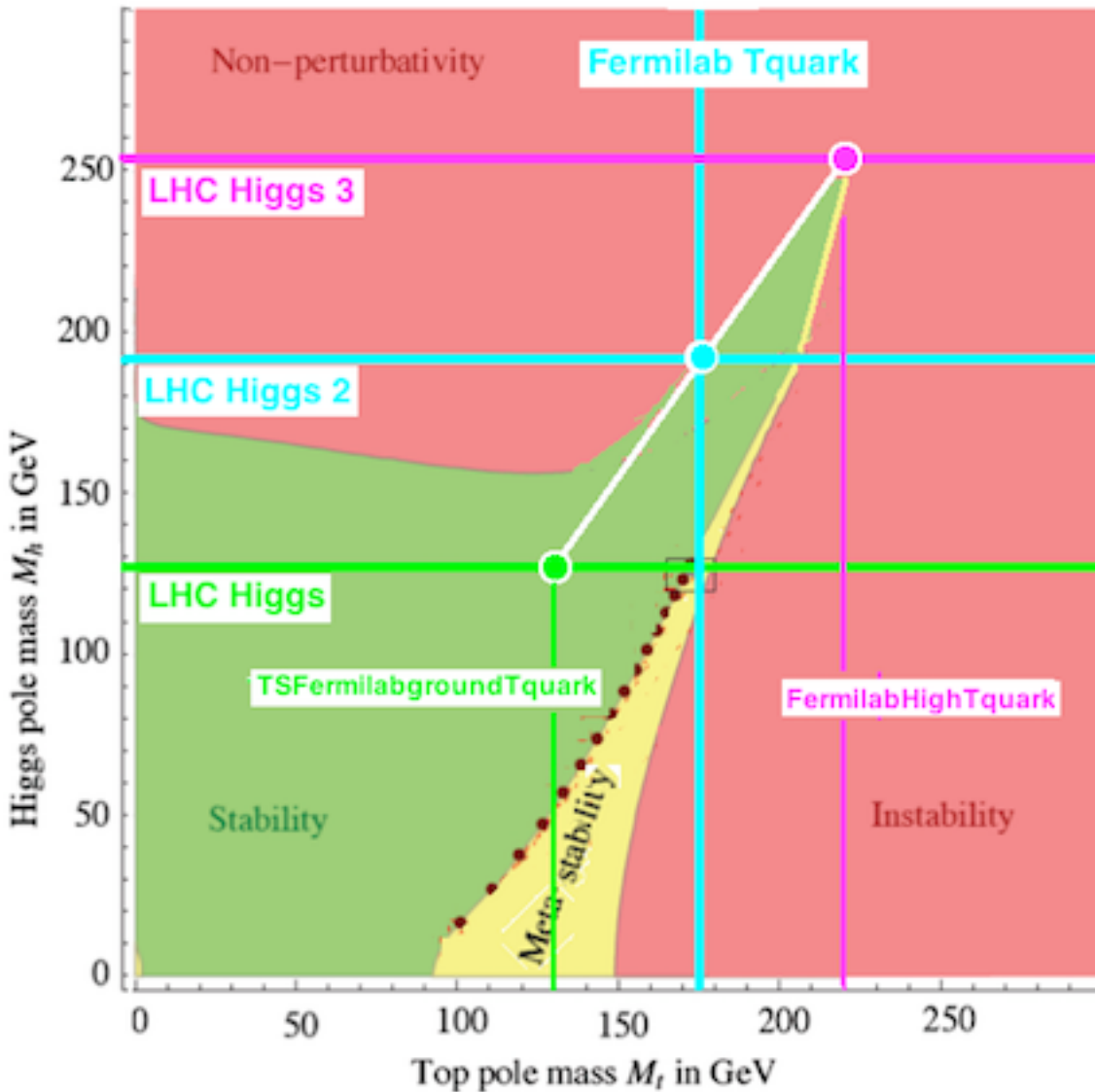
As to the unconventional mass states other than 125 GeV Higgs and 174 GeV Tquark: **ATLAS**, for the Full 2016 36.1 fb-1 of 2016 data in the Higgs -> ZZ* -> 4l channel, on 5 July 2017 released ATLAS-CONF-2017-058 saying:

“... A search for heavy resonances ...[in the Higgs -> ZZ* -> 4l channel]... uses proton–proton collision data at a centre-of-mass energy of 13 TeV corresponding to an integrated luminosity of 36.1 fb-1 collected with the ATLAS detector during 2015 and 2016 at the Large Hadron Collider ...

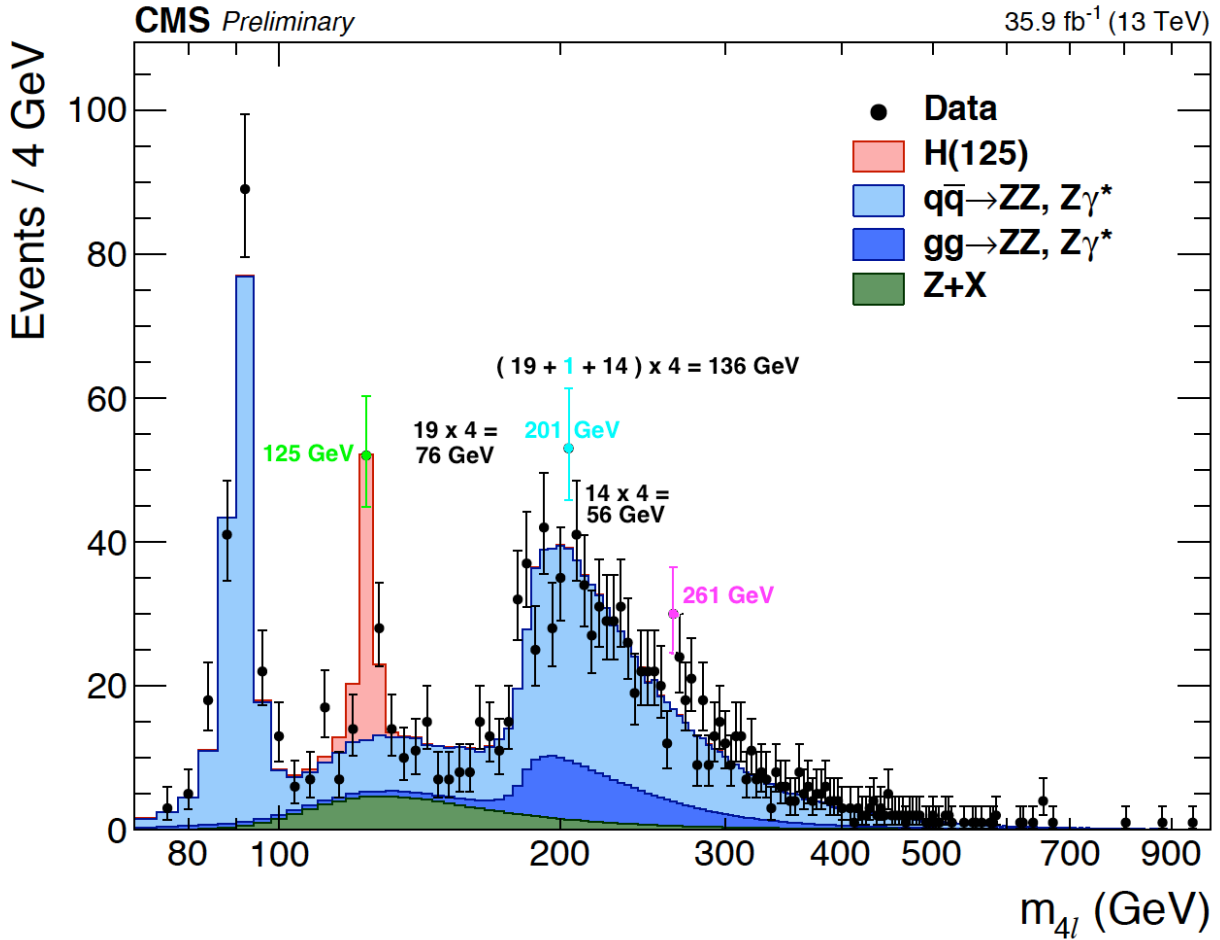
excess ...[is]... observed in the data for m4l around 240 ... GeV ... with a local significance of 3.6 sigma ...”.

It will be interesting to see whether the 2017 ATLAS data of over 45 fb-1 will confirm or refute the excess at 240 GeV as a Higgs mass state.

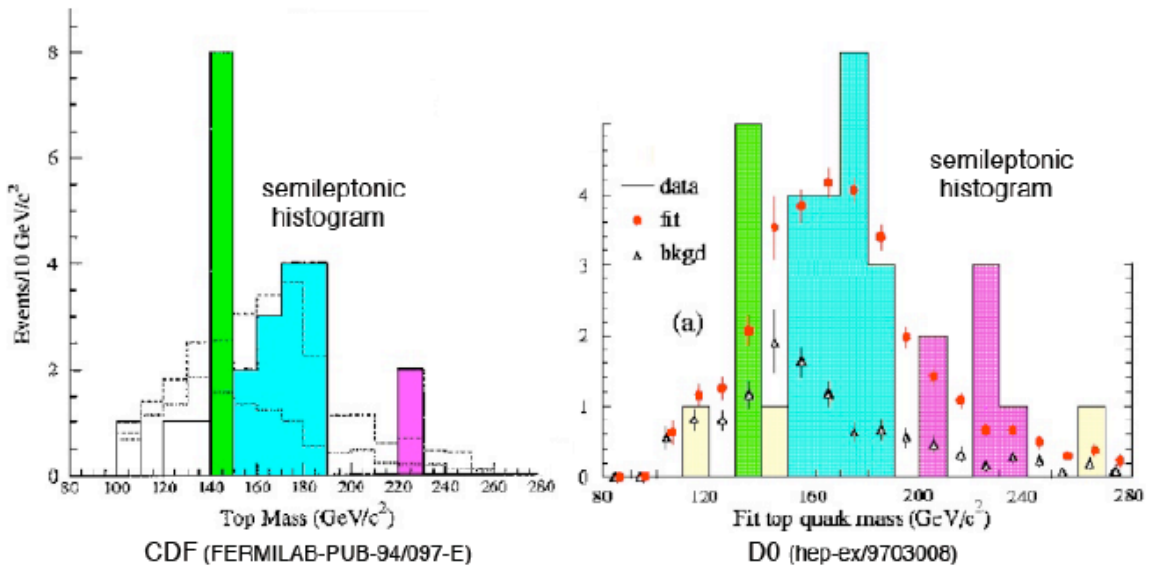
Here is a chart showing the 3 Mass States for Higgs and Tquark (viXra 1701.0496):
green dot in the Stable region (green) has 125 GeV Higgs and 130 GeV Tquark
cyan dot on the Non-perturbativity Boundary has 190 GeV Higgs and 174 GeV Tquark
magenta dot at the Critical Point has 250 GeV Higgs and 220 GeV Tquark



CMS, for their Full 35.9 fb⁻¹ of 2016 data in the Higgs → ZZ* → 4l channel, in CMS-PAS-HIG-16-041 has bins of 4 GeV width and shows all 3 Higgs mass states:
low-mass Higgs state (green) with mass 125 GeV
middle-mass Higgs state (cyan) with mass 201 GeV (close to 190 GeV)
high-mass Higgs state (magenta) with mass 261 GeV (close to 240 and 250 GeV)



Semileptonic histograms of CDF and D0 show all 3 Truth Quark Mass States



low-mass Tquark state (green) with mass 130 GeV
 middle-mass Tquark state (cyan) with mass 174 GeV
 high-mass Tquark state (magenta) with mass 220 GeV

The Completion of Union of All Tensor Products of $Cl(1,25)$ = hyperfinite AQFT

(Smith, viXra 1701.0495)

containing the Realistic Physics of the Lagrangian.

It also contains, due to its $Cl(1,25)$ components,
the structure of 26-dim String Theory

in which Strings are seen as Particle World-Lines,

the massless spin 2 state is the carrier of the Bohm Quantum Potential, and
the $SO(24)$ little group is related to the Monster automorphism group
that is the symmetry of each cell of Planck-scale local lattice structure.

(Green, Schwartz, and Witten, "Superstring Theory" vol. 1)

10-dim String Spacetime is Kaluza-Klein 6-dim Conformal x 4-dim CP^2 giving $M^4 \times CP^2$

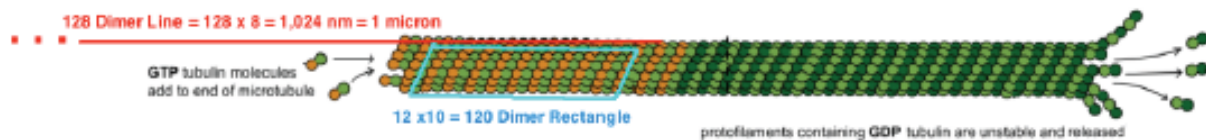
8-dim K-K Classical Lagrangian Spacetime as an NJL condensate of Dixon's

64-dim Particle spinor $T = RxCxHxO$ and the 64-dim AntiParticle spinor $Tbar$

Each cell of E8 Classical Lagrangian Spacetime corresponds to 65,536-dim $Cl(16)$

which contains 248-dim $E_8 = 120$ -dim D8 bivectors +128-dim D8 half-spinors

Human Brain Microtubules 40 microns long have 65,536 Tubulin Dimers



(image adapted from 12biophys.blogspot.com Lecture 11)

and so can have Bohm Quantum Resonance with $Cl(16)$ Spacetime cells

so that the State of Consciousness of a Human is in exact resonant

correspondence with a subset of the cells of E8 Classical Lagrangian Spacetime

Therefore E8 Classical Lagrangian Spacetime NJL Condensate is effectively the
Spirit World in which the Human States of Consciousness = Souls exist.

What happens to a Fundamental Fermion Particle whose World-Line string intersects a Single Cell ?

The Fundamental Fermion Particle does not remain a single Planck-scale entity.

Tachyons create clouds of particles/antiparticles.

(Schroer, hep-th/9908021)

The Fundamental Fermion Cloud looks like a Kerr-Newman Black Hole.

(Arcos and Pereira, hep-th/0210103)

What is the size of the Fundamental Fermion Kerr-Newman Cloud ?

The Cloud is one Planck-scale Fundamental Fermion Valence Particle plus
an effectively neutral cloud of particle/antiparticle pairs. The symmetry of the cloud
is governed by the 24-dimensional Leech lattice by which the Single Cell was formed.

According to the ATLAS at brauer.maths.qmul.ac.uk/Atlas/v3/spor/M/

the maximal subgroup of the Monster M involving Co_1 is $2^{(1+24)}.Co_1$ of order

$139511839126336328171520000 = 1.4 \times 10^{26}$ As $2.Co_1$ is the Automorphism group

of the Leech Lattice modulo to which the Single Cell was formed,

and as the 26-dim String Theory Leech Lattice is a superposition of 8 Leech Lattices,

$8 \times 2^{(1+24)}.Co_1$ describes the structure of the Cloud. Therefore,

the volume of the Cloud should be on the order of 10^{27} x Planck scale containing

10^{27} particle/antiparticle pairs with size $10^{(27/3)} \times 1.6 \times 10^{(-33)} \text{ cm} = 10^{(-24)} \text{ cm}$.

Fundamental Fermion Clouds are Schwinger Sources.

Sources require Linear Operators

“... represented by a definite integral [of a]... kernel ... function ...”.

(Fock, “Fundamental of Quantum Mechanics” (1931))

Kernel Functions for Complex Classical Domains were described by Hua.

(Hua, “Harmonic Analysis of Functions of Several Complex Variables in the Classical Domains” (1958))

Schwinger in 1951 “... introduced a description in terms of Green’s functions, what Feynman had called propagators ... The Green’s functions are vacuum expectation values of time-ordered Heisenberg operators, and the field theory can be defined non-perturbatively in terms of these functions ...[which]... gave deep structural insights into QFTs; in particular ... the structure of the Green's functions when their variables are analytically continued to complex values ...”.

(Schweber, PNAS 102, 7783-7788)

The Classical Domains (complete simply connected Riemannian symmetric spaces) representing 4-dim Spacetime with Quaternionic Structure are:

$S^1 \times S^1 \times S^1 \times S^1 = 4$ copies of $U(1)$

$S^2 \times S^2 = 2$ copies of $SU(2)$

$CP^2 = SU(3) / SU(2) \times U(1)$

$S^4 = Spin(5) / Spin(4) =$ Euclidean version of $Spin(2,3) / Spin(1,3)$

(Wolf, J. Math. Mech 14 (1965) 1033-1047)

Wyler showed how to use Green’s Functions = Kernel Functions of Classical Domain structures characterizing Sources = Leptons, Quarks, and Gauge Bosons, to calculate Particle Masses and Force Strengths

(Wyler, 1971 - C. R. Acad. Sc. Paris, t. 271, 186-188)

“... We introduce a quantitative description of the particle source in terms of a source function ... we do not have to claim that we can make the source arbitrarily small ... the experimenter... must detect the particles ...[by]... collision that annihilates the particle ... the source ... can be ... an abstraction of an annihilation collision, with the source acting negatively, as a sink ... The basic things are ... the source functions ... describing the intermediate propagation of the particle ...”

(Schwinger, 1969 - see physics/0610054)

Schwinger Sources can be described by continuous manifold structures of Bounded Complex Domains and their Shilov Boundaries

and

Wyler’s techniques allow calculation of Particle Masses and Force Strengths

(Smith, viXra 1602.0319)

Results of such calculations are shown in the Technical Endnotes:

Technical Endnotes:

Results of Calculations:

Quark masses are constituent masses. Most of the calculations are tree-level.

Fermions are Schwinger Sources with geometry of Complex Bounded Domains

and Kerr-Newman Black Hole structure size about $10^{(-24)}$ cm.

Since ratios are calculated, values for one particle mass and one force strength are assumed.

Particle/Force	Tree-Level	Higher-Order
e-neutrino	0	0 for nu_1
mu-neutrino	0	$9 \times 10^{(-3)}$ eV for nu_2
tau-neutrino	0	$5.4 \times 10^{(-2)}$ eV for nu_3
electron	0.5110 MeV	
down quark	312.8 MeV	charged pion = 139 MeV
up quark	312.8 MeV	proton = 938.25 MeV
		neutron - proton = 1.1 MeV
muon	104.8 MeV	106.2 MeV
strange quark	625 MeV	
charm quark	2090 MeV	
tauon	1.88 GeV	
beauty quark	5.63 GeV	
truth quark (low state)	130 GeV	(middle state) 174 GeV (high state) 218 GeV
W+	80.326 GeV	
W-	80.326 GeV	
W0	98.379 GeV	Z0 = 91.862 GeV
Mplanck 1.217×10^{19} GeV		
Higgs VEV (assumed)	252.5 GeV	
Higgs (low state)	126 GeV	(middle state) 182 GeV (high state) 239 GeV
Gravity Gg (assumed)	1	
(Gg)(Mproton ² / Mplanck ²)		$5 \times 10^{(-39)}$
EM fine structure	1/137.03608	
Weak Gw	0.2535	
Gw(Mproton ² / (Mw+ ² + Mw- ² + Mz0 ²))		$1.05 \times 10^{(-5)}$
Color Force at 0.245 GeV	0.6286	0.106 at 91 GeV

Kobayashi-Maskawa parameters for W+ and W- processes are:

	d	s	b
u	0.975	0.222	0.00249 -0.00388i
c	-0.222 -0.000161i	0.974 -0.0000365i	0.0423
t	0.00698 -0.00378i	-0.0418 -0.00086i	0.999

The phase angle d13 is taken to be 1 radian.

Dark Energy : Dark Matter : Ordinary Matter = 0.75 : 0.21 : 0.04

References:

Adler, Quaternionic Quantum Mechanics and Quantum Fields (1995), pages 50-52, 561

Arcos and Pereira, hep-th/0210103

Batakis, Class. Quantum Grav.3 (1986) L99-L105

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Finkelstein, Int. J. Theor. Phys. 2017 56 : 2-39

Fock, Fundamental of Quantum Mechanics

Green, Schwartz, and Witten, Superstring Theory vol. 1

Hua, Harmonic Analysis of Functions of Several Complex Variables
in the Classical Domains

Lounesto and Porteous, Lectures on Clifford (Geometric) Algebras and Applications

Mayer, Acta Physica Austriaca, Suppl. XXIII (1981)

Porteous, Clifford Algebras and the Classical Groups

Schroer, hep-th/9908021

Schweber, PNAS 102, 7783-7788

Schwinger, 1969 - see physics/0610054

Smith, viXra 1602.0319

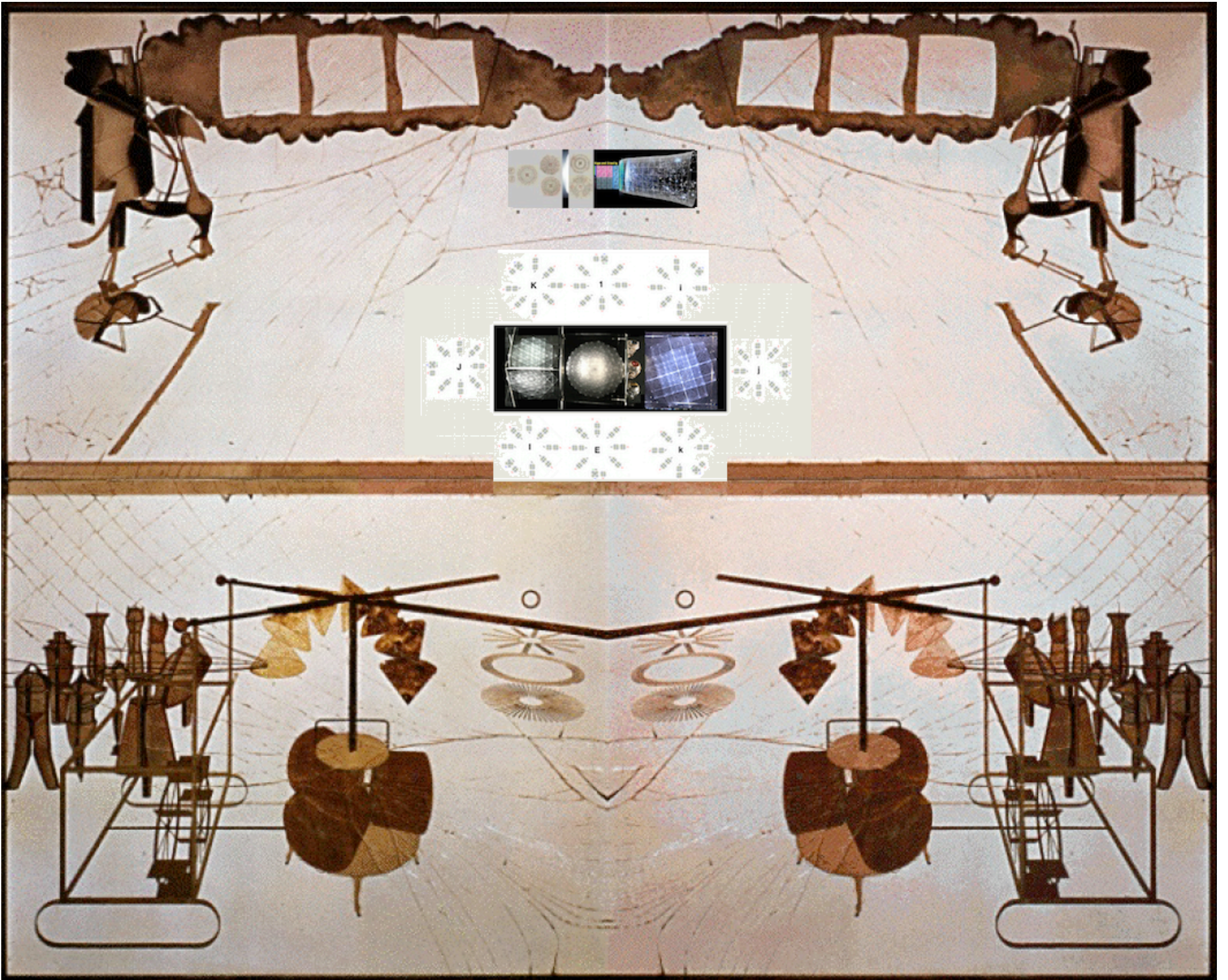
Smith, viXra 1701.0495

Smith, viXra 1701.0496

Smith, viXra 1709.0265

Wolf, J. Math. Mech 14 (1965) 1033-1047

Wyler, 1971 - C. R. Acad. Sc. Paris, t. 271, 186-188

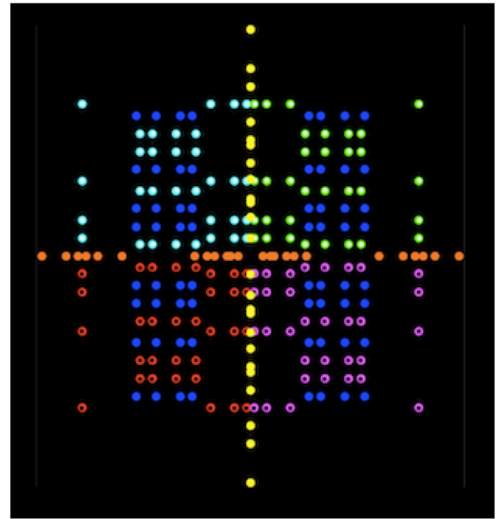
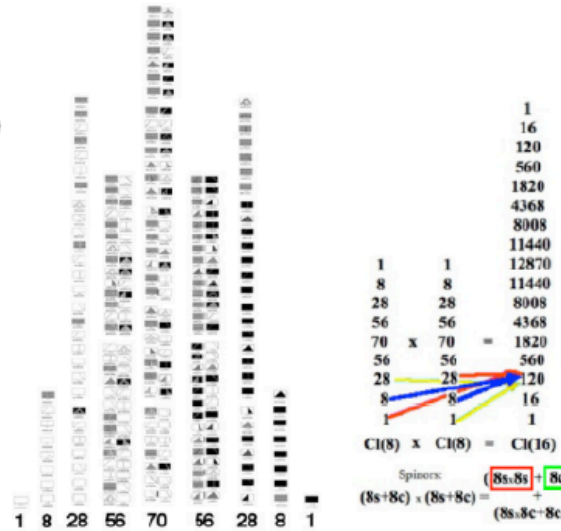
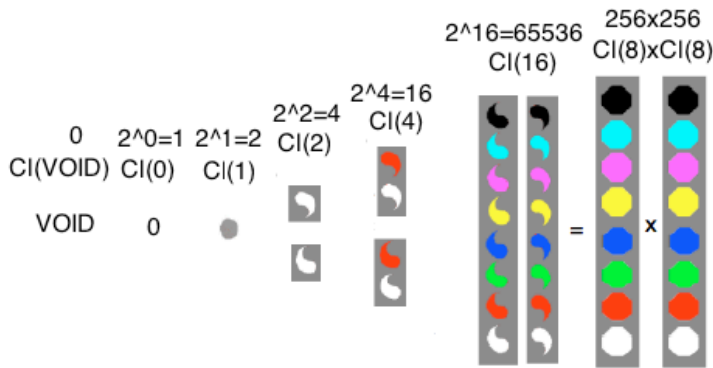


Dimension of Clifford Algebra					
0	$2^0=1$	$2^1=2$	$2^2=4$	$2^4=16$	$2^{16}=65536$
VOID	CI(VOID)	CI(0,0)	CI(0,1)	CI(0,2)	CI(0,4)

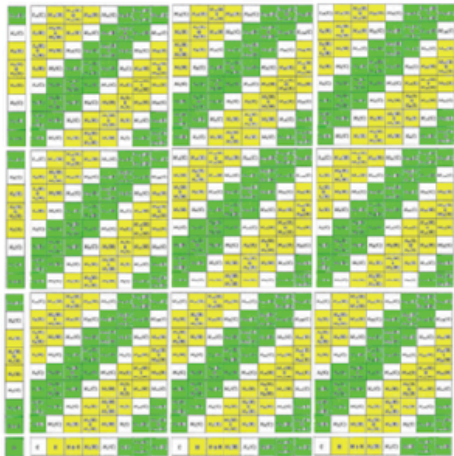
VOID \rightarrow CI(VOID) \rightarrow CI(0,0) \rightarrow CI(0,1) \rightarrow CI(0,2) \rightarrow CI(0,4) \rightarrow CI(0,16) = CI(0,8)xCI(0,8) \rightarrow CI(0,16)xCI(0,8) = CI(0,24) \rightarrow M(2,CI(0,24)) = CI(1,25) \rightarrow

\rightarrow Completion of Union of All Tensor Products of CI(1,25) = hyperfinite AQFT

CI(1,25) = CI(1,9)xCI(0,8)xCI(0,8) and CI(1,9) = CI(1,5) x CI(0,4) = CI(2,4) x CI(0,4)



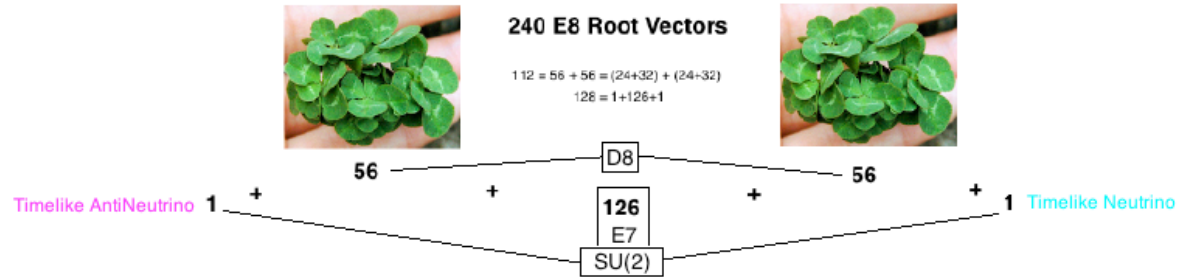
CI(16) contains $120 + 64 + 64 = 248 = E8$ with $112 + 128 = 240$ root vectors



The completion of the union of all tensor products of CI(16) = CI(8)xCI(8) produces a generalized Hyperfinite III von Neumann factor that gives the CI(16)-E8 model a natural Algebraic Quantum Field Theory

The CI(16)-E8 AQFT inherits structure from the CI(16)-E8 Local Lagrangian

The Creation-Annihilation Operator structure of CI(16)-E8 AQFT is given by the Maximal Contraction of E8 = semidirect product A7 x h92 where h92 = $92+1+92 = 185$ -dim Heisenberg algebra and A7 = 63-dim SL(8)



January 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 New Year's Day	2	3	4	5	6
7	8	9	10	11	12	13
14	15 Martin Luther King, Jr. Day	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Lagrangian

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CP2

D8 / D4xD4

D4_{sm}

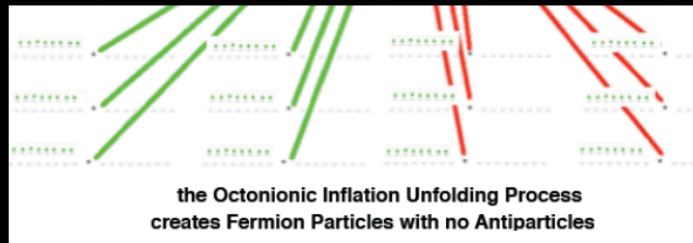
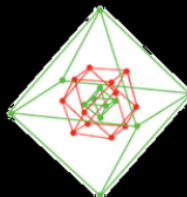
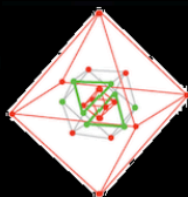
D4_{gde}

E8 / D8

8 x 8
position x momentum

A7+1

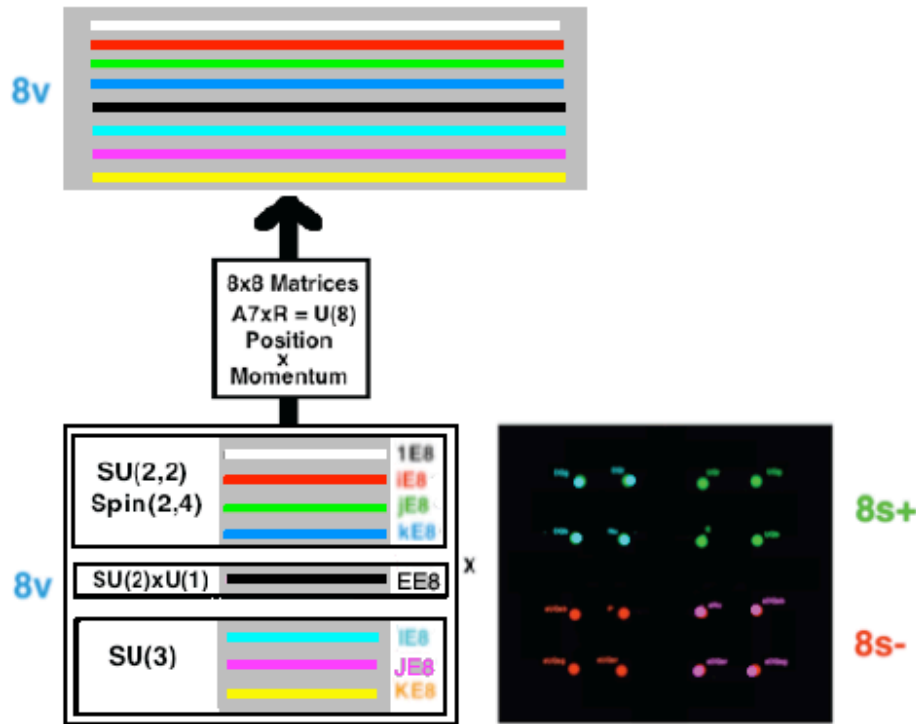
M4



the Octonionic Inflation Unfolding Process
creates Fermion Particles with no Antiparticles

February 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2 Groundhog Day	3
4	5	6	7	8	9	10
11	12 Lincoln's Birthday	13	14 St. Valentine's Day Ash Wednesday	15	16 Chinese New Year	17
18	19 President's Day	20	21	22	23	24
25	26	27	28 Purim			



Indra's Net of Schwinger Sources - Bohm Quantum Blockchain

The Cl(16)-E8 AQFT inherits structure from the Cl(16)-E8 Local Lagrangian

$$\int \text{Standard Model Gauge Gravity} + \text{Fermion Particle-AntiParticle}$$

8-dim SpaceTime

the Cl(16)-E8 model at the Planck Scale has spacetime condensing out of Clifford structures forming a Leech lattice underlying 26-dim String Theory of World-Lines with $8 + 8 + 8 = 24$ -dim of fermion particles and antiparticles and of spacetime.

Slices of 8v SpaceTime are represented as D8 branes. Each D8 brane has Planck-Scale Lattice Structure superpositions of 8 types of E8 Lattice denoted by 1E8, iE8, jE8, kE8, EE8, IE8, JE8, KE8

Stack D8 branes to get SpaceTime with Strings = World-Lines

Let Oct16 = discrete multiplicative group $\{ +/1, +/-i, +/-j, +/-k, +/-E, +/-I, +/-J, +/-K \}$.

Orbifold by Oct16 the 8s+ to get 8 Fermion Particle Types

Orbifold by Oct16 the 8s- to get 8 Fermion AntiParticle Types

Gauge Bosons from 1E8 and EE8 parts of a D8 give U(2) Electroweak Force

Gauge Bosons from IE8, JE8, and KE8 parts of a D8 give SU(3) Color Force

Gauge Bosons from 1E8, iE8, JE8, and kE8 parts of a D8 give U(2,2) Conformal Gravity

The 8x8 matrices for collective coordinates linking one D8 to the next D8 give Position x Momentum

The automorphism group of a single 26-dim String Theory cell modulo the Leech lattice is the Monster Group of order about 8×10^{53} .

When a fermion particle/antiparticle appears Tachyons create a cloud of particles/antiparticles. The cloud is one Planck-scale Fundamental Fermion Valence Particle plus an effectively neutral cloud of particle/antiparticle pairs forming a Kerr-Newman black hole. That cloud constitutes the Schwinger Source.

The Schwinger Sources are finite regions in a Complex Domain spacetime corresponding to Green's functions of particle creation / annihilation.

Its structure comes from the 24-dim Leech lattice part of the Monster Group which is $2^{24}(1+24)$ times the double cover of Co1, for a total order of about 10^{26} .

(Since a Leech lattice is based on copies of an E8 lattice and since there are 7 distinct E8 integral domain lattices there are 7 (or 8 if you include a non-integral domain E8 lattice) distinct Leech lattices. The physical Leech lattice is a superposition of them, effectively adding a factor of 8 to the order.)

The volume of the Kerr-Newman Cloud is on the order of 10^{27} x Planck scale, = roughly $10^{(-24)}$ cm.

March 2018

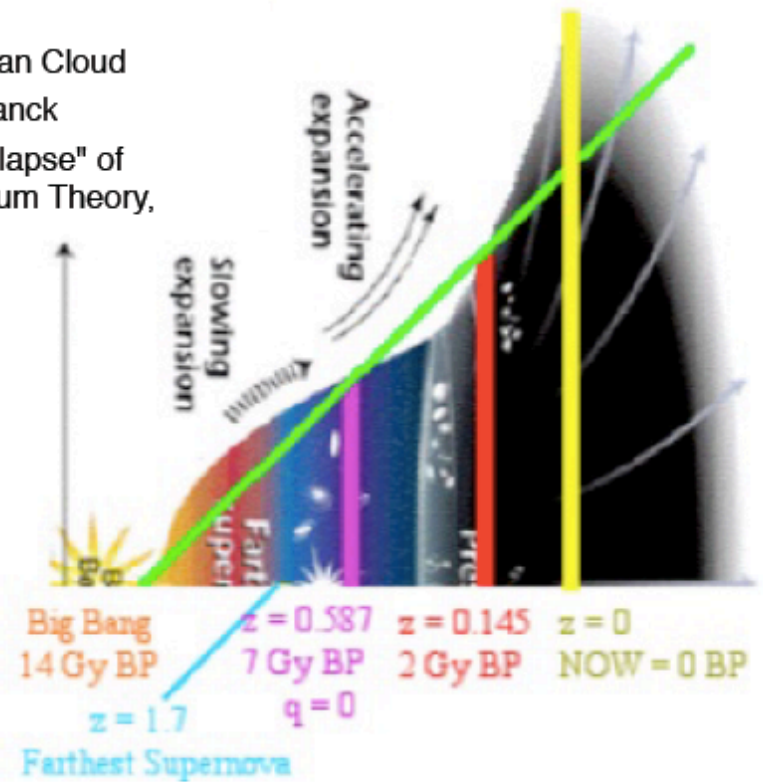
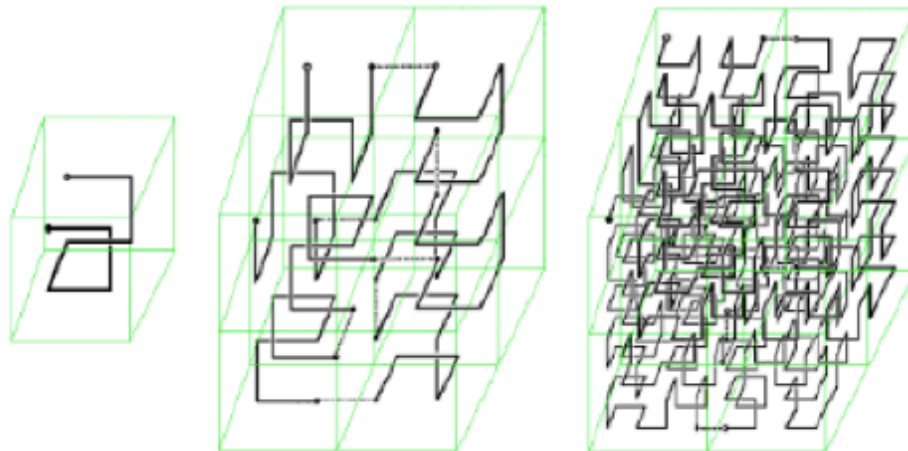
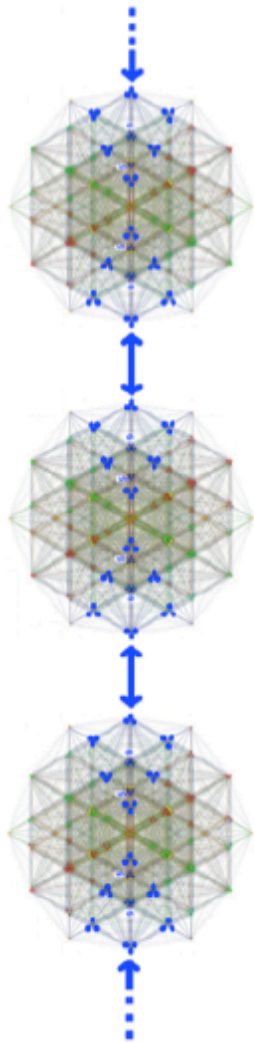
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	6	7	8	9	10
11 Daylight Savings Begins	12	13	14	15	16	17 St. Patrick's Day
18	19	20 Spring Begins	21	22	23	24
25 Palm Sunday	26	27	28	29	30 Passover	31

Big Bang E8(-248) : Spin(16) | Octonion Inflation E8(8) : SO(8,8) | Quaternion Conformal Evolution E8(-24) : SO*(16)

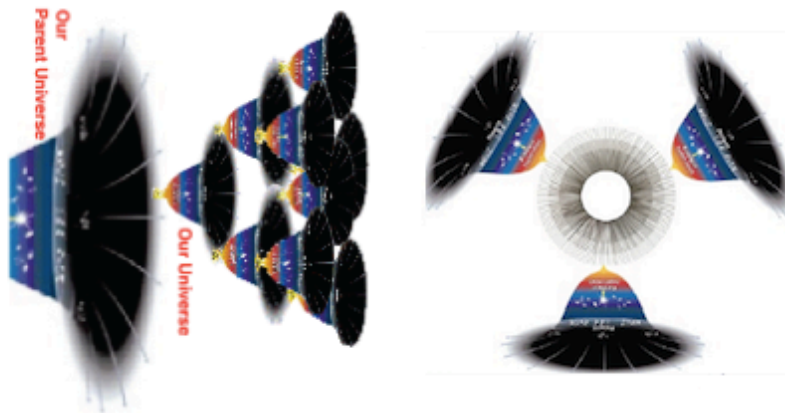
At the end of Non-Unitary Octonionic Inflation Our Universe had about $(1/2) 16^{64} = (1/2) (2^4)^{64} = 2^{255} = 6 \times 10^{76}$ Fermion Particles
 the size of our Universe was then about $10^{(-24)}$ cm
 which is about the size of a Fermion Schwinger Source Kerr-Newman Cloud

The End of Inflation time was at about $10^{(-34)}$ sec = 2^{64} Tplanck

The Zizzi Inflation phase of our universe ends with decoherence "collapse" of the 2^{64} Superposition Inflated Universe into Many Worlds of Quantum Theory,



The ratio Dark Energy : Dark Matter : Ordinary Matter for our Universe at the present time is calculated to be:
 $0.75 : 0.21 : 0.04$



Paola Zizzi in gr-qc/0007006:

"... The self-reduction of the superposed quantum state ... corresponds to a superposed state of ... [$10^{19} = 2^{64}$ qubits] ... also the number of superposed tubulins-qubits in our brain ... leading to a conscious event. ..."

April 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 April Fool's Day Easter Sunday	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22 Earth Day	23	24	25	26	27	28
29	30					

CONFORMAL KEPLER

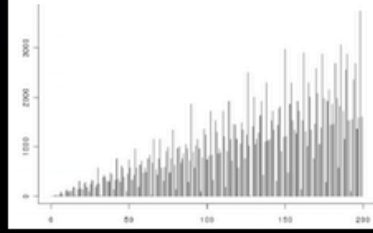
MERCURY
 0.39 AU
 Octahedron
 1 : $\sqrt{3}$
 1 : 1.7321

VENUS
 0.72 AU
 Icosahedron
 1 : $\sqrt{15-6\sqrt{5}}$
 1 : 1.2584

EARTH
 1 AU
 Dodecahedron
 1 : 1.2584

MOON
 1 AU
 Dodecahedron
 1 : 1.2584

MARS
 1.52 AU
 Dodecahedron
 1 : 1.2584



JUPITER
 5.20 AU
 Tetrahedron
 1 : 3
 SelfDual

SATURN
 9.54 AU
 Cube
 1 : $\sqrt{3}$
 1 : 1.7321

Neptune
 30.06 AU
 Rhombic Dodecahedron
 1 : $\sqrt{2}$
 1 : 1.4142
 (square face inscribed radius)

Uranus
 19.19 AU
 Cuboctahedron
 D₃ Root Vectors
 Conformal SU(2,2) = Spin(2,4)

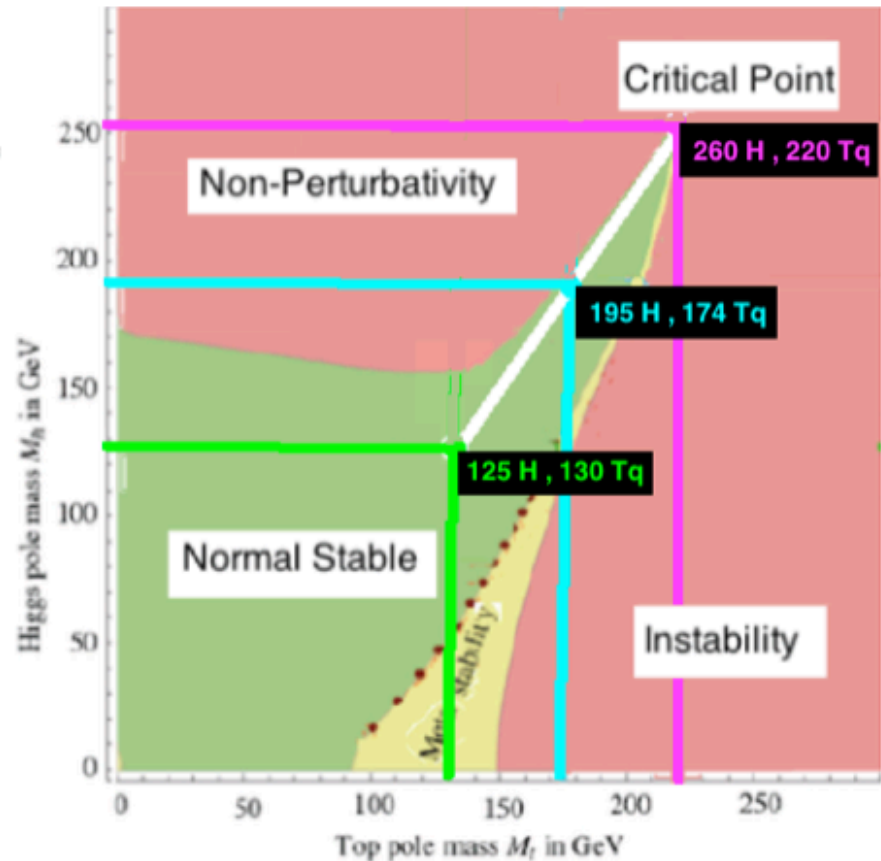
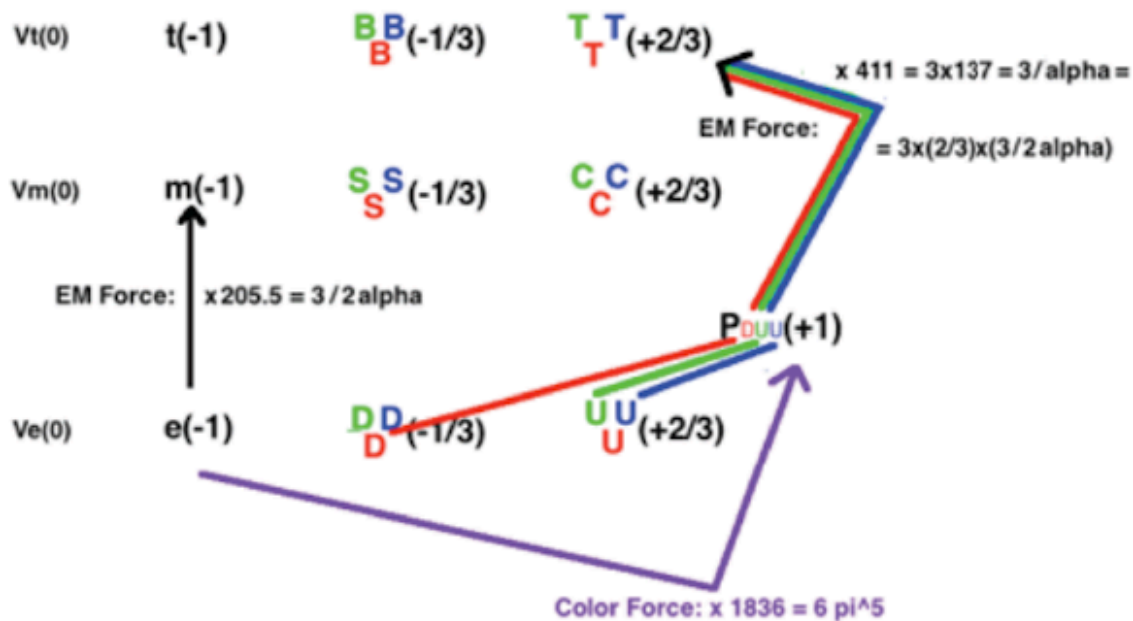
Pioneer Anomaly
 20 AU
 Rhombic Dodecahedron
 1 : $\sqrt{2}$
 1 : 1.4142



Cuboctahedron and Rhombic Dodecahedron
 are 3-dim central figures of the 4-dim 24-cell

May 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 May Day	2	3	4	5 Cinco de Mayo
6	7	8	9	10	11	12
13 Mother's Day	14	15	16	17	18	19 Shavuot Begins Sundown
20	21 Victoria Day	22	23	24	25	26
27	28 Memorial Day	29	30	31		



The Schwinger Sources are finite regions in a Complex Domain spacetime corresponding to Green's functions of particle creation / annihilation.

The force strength of a given force is

$$\left(\frac{1}{M_{\text{force}}^2} \right) \left(\text{Vol}(\text{MIS}_{\text{force}}) \right) \left(\frac{\text{Vol}(\text{Q}_{\text{force}})}{\text{Vol}(\text{D}_{\text{force}})} \right)^{\left(\frac{1}{m_{\text{force}}} \right)}$$

M_{force} represents the effective mass;

m_{force} is 4 for Gravity and Color force, 2 for Weak force 1 for Electromagnetism

$\text{Vol}(\text{D}_{\text{force}})^{\left(\frac{1}{m_{\text{force}}} \right)}$ is to reconcile

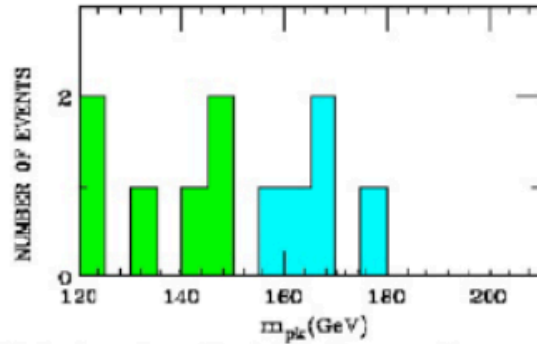
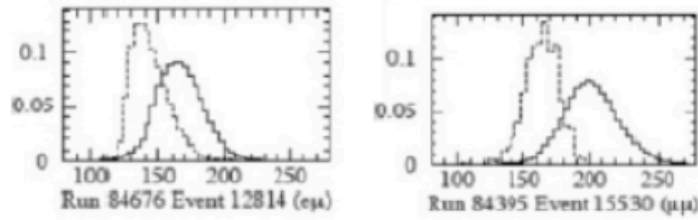
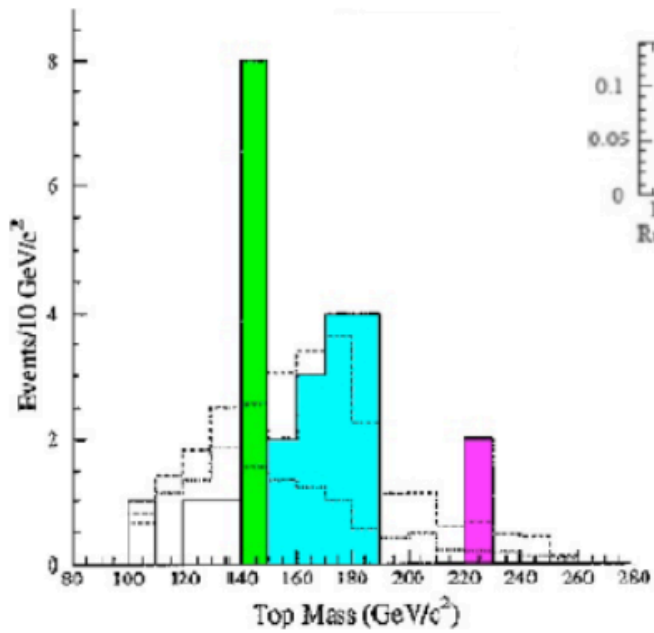
the dimensionality of the Internal Symmetry Space of the target vertex

with the dimensionality of the link from the origin to the target vertex

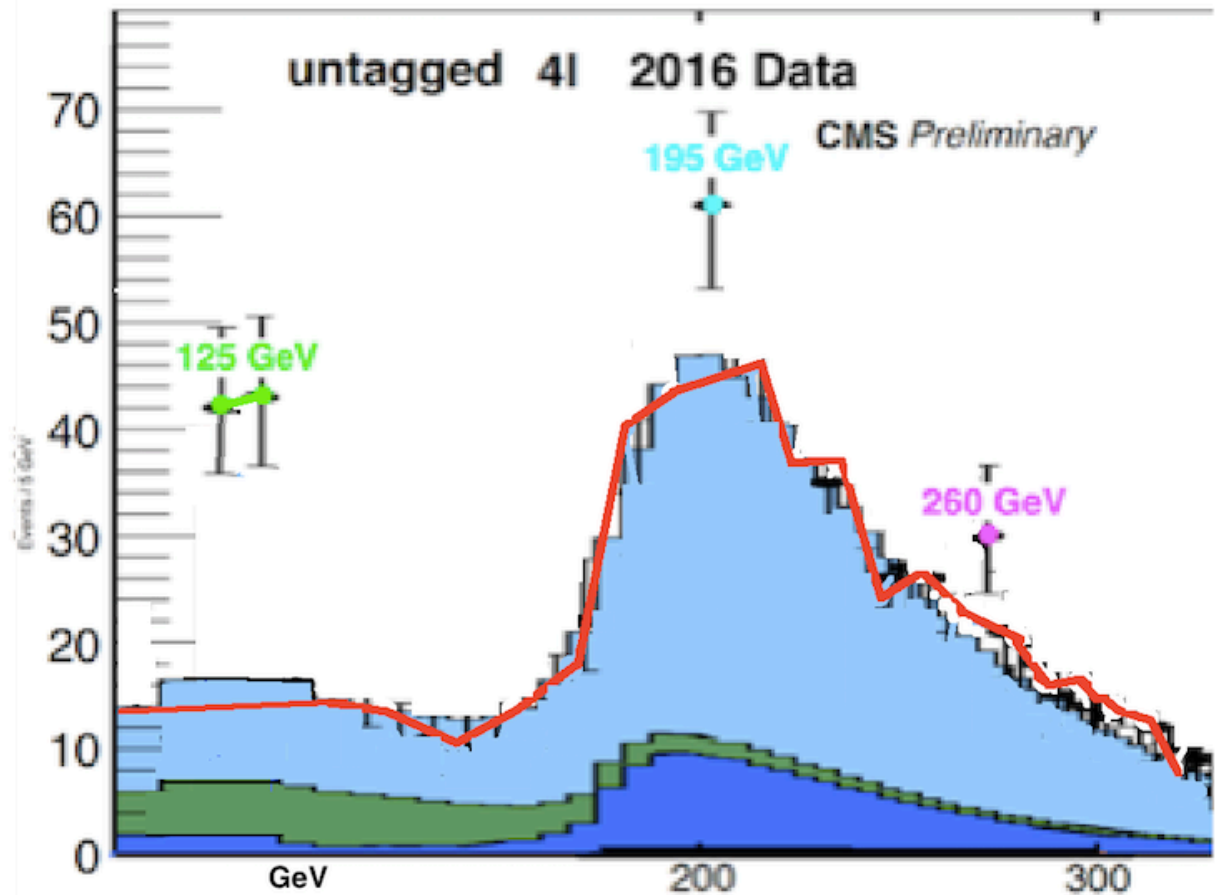
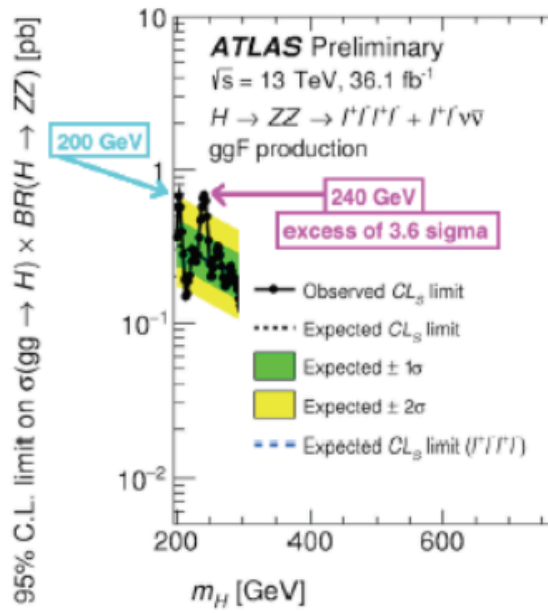
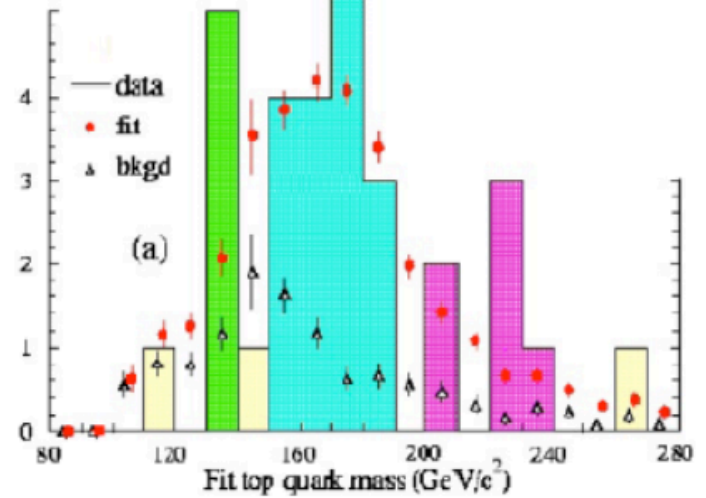
Force	M	Vol(M)	Group	SymSpace	D	Vol(D)	Q	Vol(Q)
gravity	S^4	$8\pi^2/3$	Spin(5)	Spin(7) / Spin(5)xU(1)	IV5	$\pi^5/2^4 5!$	$RP^1 \times S^4$	$8\pi^3/3$
color	CP^2	$8\pi^2/3$	SU(3)	SU(4) / SU(3)xU(1)	$B^6(\text{ball})$	$\pi^3/6$	S^5	$4\pi^3$
Weak	$S^2 \times S^2$	$2 \times 4\pi$	SU(2)	Spin(5) / SU(2)xU(1)	IV3	$\pi^3/24$	$RP^1 \times S^2$	$4\pi^2$
e-mag	T^4	$4 \times 2\pi$	U(1)	-	-	-	-	-

June 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14 Flag Day	15	16
17 Father's Day	18	19	20	21 Summer Begins	22	23
24	25	26	27	28	29	30



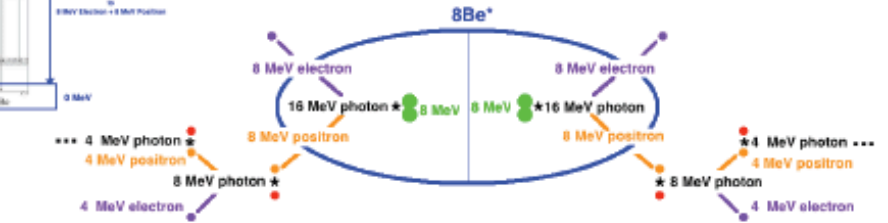
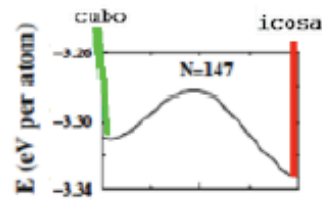
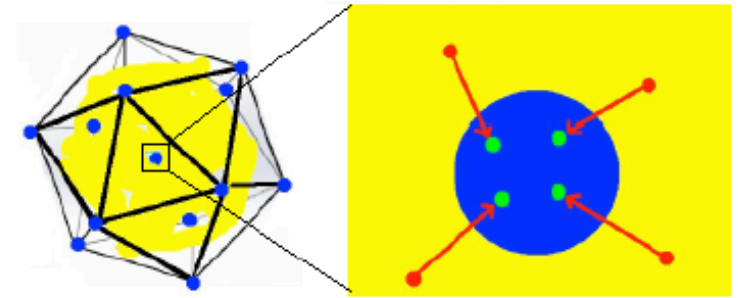
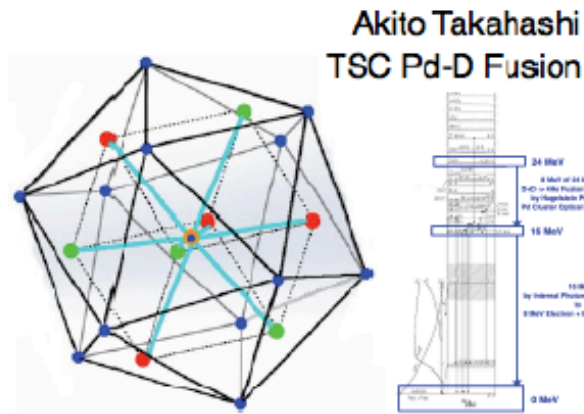
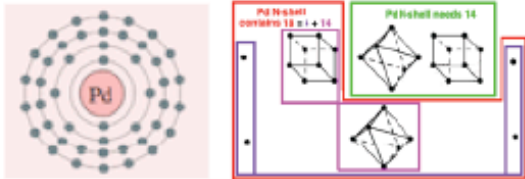
The distribution of $m_{\mu\mu}$ values determined from 11 CPD dilepton events



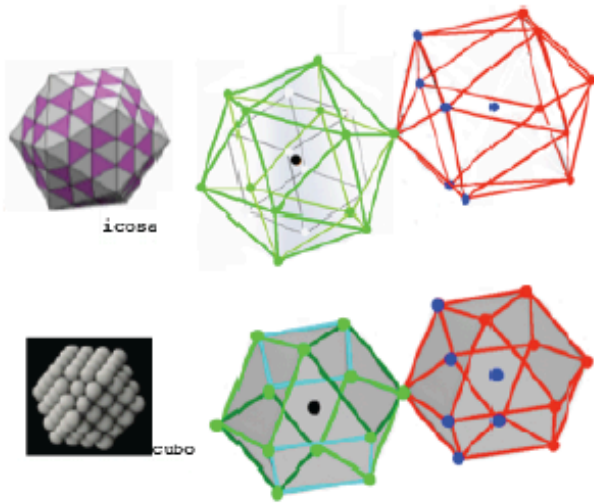
July 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1 Canada Day	2	3	4 Independence Day	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

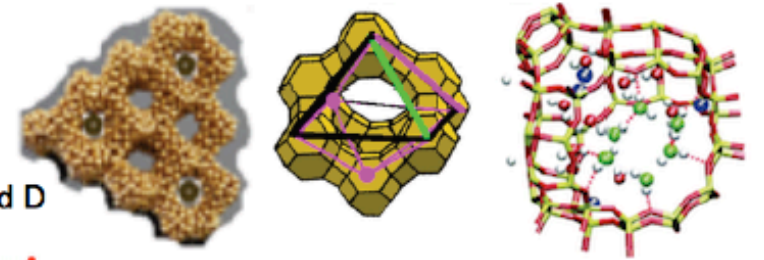
Schwinger Pd-D Zeolite Quantum Fusion Process:



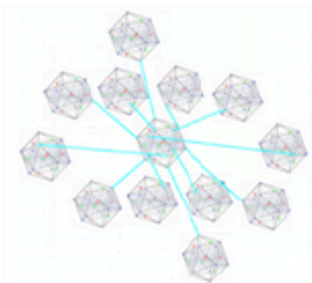
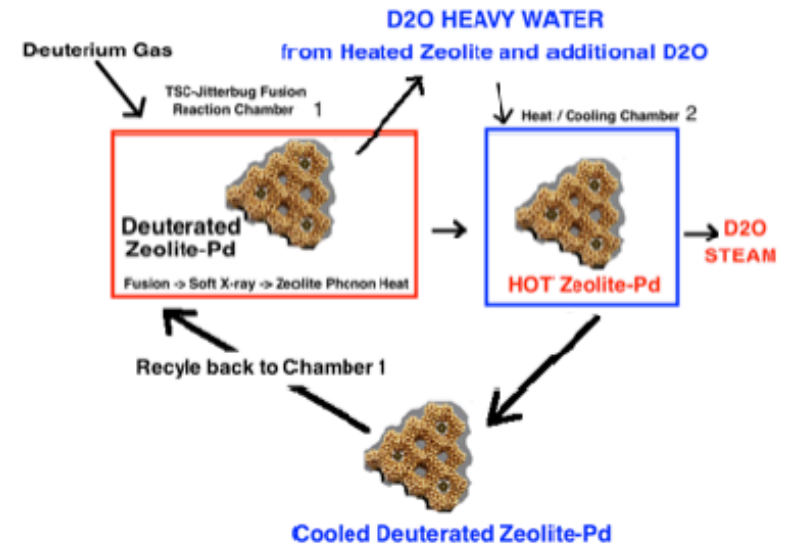
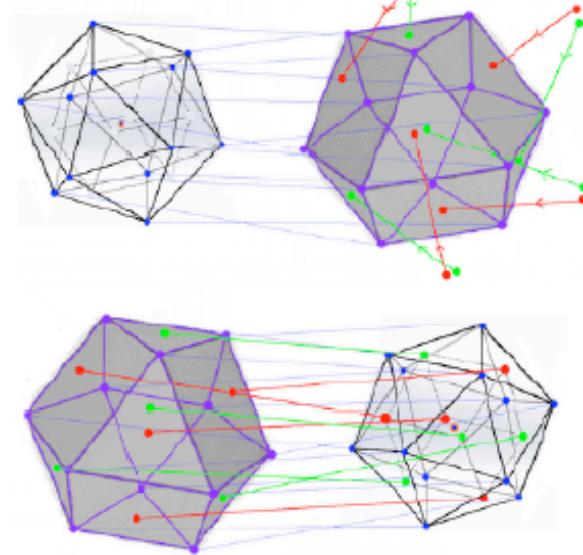
Sandia-UNM 147-atom Pd Clusters



Peter Hagelstein Nuclear Energy to Pd Structure to Zeolite



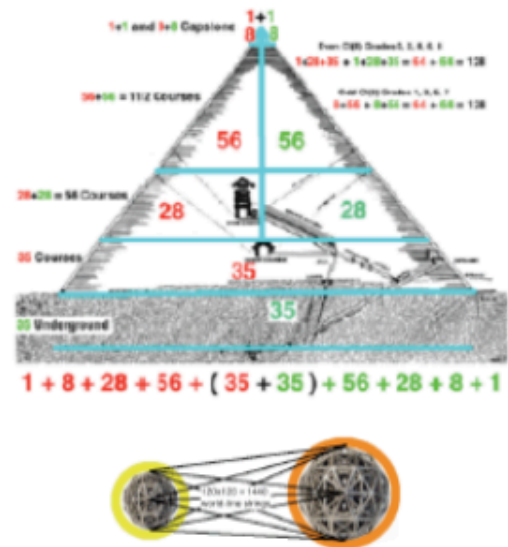
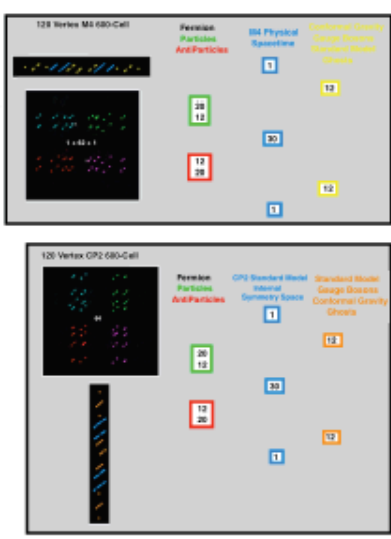
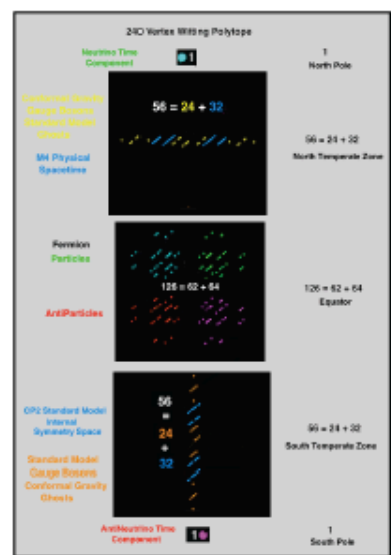
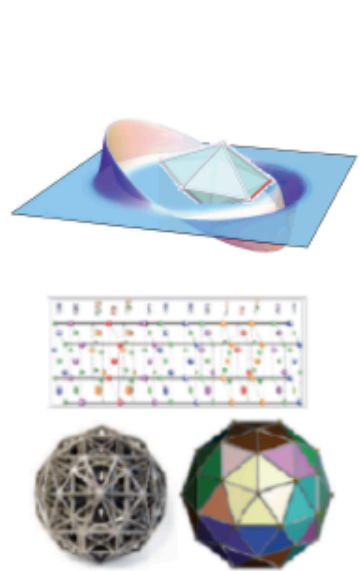
Klee Irwin Jitterbug Eject He and Reload D



August 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

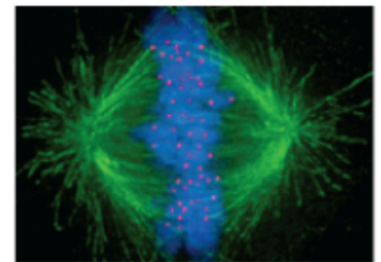
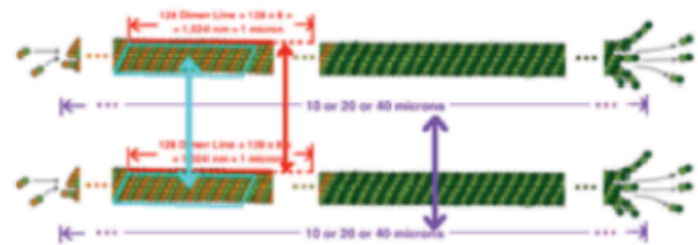
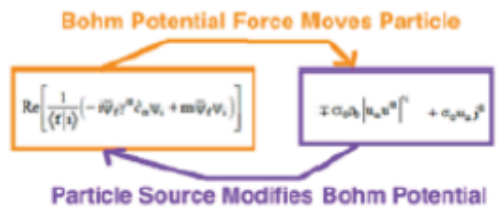
Each QRC State, analogous to a Possible Conscious Thought, is represented by a Chain of Local EB-CI(16) Multiverse Snapshots
 Each of the Local EB-CI(16) Multiverse Snapshot is described by an EB State. Since EB has 240 Root Vectors (and the 240 Root Vectors correspond to the 240-Polytope (see "Geometric Frustration" by Sadoc and Mosseri (Cambridge 2006) where they say "The polytope 240 ...[s]... not a regular polytope ... but ... an ordered structure on a hypersphere ... S3 ... which is chiral ... generated by adding two replicas of the (3,3,5), displaced along a screw axis of S3 ...")
 each Local EB-CI(10) Multiverse Snapshot is represented by a pair of (3,3,5) 000-cells.



Green, Schwartz, and Witten say in their book "Superstring Theory" vol. 1 (Cambridge 1986) "... For the ... closed ... bosonic string ... The first excited level ... consists of ... the ground state ... tachyon ... and ... a scalar ... 'dilaton' ... and ... SO(24) ... little group of a ... [26-dim] ... massless particle ... and ... a ... massless ... spin two state ...".
 Closed string tachyons localized at orbifolds of fermions produce virtual clouds of particles / antiparticles that dress fermions.
 Dilatons are Goldstone bosons of spontaneously broken scale invariance that (analogous to Higgs) go from mediating a long-range scalar gravity-type force to the nonlocality of the Bohm-Sarfatti Quantum Potential.
 The SO(24) little group is related to the Monster automorphism group that is the symmetry of each coil of Planck scale local lattice structure.
 The massless spin two state is the carrier of the Bohm-Sarfatti Quantum Potential.
 Peter R. Holland says in his book "The Quantum Theory of Motion" (Cambridge 1993) "... the total force ... from the quantum potential ... does not ... fall off with distance ... because ... the quantum potential ... depends on the form of ... [the quantum state] ... rather than ... its ... magnitude ...".

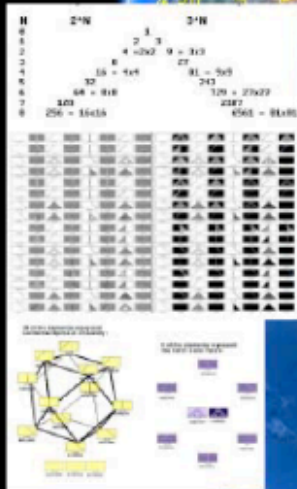
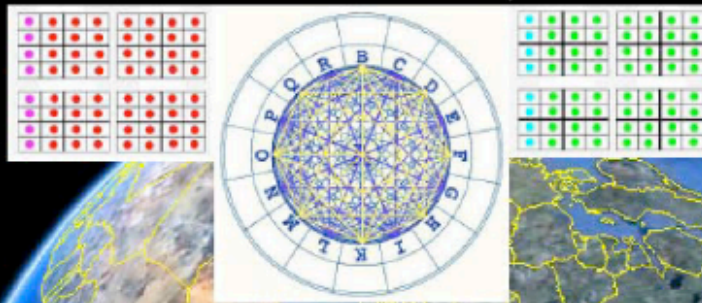
First consider Superposition of States involving one tubulin with one electron of mass m and two different position states separated by a .
 The Superposition Separation Difference is the gravitational energy $E_{\text{electron}} = G m^2 / a$
 For any single given tubulin $a = 1 \text{ nanometer} = 10^{-7} \text{ cm}$ so that for a single Electron $T = h / E_{\text{electron}} = (\text{Compton} / \text{Schwarzschild}) (a / c) = 10^{-26} \text{ sec} = 10^{-19} \text{ years}$
 Now consider the case of N Tubulin Electrons in Coherent Superposition Jack Sarfatti defines coherence length L by $L^3 = N a^3$ so that the Superposition Energy E_N of N superposed Conformation Electrons is $E_N = G M^2 / L = N^{5/3} E_{\text{electron}}$
 The decoherence time for the system of N Tubulin Electrons is $T_N = h / E_N = h / N^{5/3} E_{\text{electron}} = N^{-5/3} 10^{-26} \text{ sec}$
 Number of Involved Tubulin Dimers Time T_N
 $10^4(11+9) = 10^{20}$ $10^4(33 + 26) = 10^{(-7)} \text{ sec}$ $10^{11} \text{ neurons} \times 10^9 \text{ TD} / \text{neuron}$
 10^{16} $10^4(27 + 26) = 10^{(-1)} \text{ sec}$ $10 \text{ Hz} - \text{Human Alpha EEG is 8 to 13 Hz} -$
 Fundamental Schumann Resonance is 7.8 Hz -
 Time of Hamiltonian Circuit of 10^{16} TD separated from nearest neighbors by 10 nm is $10^{16} \times 10 \text{ nm} / c = (10^{16} \times 10^4(-6)) \text{ cm} / c = 10^{10} \text{ cm} / c = 0.3 \text{ sec} -$

$\int \int \int$
 CI(2,4) CP2 OP2
 Conformal Vectors



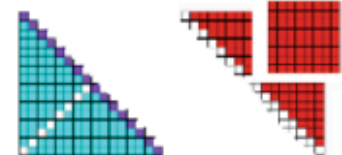
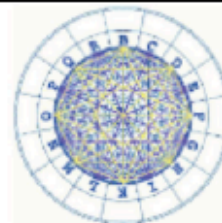
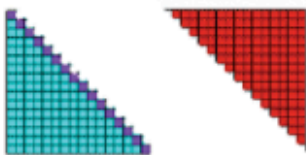
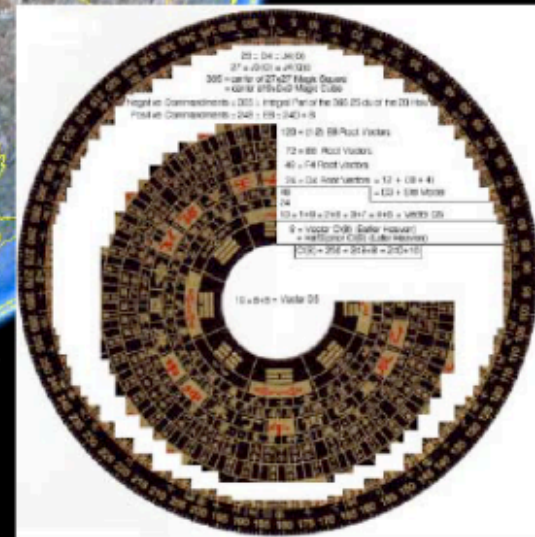
September 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 Labor Day	4	5	6	7	8
9 Grandparents Day Rosh Hashanah	10	11	12	13	14	15
16	17	18 Yom Kippur	19	20	21	22 Autumn Begins
23	24	25	26	27	28	29
	30					



33. श्रीमद्वैदिक पुराणेति सुखस्य देवकीपुत्रजम् । सोमस्यै स्वसालेषुम्
 श्रीमः पूर्वोपश्रुतिपरोदसो नूननैरुत । य देवो एह वैश्रुति
 श्रीमसो शर्वमश्रवमोपमेव दिव्यैरिवे । यशसो वीरवलेषुम्
 अष्टे य पुत्रमश्वर विभक्तः शरिभूर्त्तसै । स प्रदेनेषु सचरति
 श्रीमदोषो कविज्ञेयः सुख्याज्ञप्रश्रवसलाः । देवो देवोपश्रु गेपम्
 पदत्र सुशुभे त्वमप्यै भूरे केशिपुत्रिणि । तवेतत्कवमीडिरः
 उर्वे त्वादे दिव्यैरेवे दोषावस्तसिवा वृषम् । नद्यो धरन्तु तर्पसि
 राजन्तवश्वरार्थं गोपपुत्रस्य वेदिनिधिम् । वर्षेपानं खे दमे
 स नोः श्रितेवं सुनवेऽप्रे सुपावने शंभ । शर्चसा ना स्वगतसै

The first richa of the first sukt has 24 syllables plus 24 gaps.
 It is followed by 8 lines,
 each with 8+8 = 16 Sanskrit syllables left of the | line
 and 8 Sanskrit syllables right of the | line,
 for 24 Sanskrit syllables per line
 and 8x24 = 192 syllables for all 8 lines.
 The grand total is 24+24+192 = 240 = Root Vectors of E8.



October 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5	6
7	8 Columbus Day	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31 Halloween			



Eupedia map of Y-haplogroup E-V13

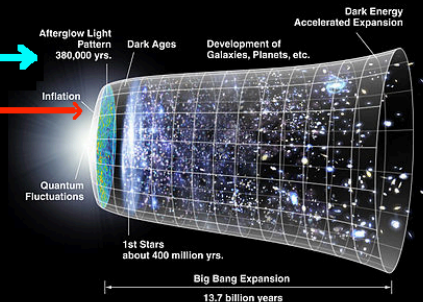


November 2018

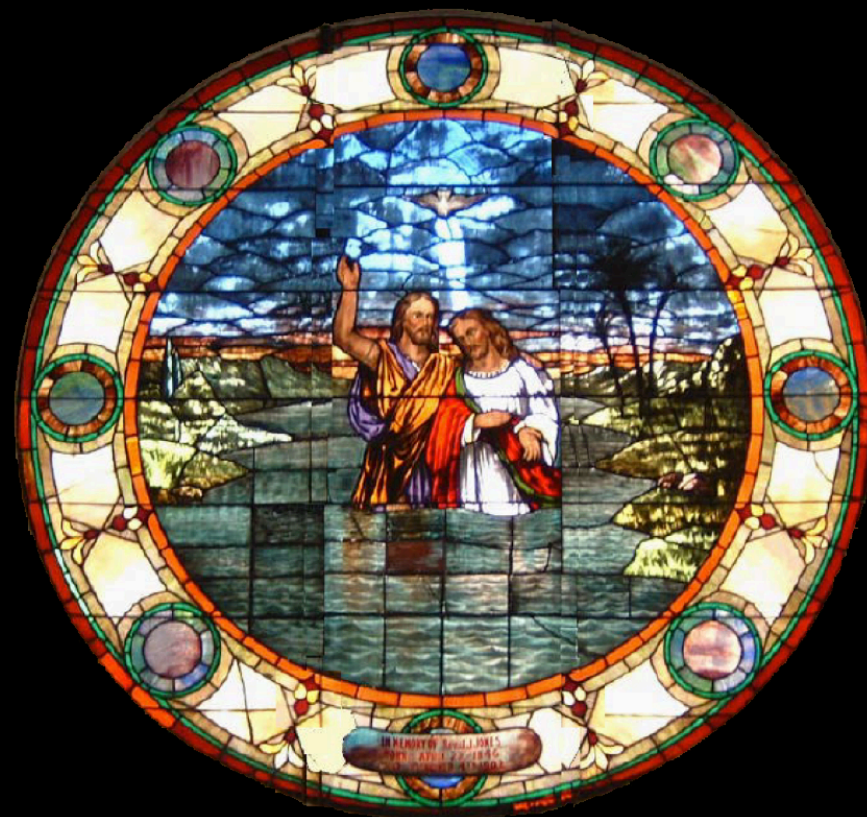
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4 Daylight Savings Ends	5	6	7	8	9	10
11 Veterans Day	12 Veterans Day (Observed)	13	14	15	16	17
18	19	20	21	22 Thanksgiving	23	24
25	26	27	28	29	30	

Cl(8) that contains 28 = D4 for NCG M Gravity	Cl(8) that contains 28 = D4 for NCG F SM	1
		16
		120
		560
		1820
		4368
		8008
		11440
1	1	12870
8	8	11440
28	28	8008
56	56	4368
70 x 70 =		1820 = D8
56	56	560
28	28	120 = D8
8	8	16
1	1	1
$Cl(8) \times Cl(8) = Cl(16)$		

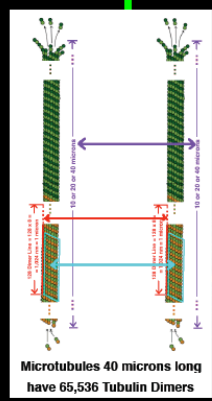
NJL Quantum Condensate



10¹⁹ E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation

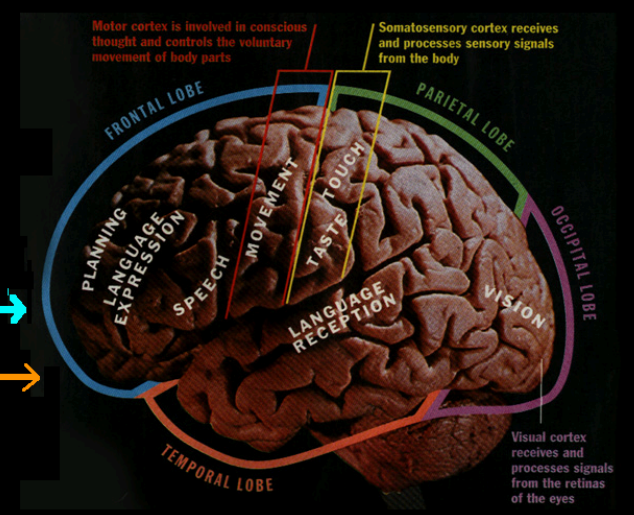


Quantum Resonant Connection



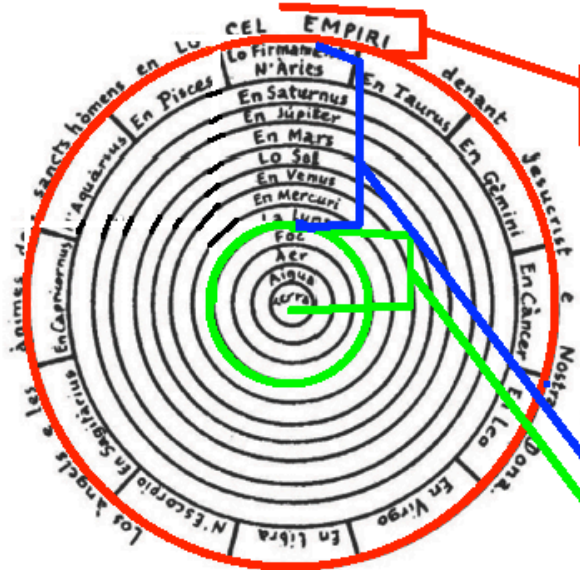
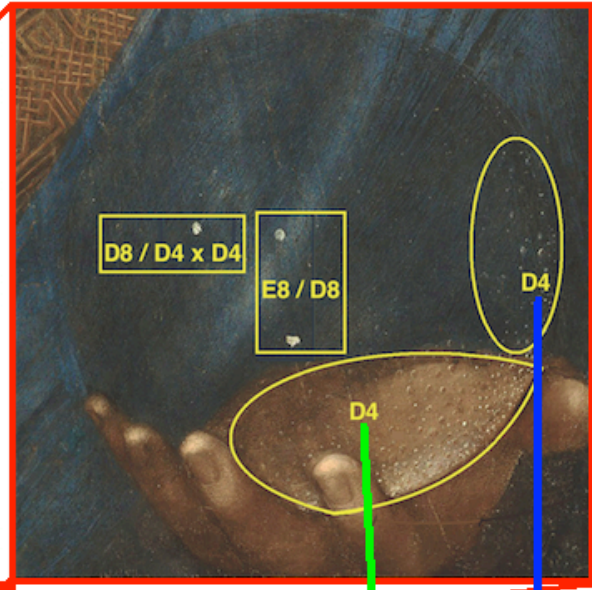
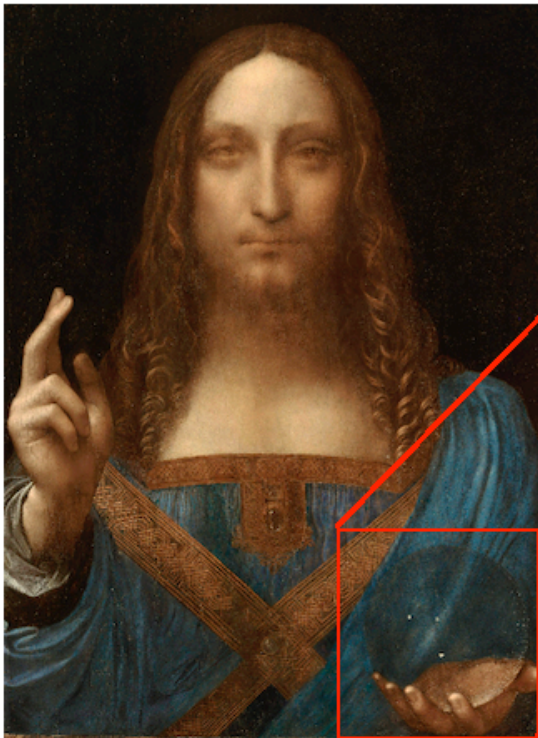
Penrose-Hameroff Quantum Condensate

10¹⁹ Tubulin Dimers in a Human Brain

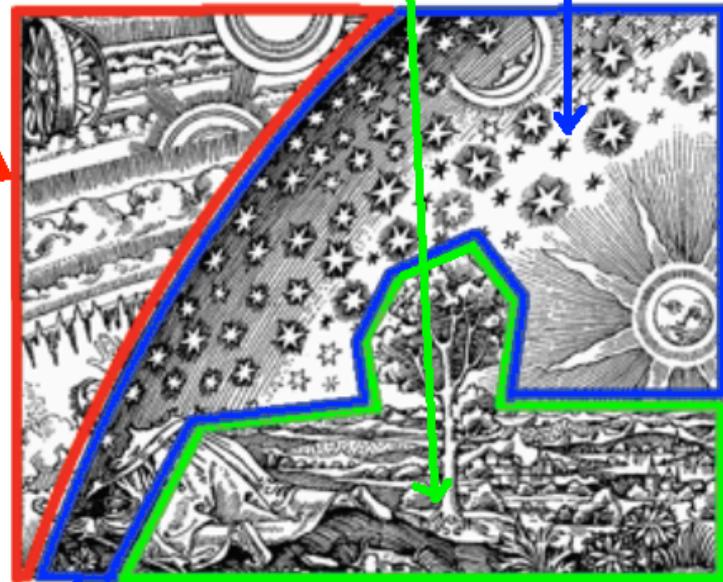


December 2018

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2 Hanukkah	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21 Winter Begins	22
23	24	25	26	27	28	29
30	31	Christmas Day	Kwanzaa			



E8

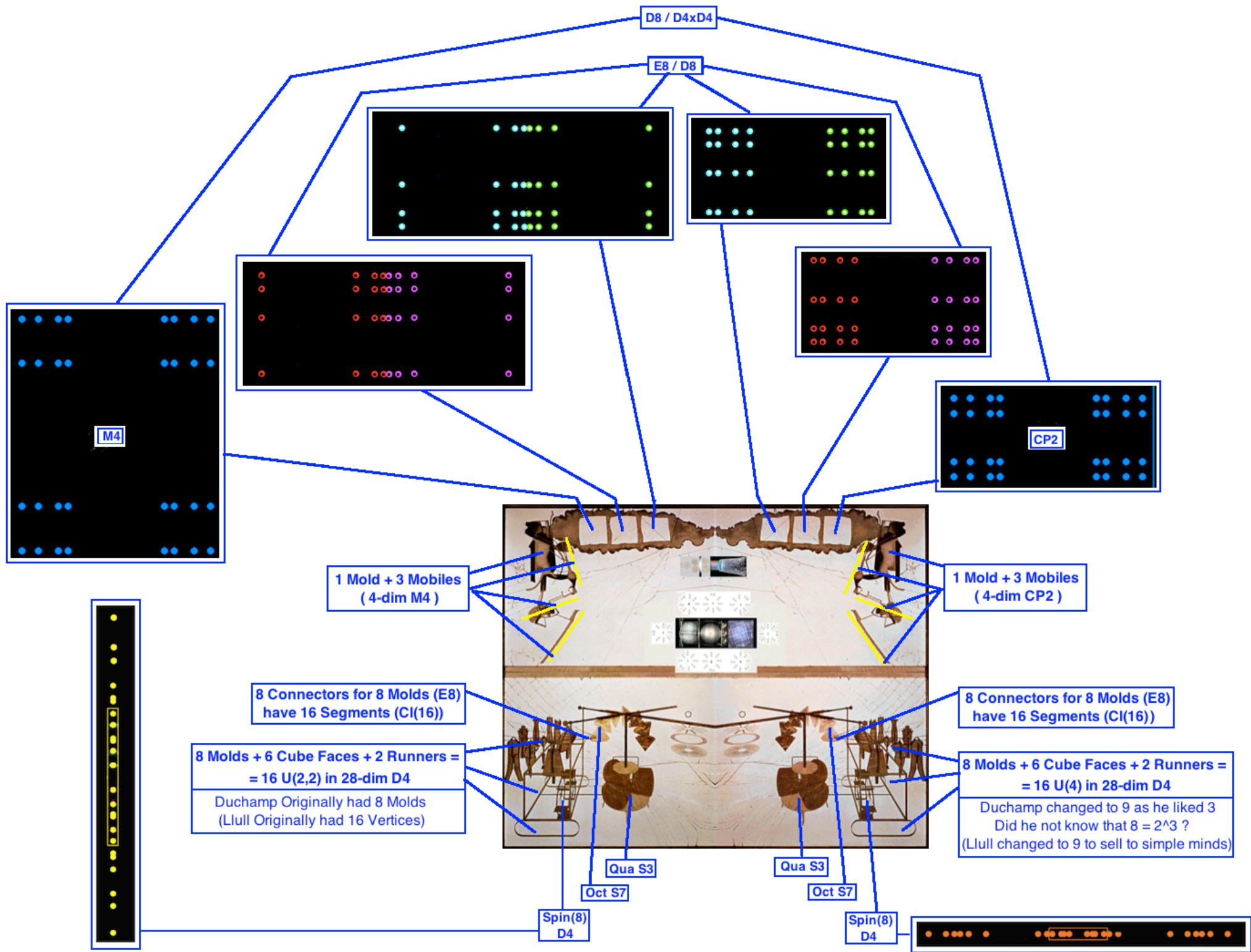


January 2019 (United States)

February 2019

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	31	1 <small>New Year's Day</small>	2	3	4	5 <small>● New Moon</small>
6	7	8	9	10	11	12
13	14 <small>● 1st Quarter</small>	15	16	17	18	19
20	21 <small>Martin Luther King Jr. Day Tu Bishvat/Tu B'Shevat ○ Full Moon</small>	22	23	24	25	26
27 <small>● 3rd Quarter</small>	28	29	30	31	1	2



February 2019 (United States)

March 2019

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27 ☾ 3rd Quarter	28	29	30	31	1	2
3	4 ● New Moon	5	6	7	8	9
10	11	12 ☽ 1st Quarter	13	14	15	16
17	18 🇺🇸 Presidents' Day	19 ☾ Full Moon	20	21	22	23
24	25	26 ☾ 3rd Quarter	27	28	1	2

Alien Mind

Big Bang - Inflation - - Conformal Evolution

E8 240 - 2160 - - 17520 = 240 + 8x2160

Alien Eyes

1

36

6

60

1+6 = 7 of S7






36x60 = 2160 = E8 Layer 2

Alien LGL+LGL Body

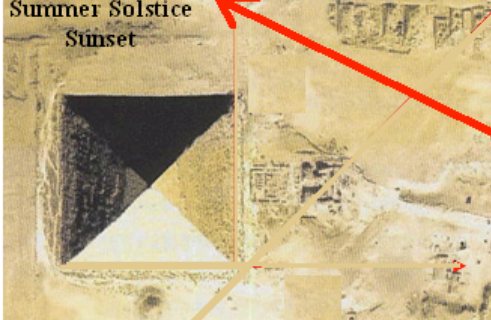
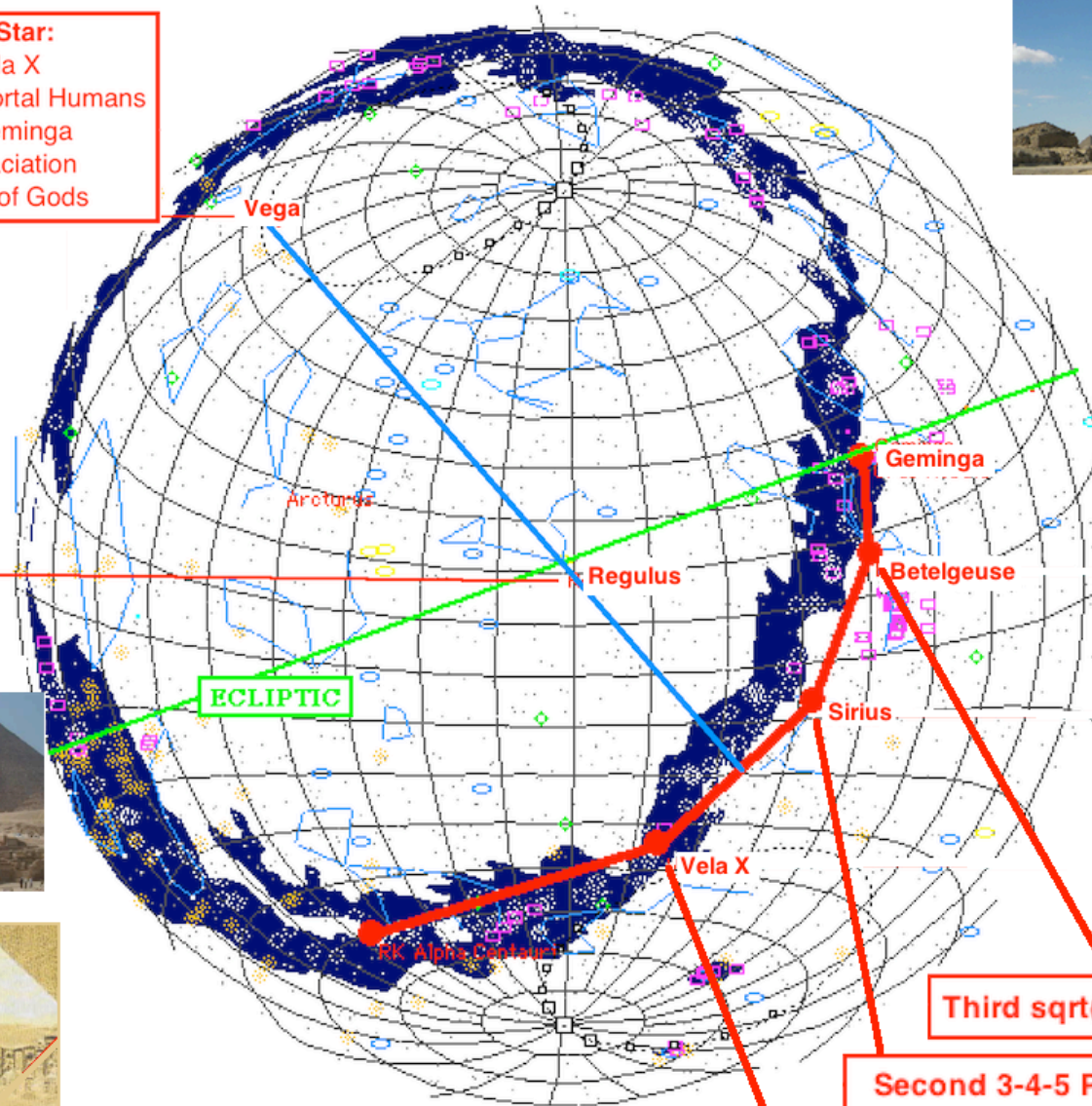
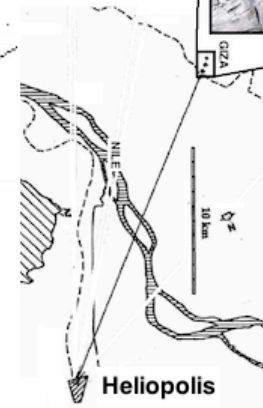
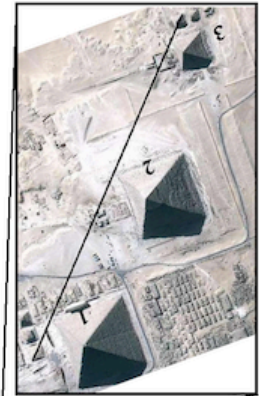
March 2019 (United States)

April 2019

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Sun	Mon	Tue	Wed	Thu	Fri	Sat
24	25	26  3rd Quarter	27	28	1	2
3	4	5	6  New Moon	7	8	9
10	11	12	13	14  1st Quarter	15	16
17	18	19	20 <small>March equinox</small>  Full Moon	21 <small>Purim</small>	22	23
24	25	26	27	28  3rd Quarter	29	30
31	1	2	3 <small>Isra and Mi'raj</small>	4	5  New Moon	6

Vega = North Star:
 11600 BP - Vela X
 Manetho Rule of Mortal Humans
 37000 BP - Geminga
 Wisconsin Glaciation
 Manetho Rule of Gods



Third $\sqrt{2} \times 10/9$ Pyramid

Second 3-4-5 Pyramid

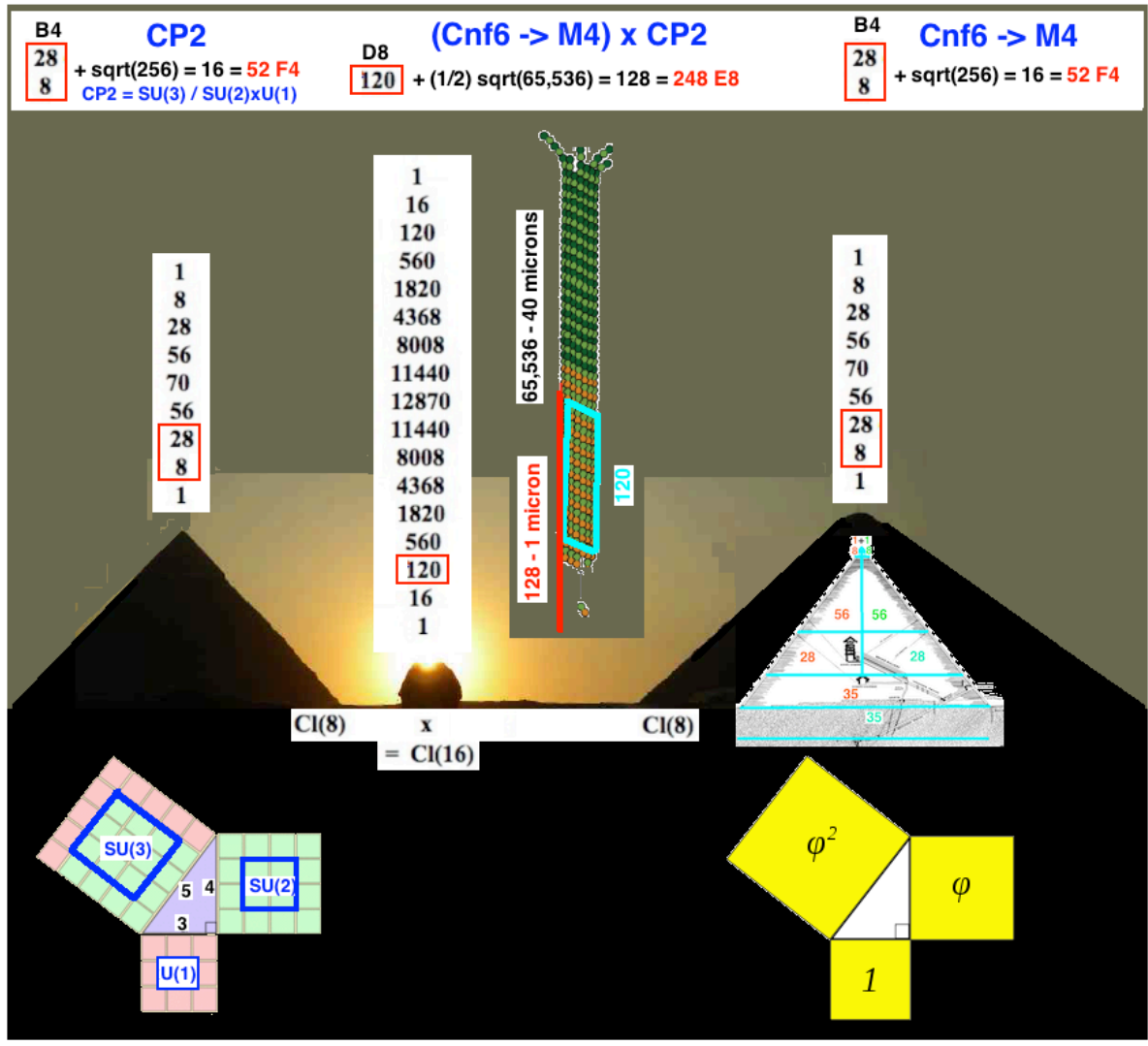
Great Golden CI(8) Pyramid

April 2019 (United States)

May 2019

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3 <small>Isra and Mi'raj</small>	4	5 ● <small>New Moon</small>	6
7	8	9	10	11	12 ○ <small>1st Quarter</small>	13
14	15	16	17	18	19 <small>Good Friday (Many regions)</small> ○ <small>Full Moon</small>	20 <small>Passover (first day)</small>
21 <small>Easter Sunday</small>	22 <small>Easter Monday</small>	23	24	25	26 ● <small>3rd Quarter</small>	27 <small>Last Day of Passover</small>
28	29	30	1 <small>Yom HaShoah</small>	2	3	4 ● <small>New Moon</small>



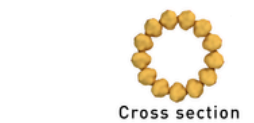
B4 CP2
 $\begin{matrix} 28 \\ 8 \end{matrix} + \text{sqrt}(256) = 16 = 52 \text{ F4}$
 CP2 = SU(3) / SU(2)xU(1)

D8 (Cnf6 -> M4) x CP2
 $\begin{matrix} 120 \\ 8 \end{matrix} + (1/2) \text{sqrt}(65,536) = 128 = 248 \text{ E8}$

B4 Cnf6 -> M4
 $\begin{matrix} 28 \\ 8 \end{matrix} + \text{sqrt}(256) = 16 = 52 \text{ F4}$

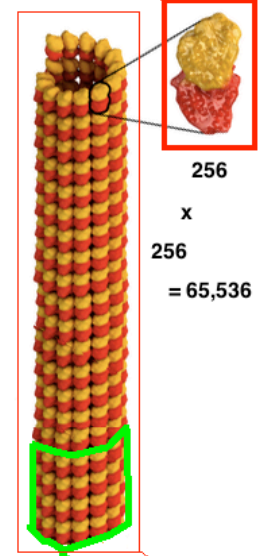
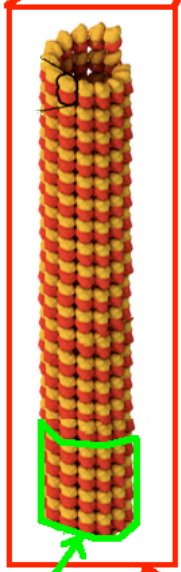
52-dim F4 of CP2 in **256-dim Cl(8)**
 F4 / B4 = OP2 = Spinor Fermions =
 = 8 Particles + 8 AntiParticles
 B4 / D4 = 8-dim SpaceTime =
 = Kaluza-Klein M4 x CP2
 D4 = Spin(8) contains Spin(6) = SU(4)
 contains SU(3) Color Force
 SU(3) Color Force = Global Symmetry
 of CP2 = SU(3) / SU(2)xU(1)
 SU(2)xU(1) ElectroWeak Force =
 = Local Symmetry of CP2

52-dim F4 of Cnf6 -> M4 in **256-dim Cl(8)**
 F4 / B4 = OP2 = Spinor Fermions =
 = 8 Particles + 8 AntiParticles
 B4 / D4 = 8-dim SpaceTime =
 = Kaluza-Klein M4 x CP2
 D4 = Spin(4,4) contains Spin(2,4) of
 Conformal Gravity + Dark Energy



E8 Kaluza-Klein (Cnf6 -> M4) x CP2
 In (Cl(8) of CP2) x (Cl(8) of Cnf6 -> M4) = Cl(16)
 containing E8
 at each of the 256 points of Cl(8) of Cnf6 -> M4
 there are all 256 points of Cl(8) of CP2

E8 / D8 = 128-dim Fermion Spinor Space = 8 components of 8+8 Fermions
D8 / D4 x D4 = A7+1 = 64 = 8-dim position x 8-dim momentum
D4 containing D3 = Spin(2,4) = A3 = SU(2,2) for Conformal Gravity + Dark Energy
D4 containing D3 = SU(4) containing Color Force SU(3)



$256 \times 256 = 65,536$

May 2019 (United States)

June 2019

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	1 Yom HaShoah	2	3	4 ● New Moon
5	6 Ramadan starts	7	8	9 Yom Ha'atzmaut	10	11 ● 1st Quarter
12	13	14	15	16	17	18 ○ Full Moon
19	20	21	22	23 Lag BaOmer	24	25
26 ● 3rd Quarter	27 Memorial Day	28	29	30	31 Lailat al-Qadr	1

June 2019 (United States)

July 2019

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26 🌑 3rd Quarter	27 Memorial Day	28	29	30	31 Lailat al-Qadr	1
2	3 🌑 New Moon	4	5 Eid al-Fitr	6	7	8
9 Shavuot	10 🌒 1st Quarter	11	12	13	14	15
16	17 🌕 Full Moon	18	19	20	21 June Solstice	22
23	24	25 🌑 3rd Quarter	26	27	28	29
30	1	2 🌑 New Moon	3	4 Independence Day	5	6

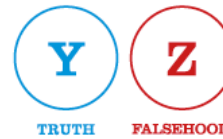
Ramon Llull Wheels:

Tensor Product $RxCxHxO = T = 64\text{-dim} =$

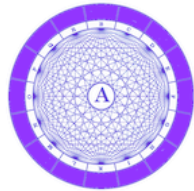
The Figures of Fire (East)				The Figures of Air (West)			
Fire	Air	Water	Earth	Air	Fire	Water	Earth
Air	Fire	Earth	Water	Water	Earth	Air	Fire
Water	Earth	Fire	Air	Earth	Water	Fire	Air
Earth	Water	Air	Fire	Fire	Air	Water	Earth
Fire	Water	Air	Earth	Water	Earth	Fire	Air

The Figures of Water (South)				The Figures of Earth (North)			
Water	Earth	Air	Fire	Water	Earth	Air	Fire
Earth	Air	Fire	Water	Earth	Air	Fire	Water
Air	Fire	Water	Earth	Air	Fire	Water	Earth
Fire	Water	Earth	Air	Fire	Water	Earth	Air
Water	Earth	Air	Fire	Water	Earth	Air	Fire

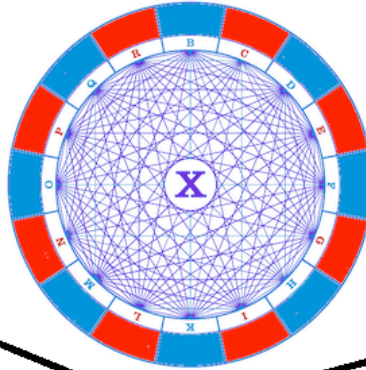
$T + T = 128\text{-dim} = E8 / D8$



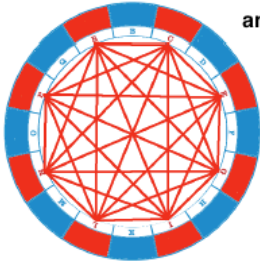
Binary Real Clifford Algebras of tensor product $Cl(8) \times Cl(8) = Cl(16)$



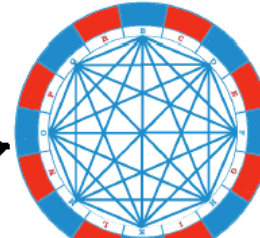
120-dim D8 and $E8 / D8 = (OxO)P2$



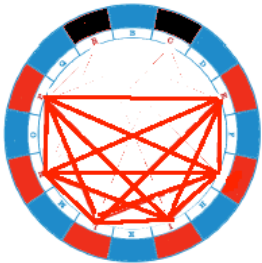
120-dim D8



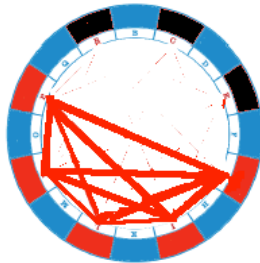
28-dim D4



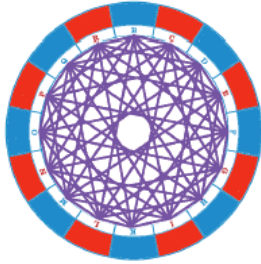
28-dim D4



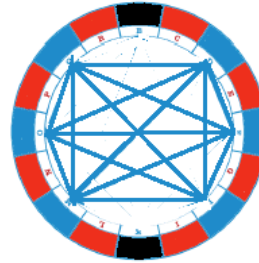
15-dim Spin(2,4)



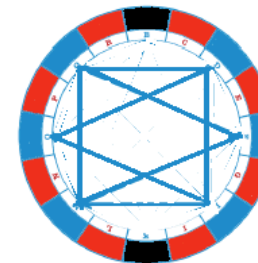
10-dim Spin(2,3)



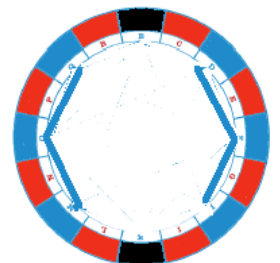
64-dim A7+R



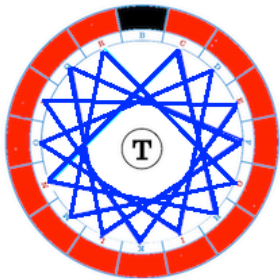
15-dim SU(4)



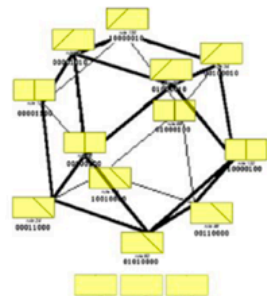
8-dim SU(3)



4-dim SU(2)xU(1)

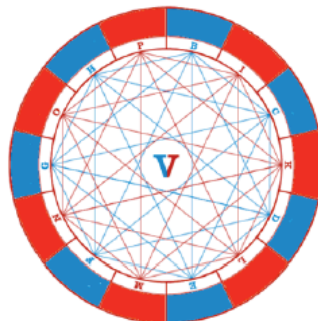


3 = Cartan Subalgebra $D3 = A3$

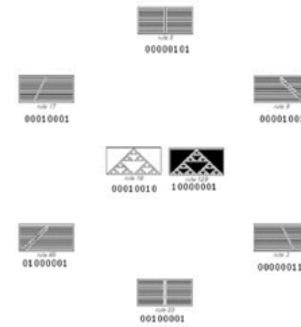


4 x 3 = Cuboctahedron Vertices $D3 = A3$

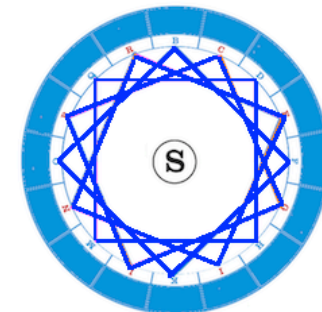
$D3 = A3$ acts Conformally on $M4$ of $M4 \times CP2$ Kaluza-Klein



42 Assessors = 21-dim Spin(7) + 21-dim Spin(7)
Zero Divisors of Sedenions



4 + 4 = Cube Vertices = $A2 = SU(3)$ of $CP2 = SU(3) / SU(2)xU(1)$



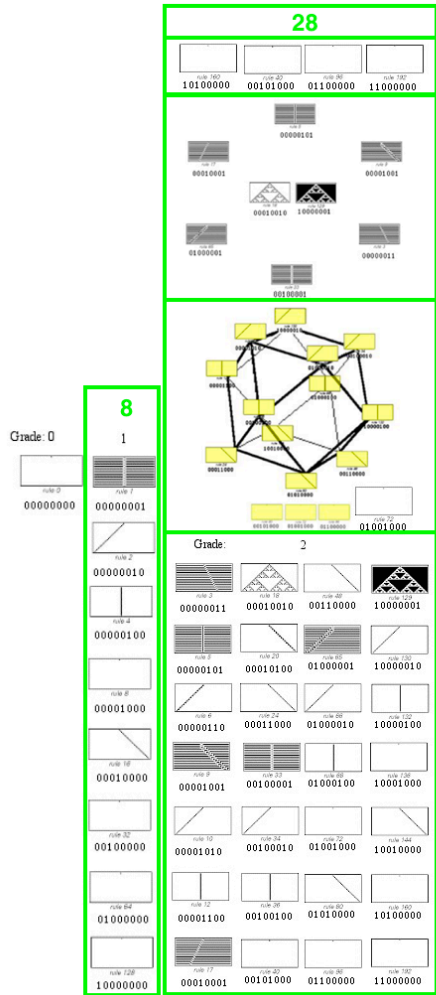
4 = $CP2$ of $M4 \times CP2$ Kaluza-Klein
4 = $SU(2)xU(1)$ of $CP2 = SU(3) / SU(2)xU(1)$

July 2019 (United States)

August 2019

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	1	2 ● New Moon	3	4 Independence Day	5	6
7	8	9 ● 1st Quarter	10	11	12	13
14	15	16 ○ Full Moon	17	18	19	20
21	22	23	24 ● 3rd Quarter	25	26	27
28	29	30	31 ● New Moon	1	2	3



$$8+28+16 = 52 \text{ F4}$$

256-dim Cl(8) as Cellular Automata

16

Cl(8) Primitive Idempotent has 16 Terms

$$I = (1/2)(1 + e_{1248}) (1/2)(1 + e_{2358}) (1/2)(1 + e_{3468}) (1/2)(1 + e_{4578}) =$$

$$= (1/16)(1 + e_{1248} + e_{2358} + e_{3468} + e_{4578} + e_{5618} + e_{6728} + e_{7138} - e_{3567} - e_{4671} - e_{5712} - e_{6123} - e_{7234} - e_{1345} - e_{2456} + e_J)$$

corresponding to 16 of the 256 Cellular Automata

• +e_12345678 11111111

• +e_6728+e_3468+e_4578 to 11100010 10101100 11010100

• +e_2358+e_1248+e_5618+e_7138 10010110 10031011 10117001 11000101

• +1 to 00000000

• -e_5712-e_1345-e_6123 01010011 00011101 00100011

• -e_4671-e_7234-e_2456-e_3567 01101001 01000110 01101101 01110100

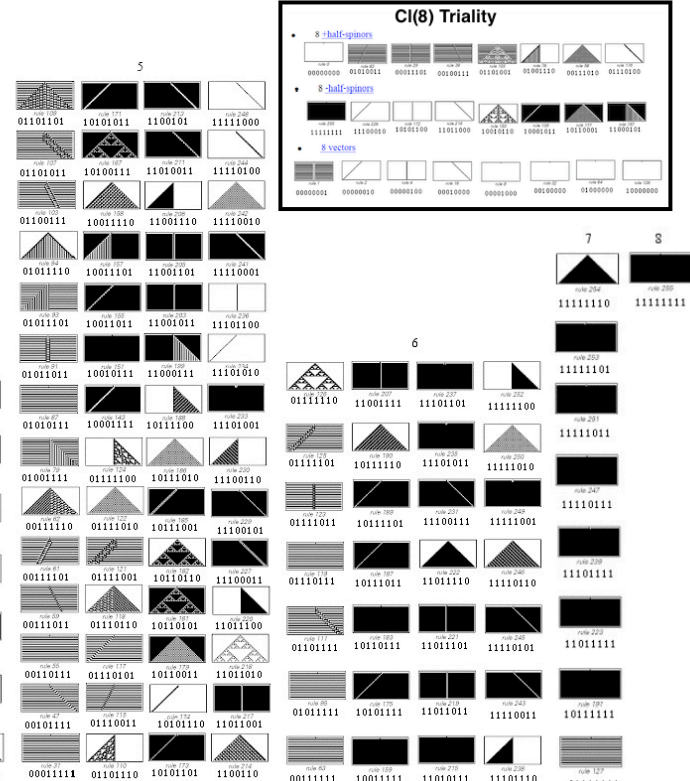
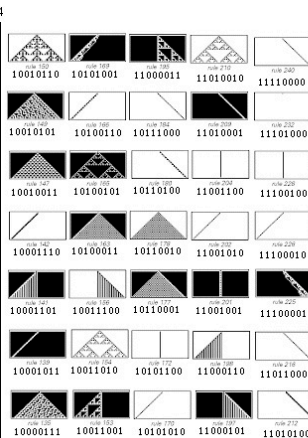
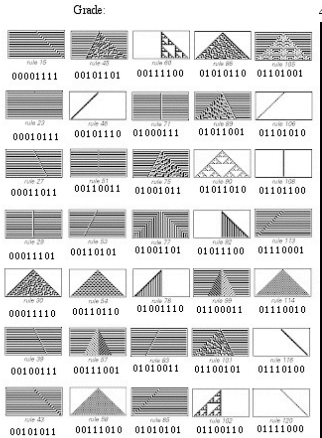
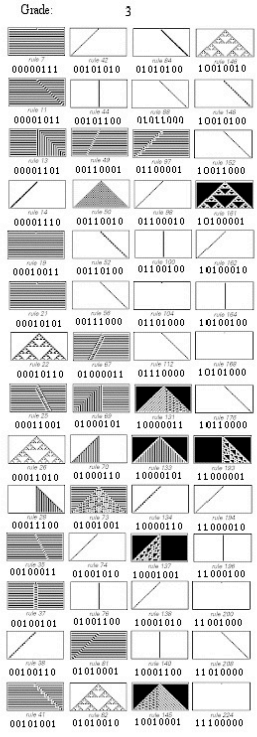
Tensor Product Cl(8) x Cl(8) = Cl(16)

$$(F4 \text{ in Cl(8)}) \times (F4 \text{ in Cl(8)}) =$$

$$= 8 \times 8 + 28 \times 1 + 1 \times 28 + 16 \times 16 =$$

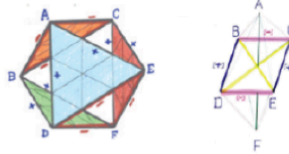
$$= 120 \text{ Cl(16) BiVectors} + (128 + 128) \text{ Cl(16) Spinors}$$

$$120 \text{ Cl(16) BiVectors} + 128 \text{ Cl(16) Half-Spinors} = E8$$

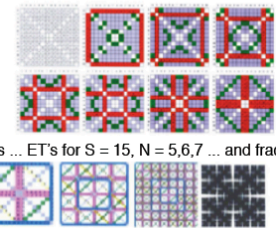


Guillermo Moreno (arXiv/math/0512517) has shown that $V(7,2) = \text{Spin}(7) / \text{Spin}(5)$ can be identified with the **Zero Divisors of Sedenions** which have $7+28 = 35$ Associative Triples and for which Zero Divisors are given by the fibration $V(7,2) \rightarrow G_2 \rightarrow S^3$ [3-sphere] and which have 4-2=2 ZD Irreducible Components and 10-dim Lie Sphere $\text{Spin}(7) / \text{Spin}(5) \times U(1)$ whose 10D correspond to $\text{Cl}(1,9) = \text{Cl}(2,8)$ Conformal over $\text{Cl}(1,7)$ that $V(15,2) = \text{Spin}(15) / \text{Spin}(13)$ is related to, but not identified with, the **Zero Divisors of 32-ons** which have $35 + 120 = 155$ Associative Triples and which have 8-2=6 ZD Irreducible Components and 26-dim Lie Sphere $\text{Spin}(15) / \text{Spin}(13) \times U(1)$ whose 26D correspond to **26D String Theory and to 26-dim traceless $J(3,0)_0$** that $V(127,2) = \text{Spin}(127) / \text{Spin}(125)$ is related to, but not identified with, the **Zero Divisors of Voudon 256-ons** corresponding to $\text{Cl}(8)$ which have $1+6+28+120+496+2016+8128=10795$ Associative Triples and which have 64-2=62 ZD Irreducible Components and 250-dim Lie Sphere $\text{Spin}(127) / \text{Spin}(125) \times U(1)$

Robert de Marrais said "... 256 ... 2^8 ions Voudons ... Moreno ... determines that the automorphism group of the ZD's of all 2^n-ions ... obey a simple pattern: for $n \geq 4$ this group has the form $G_2 \times (n-3) \times S_3$ (... order-6 permutation group on 3 elements) ... This says the automorphism group of the Sedenions' ZD's has order $14 \times 1 \times 6 = 84$... based on 7 octahedral lattices ("Box-Kites") ...



"... Harmonics of Box-Kites, called here "Kite-Chain Middens," ... extend indefinitely into higher forms of 2^n -ions. All non-Midden-collected ZD diagonals in the ... 32-ons ... belong ... to a set of 15 "emanation tables," ... they house 168 ... PSL(2,7) ... cells ... 8 ... 32-ons ... ET's ... from S=8 to 15 ...




[here are] ... Emanation Tables ... ET's for S=15, N=5,6,7 ... and fractal limit ...

August 2019 (United States)

September 2019

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Sun	Mon	Tue	Wed	Thu	Fri	Sat
28	29	30	31 ● New Moon	1	2	3
4	5	6	7 ● 1st Quarter	8	9	10
11 Tisha B'Av	12 Eid al-Adha	13	14	15 ○ Full Moon	16	17
18	19	20	21	22	23 ● 3rd Quarter	24
25	26	27	28	29	30 ● New Moon	31

Julian Schwinger describes Elementary Particles  as volumes of space - Sources - whose properties are determined by Green's Functions characteristic of the volumes.

In E8 Physics any Elementary Particle is immediately surrounded by a cloud of virtual particle-antiparticle pairs similar to a Kerr-Newman Black Hole with Symmetric Space - Bounded Complex Domain - Shilov Boundary structure corresponding to its Gauge Group properties.
The Poisson Kernel - Bergman Kernel defines the Green's Function.

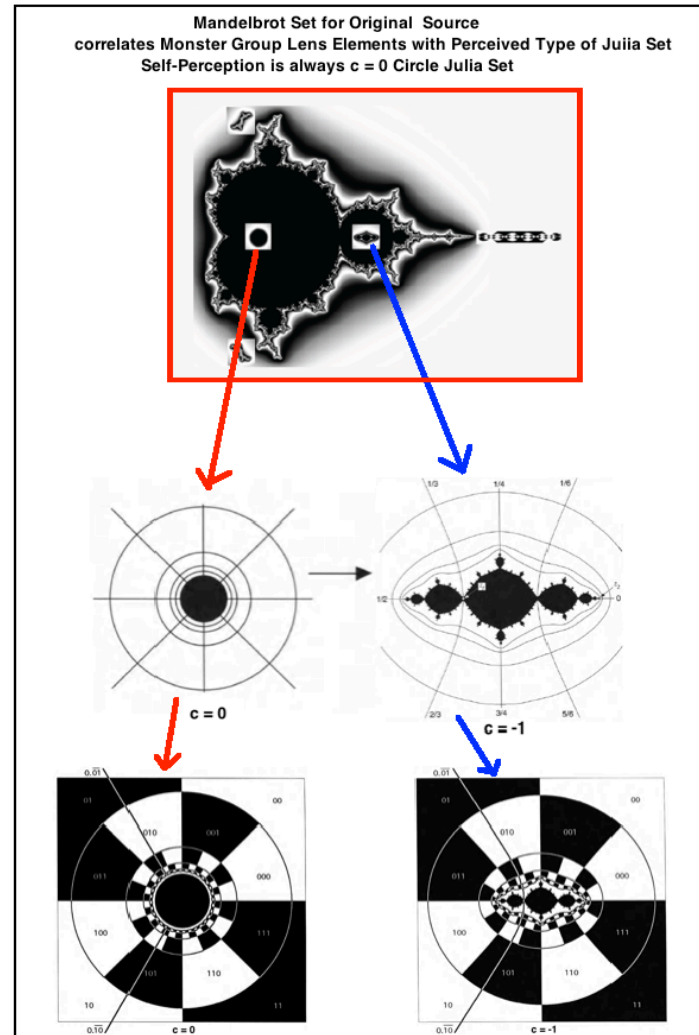
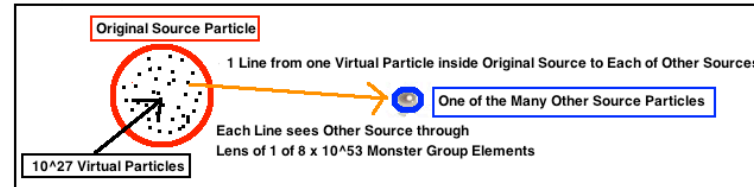
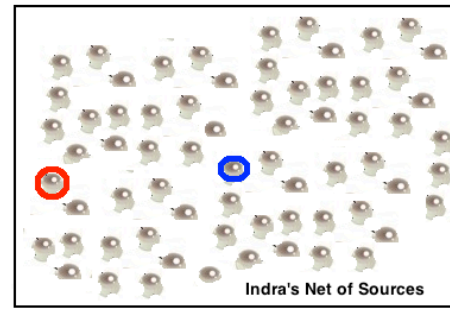
The initial Valence Particle is Planck scale. The number of Virtual Particles is determined by the Planck scale geometry of spacetime. The E8 model at the Planck Scale has spacetime condensing out of Clifford structures forming a Lorentz Leech lattice underlying 26-dim String Theory of World-Lines with $8 + 8 + 8 = 24$ -dim of fermion particles and antiparticles and of spacetime.
The automorphism group of one 26-dim String Theory cell modulo the Leech lattice is the Monster Group of order about 8×10^{53} . The Cloud structure comes from the 24-dim Leech lattice part of the Monster Group which is 2^{24} times the double cover of Co_1 , for an order of about 10^{26} . Due to superpositions of algebraically independent E8 Lattices the total number of Virtual particle/antiparticle pairs is about 10^{27} so the volume of the Kerr-Newman Cloud is on the order of 10^{27} x Planck scale, and its size should be about $10^{(27/3)} \times 1.6 \times 10^{(-33)} \text{ cm} = \text{roughly } 10^{(-24)} \text{ cm}$.

Each Schwinger Source particle-antiparticle pair should see (with Bohm Quantum Potential and Sarfatti Back-Reaction) the rest of our Universe in the perspective of 8×10^{53} Monster Symmetry so a Schwinger Source acting as a Jewel of Indra's Net of Schwinger Source Bohm Quantum Blockchain Physics can see $10^{27} \times 8 \times 10^{53} = 8 \times 10^{80}$ Other Sources of an Indra's Net.

To fit inside the initial Schwinger Source the Information Elements of all the Other Schwinger Sources of Our Universe (10^{77} or so) should be distributed as a Fractal Julia Set. There are 2^n stage-n cells in a Binary Decomposition of Julia Sets, so a stage-256 Julia level set based on Binary Decomposition has $2^{256} = \text{about } 10^{77}$ cells so Full Indra Net information can be seen / reflected by each Schwinger Source Indra Jewel.

Each Schwinger Source contains 10^{27} Virtual pairs of particles each of which can see along a connecting Line an Other Indra's Net Source which Line sees Other Sources through Monster Group Lens elements so that the Other Source appears to the Original Source to be a Julia Set.

Each Schwinger Source has a Mandelbrot Set that tells its Source what each of the many Indra's Net Source Julia set looks like by correlating Monster Group Lens Elements with Types of Julia Set. Self-Perception is always the $c = 0$ Circle Julia Set.



September 2019 (United States)

October 2019

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 Muharram	2 Labor Day	3	4	5 ☾ 1st Quarter	6	7
8	9	10	11	12	13	14 ☽ Full Moon
15	16	17	18	19	20	21 ☾ 3rd Quarter
22	23 September equinox	24	25	26	27	28 ● New Moon
29	30 Rosh Hashana	1	2	3	4	5 ☾ 1st Quarter

$$\begin{matrix} \mathbf{S0} & \mathbf{S1} & \mathbf{S3} & \mathbf{S7} \\ \mathbf{U} & \mathbf{U} & \mathbf{U} & \mathbf{U} \\ \mathbf{T} = \mathbf{R} \times \mathbf{C} \times \mathbf{H} \times \mathbf{O} \\ \mathbf{Z2} & \mathbf{U(1)} & \mathbf{SU(2)} & \mathbf{Spin(8)} \end{matrix}$$

Division Algebras, Lattices, Physics, Windmill Tilting
Geoffrey Dixon

As to **T**, resolve its identity into four orthogonal *idempotents*

$$\begin{aligned} \Delta_0 &= \frac{1}{4}(1 + i\vec{x})(1 + ie_7) = \left(\frac{1}{2}(1 + i\vec{x})\right)\left(\frac{1}{2}(1 + ie_7)\right) \\ \Delta_1 &= \frac{1}{4}(1 - i\vec{x})(1 + ie_7) = \left(\frac{1}{2}(1 - i\vec{x})\right)\left(\frac{1}{2}(1 + ie_7)\right) \\ \Delta_2 &= \frac{1}{4}(1 + i\vec{y})(1 - ie_7) = \left(\frac{1}{2}(1 + i\vec{y})\right)\left(\frac{1}{2}(1 - ie_7)\right) \\ \Delta_3 &= \frac{1}{4}(1 - i\vec{y})(1 - ie_7) = \left(\frac{1}{2}(1 - i\vec{y})\right)\left(\frac{1}{2}(1 - ie_7)\right) \end{aligned}$$

In the Pauli algebra case, we got Dirac spinors by doubling **P** to **P**² we double up and use **T**² as our spinor space. Let Ψ be a **T**² spinor the following identifications fall out of the mathematics

$\rho_+ \Psi$: matter
 $\rho_- \Psi$: antimatter

<p>8 Fermion First-Generation Particles each with 8 Spacetime Components</p> <p>$\rho_+ \Psi \Delta_0$: matter - neutrino - <i>SU(3)</i> singlet $\rho_+ \Psi \Delta_1$: matter - electron - <i>SU(3)</i> singlet $\rho_+ \Psi \Delta_2$: matter - up quark - <i>SU(3)</i> triplet $\rho_+ \Psi \Delta_3$: matter - down quark - <i>SU(3)</i> triplet</p>
+
<p>8 Fermion First-Generation AntiParticles each with 8 Spacetime Components</p> <p>$\rho_- \Psi \Delta_3$: antimatter - antineutrino - <i>SU(3)</i> antisinglet $\rho_- \Psi \Delta_2$: antimatter - positron - <i>SU(3)</i> antisinglet $\rho_- \Psi \Delta_1$: antimatter - anti-up antiquark - <i>SU(3)</i> antitriplet $\rho_- \Psi \Delta_0$: antimatter - anti-down antiquark - <i>SU(3)</i> antitriplet</p>
<p>= 8x8 + 8x8 = 64 + 64 = T + T = 128 = T2 = = E8 / D8 = (OxO)P2 = HalfSpinors of Cl(16)</p>

Geoffrey Dixon wrote a 1995 paper in which he represented the Leech lattice over **O**³.
the final result breaks up the inner shell of Λ_{24} ,
which is of order $K_{24} = 196560$,
into three subsets with orders $3 \times 240 = 720$,
 $3 \times 240 \times 16 = 11520$, and $3 \times 240 \times 16 \times 16 = 184320$,
the sum of all three orders being 196560.

Here is a summary of E8 Physics model calculation results. Since ratios are calculated, values for one particle mass and one force strength are assumed.
Quark masses are constituent masses. Most of the calculations are tree-level, so more detailed calculations might be even closer to observations.

Dark Energy : Dark Matter : Ordinary Matter = 0.75 : 0.21 : 0.04

Fermions as Schwinger Sources have geometry of Complex Bounded Domains with Kerr-Newman Black Hole structure size about $10^{(-24)}$ cm.

Particle/Force	Tree-Level	Higher-Order
e-neutrino	0	0 for nu_1
mu-neutrino	0	$9 \times 10^{(-3)}$ eV for nu_2
tau-neutrino	0	$5.4 \times 10^{(-2)}$ eV for nu_3
electron	0.5110 MeV	
down quark	312.8 MeV	charged pion = 139 MeV
up quark	312.8 MeV	proton = 938.25 MeV
		neutron - proton = 1.1 MeV
muon	104.8 MeV	106.2 MeV
strange quark	625 MeV	
charm quark	2090 MeV	
tauon	1.88 GeV	
beauty quark	5.63 GeV	
truth quark (low state)	130 GeV	(middle state) 174 GeV (high state) 218 GeV
W+	80.326 GeV	
W-	80.326 GeV	
W0	98.379 GeV	Z0 = 91.862 GeV
Mplanck	1.217×10^{19} GeV	
Higgs VEV (assumed)	252.5 GeV	
Higgs (low state)	126 GeV	(middle state) 182 GeV (high state) 239 GeV
Gravity Gg (assumed)	1	
(Gg)(Mproton ² / Mplanck ²)		$5 \times 10^{(-39)}$
EM fine structure	1/137.03608	
Weak Gw	0.2535	
Gw(Mproton ² / (Mw+ ² + Mw- ² + Mz0 ²))		$1.05 \times 10^{(-5)}$
Color Force at 0.245 GeV	0.6286	0.106 at 91 GeV

Kobayashi-Maskawa parameters for W+ and W- processes are:

	d	s	b
u	0.975	0.222	0.00249 -0.00388i
c	-0.222 -0.000161i	0.974 -0.0000365i	0.0423
t	0.00698 -0.00378i	-0.0418 -0.00086i	0.999

The phase angle d13 is taken to be 1 radian.

October 2019 (United States)

November 2019

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30 Rosh Hashana	1	2	3	4	5 🌑 1st Quarter
6	7	8	9 Yom Kippur	10	11	12
13 🌕 Full Moon	14 Columbus Day (Most regions) First Day of Sukkot	15	16	17	18	19
20 Last Day of Sukkot	21 Shmini Atzeret 🌑 3rd Quarter	22 Simchat Torah	23	24	25	26
27 🌑 New Moon	28	29	30	31	1	2

Void -> CI(Void) -> CI(0) -> CI(1) -> CI(2) -> CI(4) -> CI(16)

Kaluza-Klein Spacetime
M4 x CP2

1	16
120	120
560	560
1820	1820
4368	4368
8008	8008
11440	11440
12870	12870
11440	11440
8008	8008
4368	4368
1820	1820
560	560
120	120
16	16
1	1

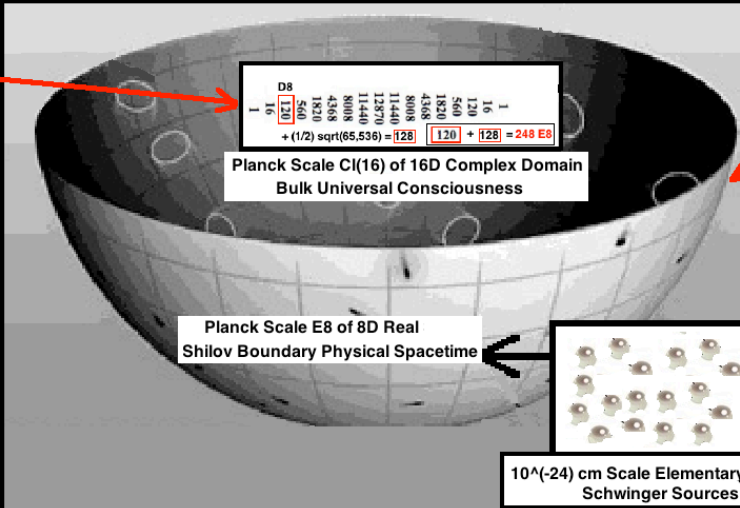
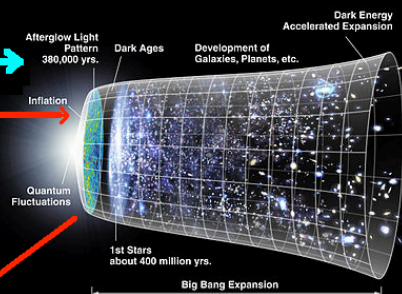
CI(8) that contains 28 = D4 for M4 Gravity

CI(8) that contains 28 = D4 for CP2 Std Model

Spinors: $(8s+8c) \times (8s+8c) = (8c \cdot 8s + 8c \cdot 8c)$

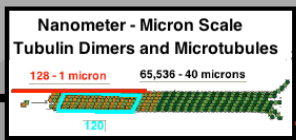
NJL Quantum Condensate

10¹⁹ E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation

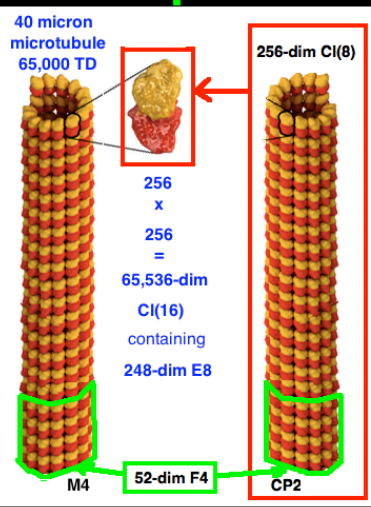


D8	16
120	120
560	560
1820	1820
4368	4368
8008	8008
11440	11440
12870	12870
11440	11440
8008	8008
4368	4368
1820	1820
560	560
120	120
16	16
1	1

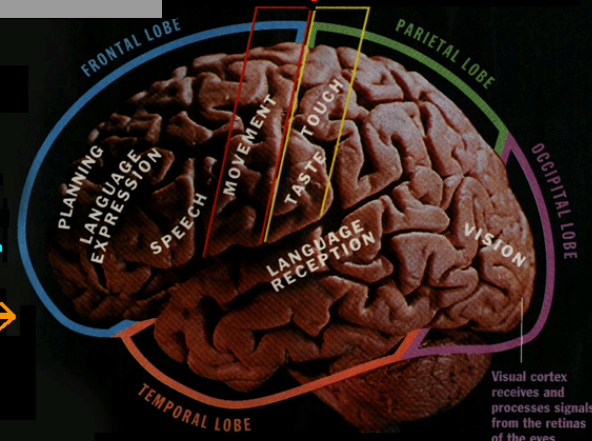
$+ (1/2) \sqrt{65,536} = 128$ $120 + 128 = 248 E8$



Quantum Resonant Connection



Penrose-Hameroff Quantum Condensate



10¹⁹ Tubulin Dimers in a Human Brain

November 2019 (United States)

December 2019

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27 ● New Moon	28	29	30	31	1	2
3	4 ● 1st Quarter	5	6	7	8	9
10 The Prophet's Birthday	11 Veterans Day	12 ○ Full Moon	13	14	15	16
17	18	19 ● 3rd Quarter	20	21	22	23
24	25	26 ● New Moon	27	28 Thanksgiving Day	29	30

Void -> CI(Void) -> CI(0) -> CI(1) -> CI(2) -> CI(4) -> CI(16)

Kaluza-Klein Spacetime
M4 x CP2

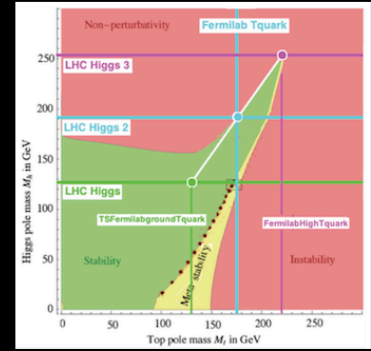
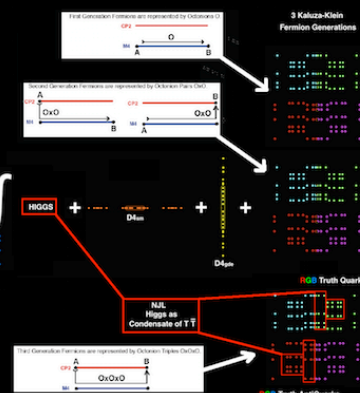
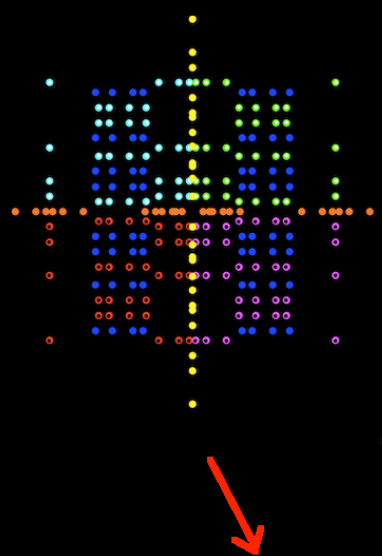
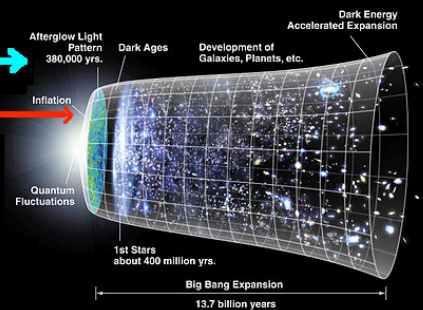
1	16
8	120
28	560
70	1820
160	4368
350	8008
700	11440
1260	12870
2002	11440
2800	8008
3500	4368
3701	1820
3003	560
2100	120
1050	16
350	1

CI(8) x CI(8) = CI(16)

Spinors: $(8s, 8s) + (8s, 8c)$
 $(8s+8c) \times (8s+8c) = (8c, 8s + 8c, 8c)$

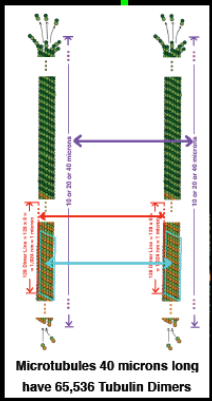
NJL Quantum Condensate

10¹⁹ E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation

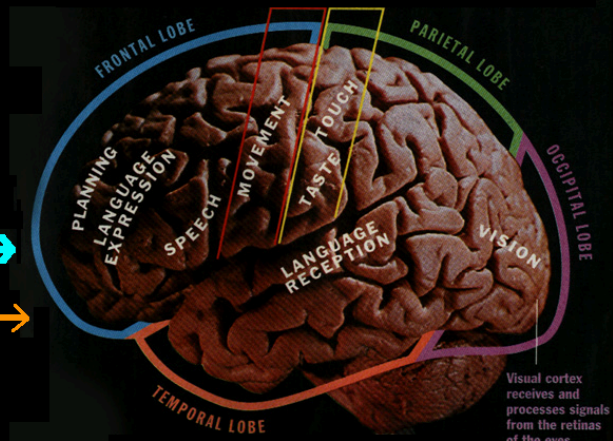


$CI(0,16) \times CI(0,8) = CI(0,24)$
 $M(2, CI(0,24)) = CI(1,25)$
 Completion of Union of All Tensor Products of $CI(1,25) = AQFT$

Quantum Resonant Connection



Penrose-Hameroff Quantum Condensate



10¹⁹ Tubulin Dimers in a Human Brain

Visual cortex receives and processes signals from the retinas of the eyes



December 2019 (United States)

January 2020

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4 ☾ 1st Quarter	5	6	7
8	9	10	11	12 ☽ Full Moon	13	14
15	16	17	18 ☾ 3rd Quarter	19	20	21 December Solstice
22	23 Chanukah/Hanukkah (first day)	24 Christmas Eve	25 Christmas Day	26 ● New Moon	27	28
29	30 Last Day of Chanukah	31	1 New Year's Day	2 ☾ 1st Quarter	3	4

Tensor Product $Cl(0,8) \times Cl(p,q) = M(R,16) \times Cl(p,q) = Cl(p,q+8)$

Real Clifford Algebras $Cl(p,q)$

H = Quaternion

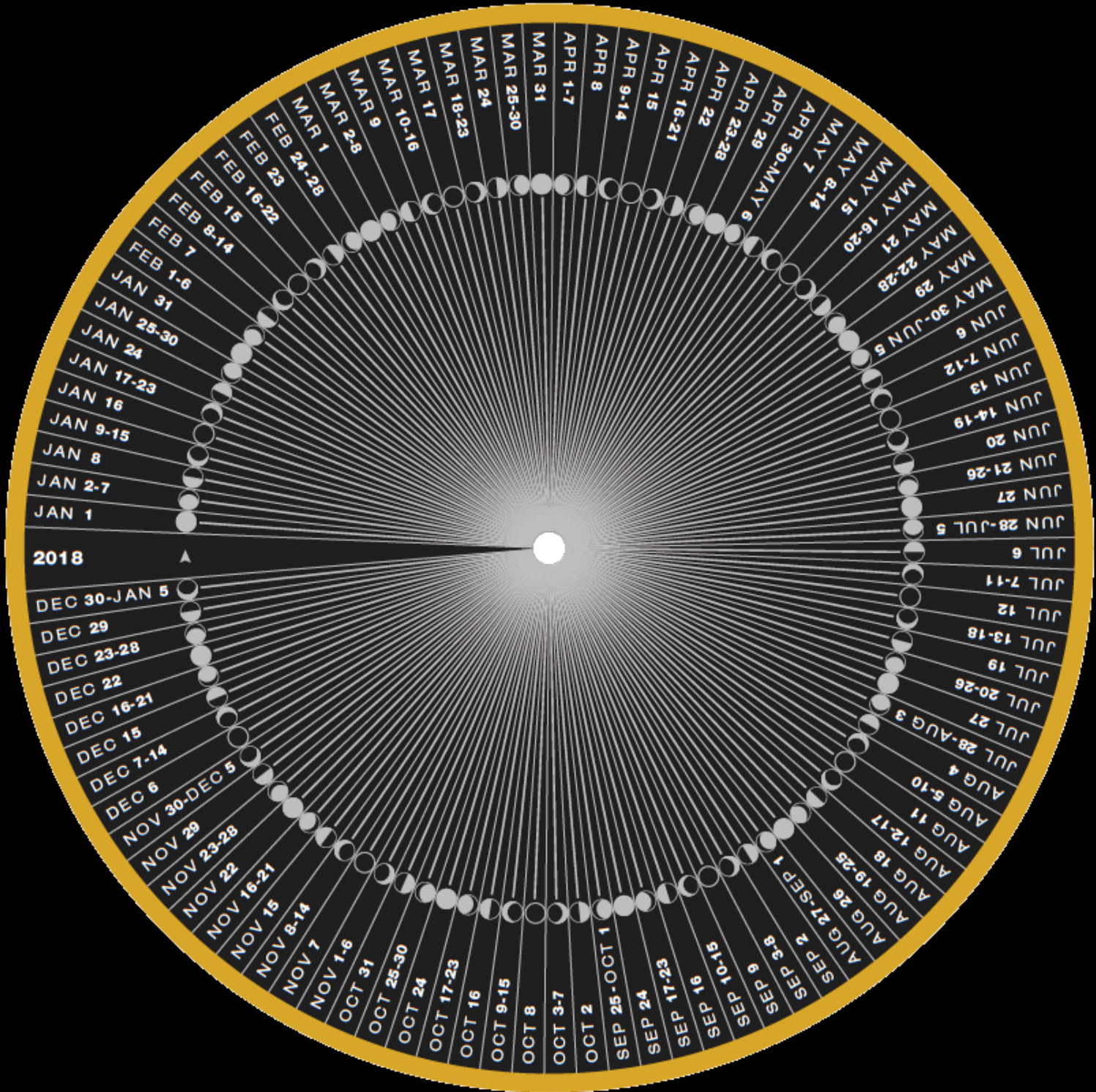
C = Complex

R = Real

8	$M_{16}(R)$	$M_{16}(C)$	$M_{16}(H)$	$M_{16}(H) \oplus M_{16}(H)$	$M_{32}(H)$	$M_{64}(C)$	$M_{128}(R)$	$M_{128}(R) \oplus M_{128}(R)$	$M_{256}(R)$								
7	$M_8(C)$	$M_8(H)$	$M_8(H) \oplus M_8(H)$	$M_{16}(H)$	$M_{32}(C)$	$M_{64}(R)$	$M_{64}(R) \oplus M_{64}(R)$	$M_{128}(R)$	$M_{128}(C)$	$M_{128}(H)$							
6	$M_4(H)$	$M_4(H) \oplus M_4(H)$	$M_8(H)$	$M_{16}(C)$	$M_{32}(R)$	$M_{32}(R) \oplus M_{32}(R)$	$M_{64}(R)$	$M_{64}(C)$	$M_{64}(H)$	$M_{64}(H) \oplus M_{64}(H)$	$M_{128}(H)$						
5	$M_2(H) \oplus M_2(H)$	$M_4(H)$	$M_8(C)$	$M_{16}(R)$	$M_{16}(R) \oplus M_{16}(R)$	$M_{32}(R)$	$M_{32}(C)$	$M_{32}(H)$	$M_{32}(H) \oplus M_{32}(H)$	$M_{64}(H)$	$M_{128}(C)$	$M_{256}(R)$					
4	$M_2(H)$	$M_4(C)$	$M_8(R)$	$M_8(R) \oplus M_8(R)$	$M_{16}(R)$	$M_{16}(C)$	$M_{16}(H)$	$M_{16}(H) \oplus M_{16}(H)$	$M_{32}(H)$	$M_{64}(C)$	$M_{128}(R)$	$M_{128}(R) \oplus M_{128}(R)$	$M_{256}(R)$				
3	$M_2(C)$	$M_4(R)$	$M_8(R) \oplus M_8(R)$	$M_8(R)$	$M_8(C)$	$M_8(H)$	$M_8(H) \oplus M_8(H)$	$M_{16}(H)$	$M_{32}(C)$	$M_{64}(R)$	$M_{64}(R) \oplus M_{64}(R)$	$M_{128}(R)$	$M_{128}(C)$	$M_{128}(H)$			
2	$M_2(R)$	$M_2(R) \oplus M_2(R)$	$M_4(R)$	$M_4(C)$	$M_4(H)$	$M_4(H) \oplus M_4(H)$	$M_8(H)$	$M_{16}(C)$	$M_{32}(R)$	$M_{32}(R) \oplus M_{32}(R)$	$M_{64}(R)$	$M_{64}(C)$	$M_{64}(H)$	$M_{64}(H) \oplus M_{64}(H)$	$M_{128}(H)$		
1	$R \oplus R$	$M_2(R)$	$M_2(C)$	$M_2(H)$	$M_2(H) \oplus M_2(H)$	$M_4(H)$	$M_8(C)$	$M_{16}(R)$	$M_{16}(R) \oplus M_{16}(R)$	$M_{32}(R)$	$M_{32}(C)$	$M_{32}(H)$	$M_{32}(H) \oplus M_{32}(H)$	$M_{64}(H)$	$M_{128}(C)$	$M_{256}(R)$	
0	R	C	H	$H \oplus H$	$M_2(H)$	$M_4(C)$	$M_8(R)$	$M_8(R) \oplus M_8(R)$	$M_{16}(R)$	$M_{16}(C)$	$M_{16}(H)$	$M_{16}(H) \oplus M_{16}(H)$	$M_{32}(H)$	$M_{64}(C)$	$M_{128}(R)$	$M_{128}(R) \oplus M_{128}(R)$	$M_{256}(R)$
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

q -->

p ^



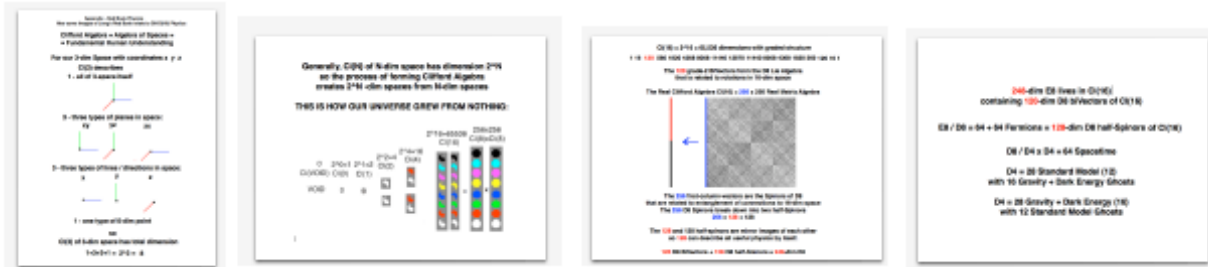
RED BOOK PHYSICS

How Jung's Red Book Archetypes connect with E8 - Cl(16) Physics

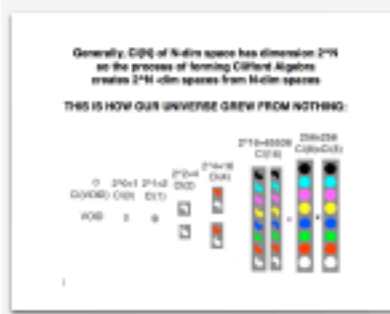
Frank Dodd (Tony) Smith, Jr. - 2018

The first five pages after the cover summarize the rest of this paper.

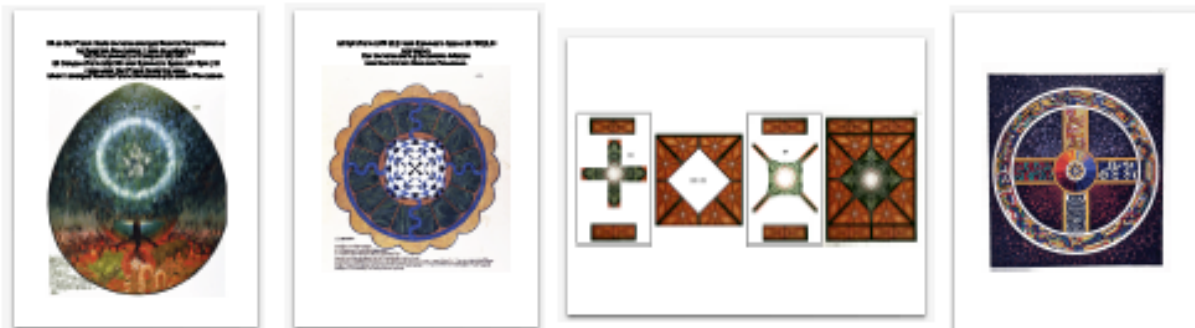
CLIFFORD ALGEBRAS to E8



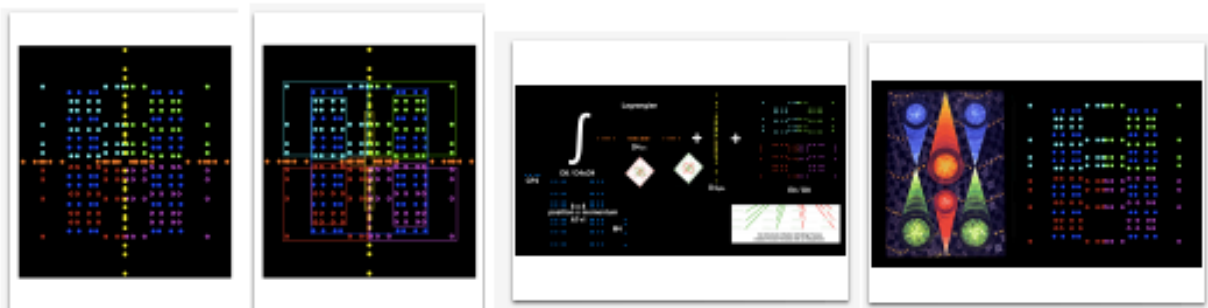
CLIFFORD EVOLUTION of OUR UNIVERSE



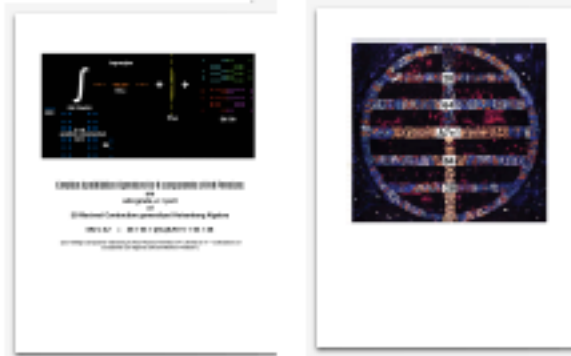
CREATION - OCTONIONIC NON-UNITARY INFLATION 28+64+28 = 120 D8 = 4X32 =128 D8 HALF-SPINOR



E8 - PARTICLES and FORCES - 8D LAGRANGIAN - TRIALITY

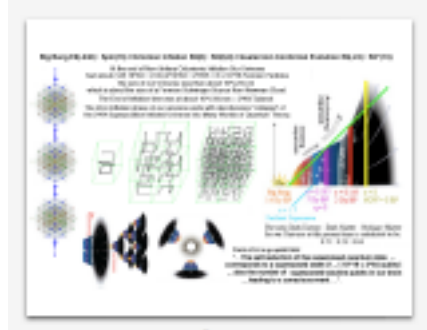


E8 HEISENBERG CREATION-ANNIHILATION - $28+64+(63+1)+64=28$

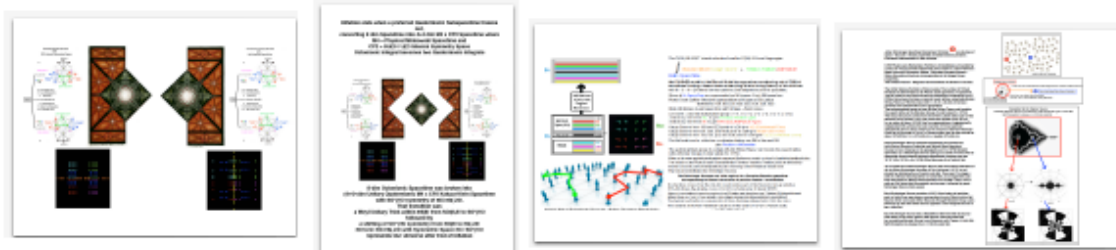


AFTER INFLATION - QUATERNIONIC UNITARY EXPANSION

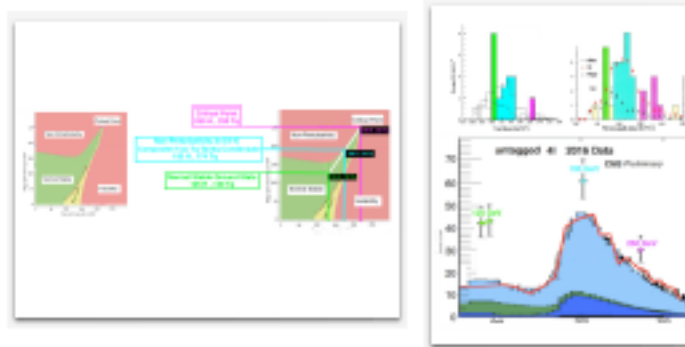
now - DE : DM : OM = 0.75 : 0.21 : 0.04



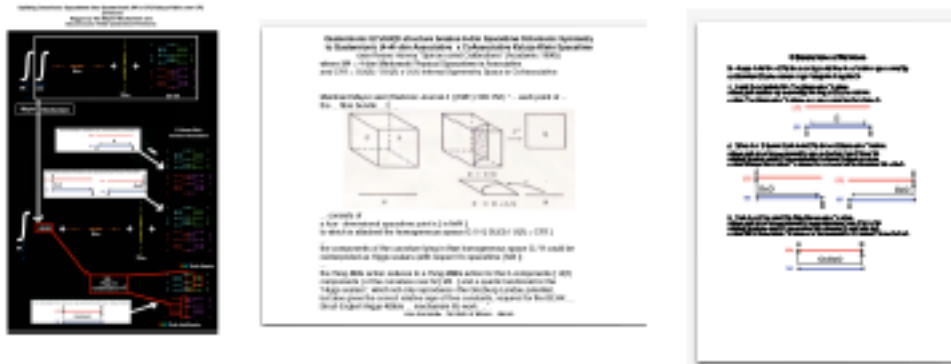
**E8 = H4 STANDARD MODEL CP2 + H4 GRAVITY+DARK ENERGY M4
STRINGS = WORLD LINES 26D STRING THEORY - SPIN-2 BOHMIONS
QUANTUM BLOCKCHAINS OF SCHWINGER SOURCES**



**HIGGS = NAMBU-JONA-LASINIO TRUTH QUARK COMPOSITE
 FERMILAB TRUTH QUARK MASSES 130 GeV - 174 GeV - 220 GeV
 CMS HIGGS MASSES 125 GeV - 195 GeV - 260 GeV**



M4xCP2 KALUZA-KLEIN - MAYER HIGGS - 3 FERMION GENERATIONS



FERMION OCTONIONIC BRAIDS - FERMION MASSES



D4 STANDARD MODEL and GRAVITY+DE GHOSTS D4 GRAVITY+DE and STANDARD MODEL GHOSTS

248-dim E8 contains 120-dim D6
 E8 / D8 = 64 + 64 Fermions
 D8 / D4 x D4 = 64 Spacetime
 D4 = 28 Standard Model (12)
 with 16 Gravity + Dark Energy Ghosts
 D4 = 28 Gravity + Dark Energy (16)
 with 12 Standard Model Ghosts

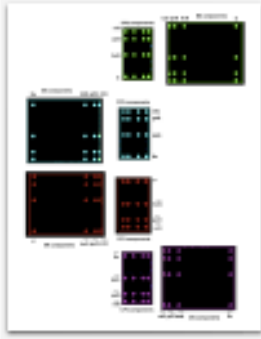
The Standard Model
 The Standard Model of particle physics is a quantum field theory of electroweak and strong interactions. It is the most successful theory of particle physics to date, having been tested to high precision in a wide range of experiments. The Standard Model is based on the gauge theory of the SU(3) color group, the SU(2) weak isospin group, and the U(1) hypercharge group. The Standard Model is a renormalizable quantum field theory, which means that it is possible to calculate the probability of any process occurring in a given interaction, to any order in perturbation theory. The Standard Model is a gauge theory, which means that the interactions are mediated by gauge bosons. The Standard Model is a quantum field theory, which means that the particles are described by fields. The Standard Model is a renormalizable quantum field theory, which means that it is possible to calculate the probability of any process occurring in a given interaction, to any order in perturbation theory.

The Standard Model
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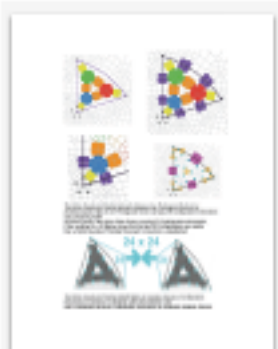
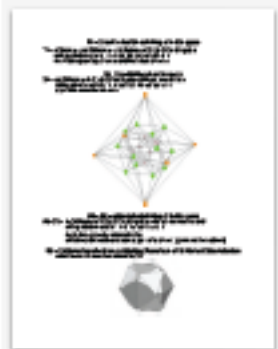
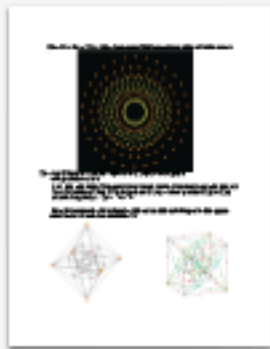
FORCE STRENGTHS - 4D LAGRANGIAN - CALCULATION RESULTS

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Force	Strength	Dimension
Gravity	10 ⁻³⁸	4
Electromagnetism	10 ⁻²	4
Weak Interaction	10 ⁻¹⁶	4
Strong Interaction	10 ⁻¹³	4
Gravity	10 ⁻³⁸	10
Electromagnetism	10 ⁻²	10
Weak Interaction	10 ⁻¹⁶	10
Strong Interaction	10 ⁻¹³	10

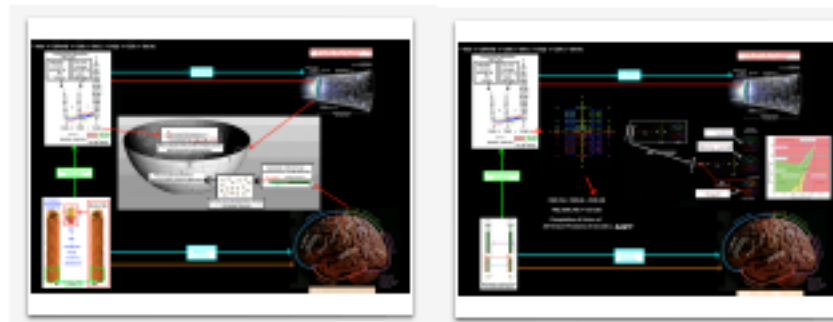
E8 - H4 - F4 - D4 - D3=A3 - H3 - H2=PENROSE STAR



CELLULAR AUTOMATA - CL(8) - CL(16) - MICROTUBULE - PYRAMIDS



SHILOV BOUNDARY HUMAN MIND COMPLEX DOMAIN UNIVERSAL CONSCIOUSNESS



William Kingdon Clifford (1845 - 1879)
described Geometry in terms of his invention: Real Clifford Algebras,
which he called “**mind-stuff**”, saying:

“... That element of which ... even the simplest feeling is a complex,
I shall call **Mind-stuff**.

A moving molecule of **inorganic matter** does not possess mind or
consciousness ; but it **possesses a small piece of mind-stuff**. ...

When molecules are ... combined together ... the elements of mind-stuff
which go along with them ... combine ... to form the ... beginnings of Sentience.

When the molecules are so combined as to form the brain and nervous system ...
the corresponding elements of mind-stuff are so combined as to form some kind
of consciousness ... changes in the complex which take place at the same time
get so linked together that the repetition of one implies the repetition of the other.

**When matter takes the complex form of a living human brain,
the corresponding mind-stuff takes the form of a human consciousness ...”.**

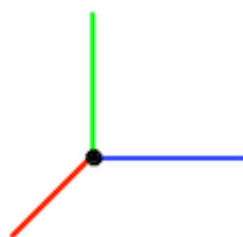
(Wikipedia - (1878, "On the Nature of Things-in-Themselves", Mind, Vol. 3, No. 9, pp. 57–67))

**Clifford Algebra = Algebra of Spaces =
= Fundamental Human Understanding**

For our 3-dim Space with coordinates x y z

Cl(3) describes

1 - all of 3-space itself



3 - three types of planes in space:

xy

yz

zx



3 - three types of lines / directions in space:

x

y

z



1 - one type of 0-dim point

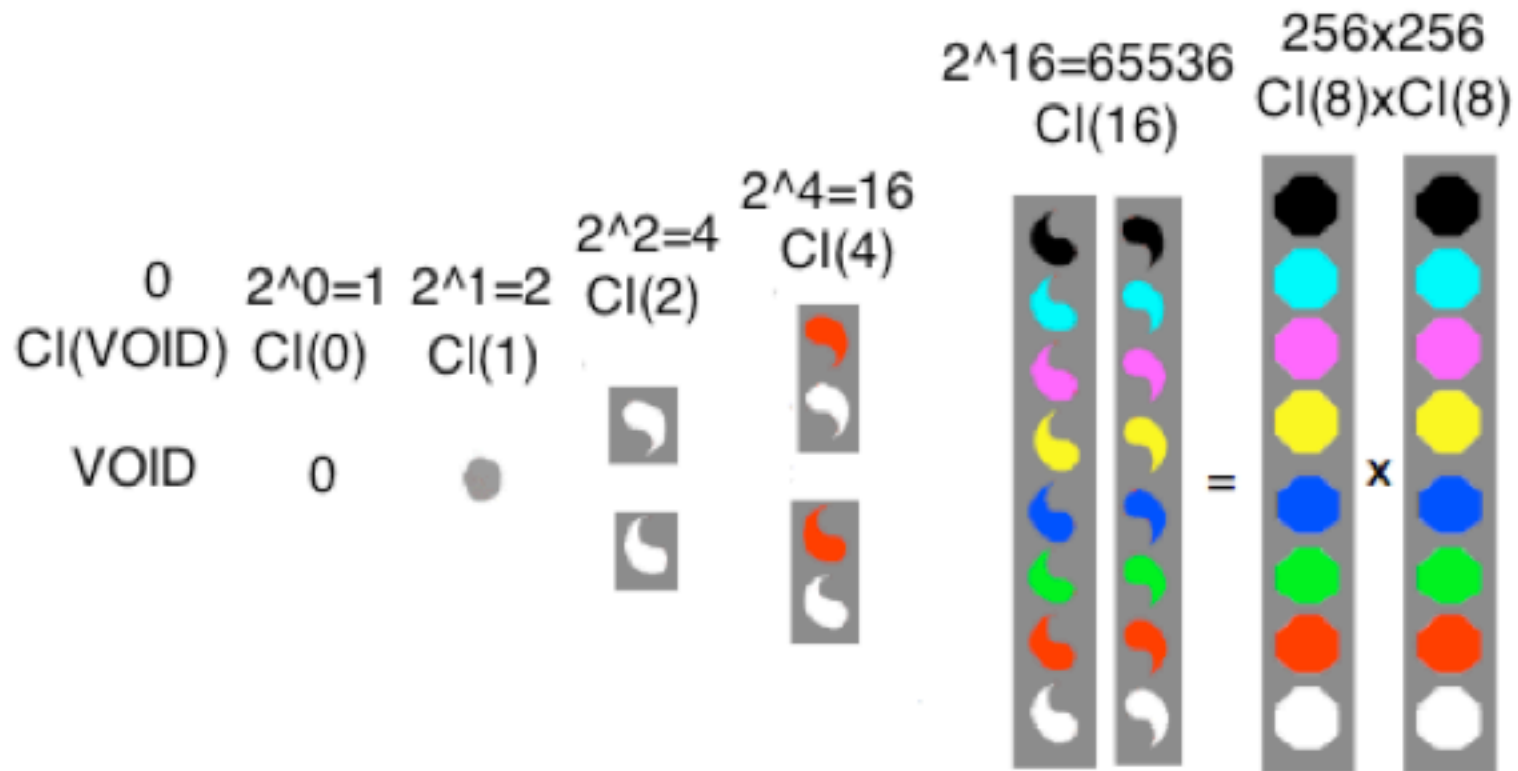
so

Cl(3) of 3-dim space has total dimension

$$1+3+3+1 = 2^3 = 8$$

**Generally, $Cl(N)$ of N -dim space has dimension 2^N
 so the process of forming Clifford Algebra
 creates 2^N -dim spaces from N -dim spaces**

THIS IS HOW OUR UNIVERSE GREW FROM NOTHING:

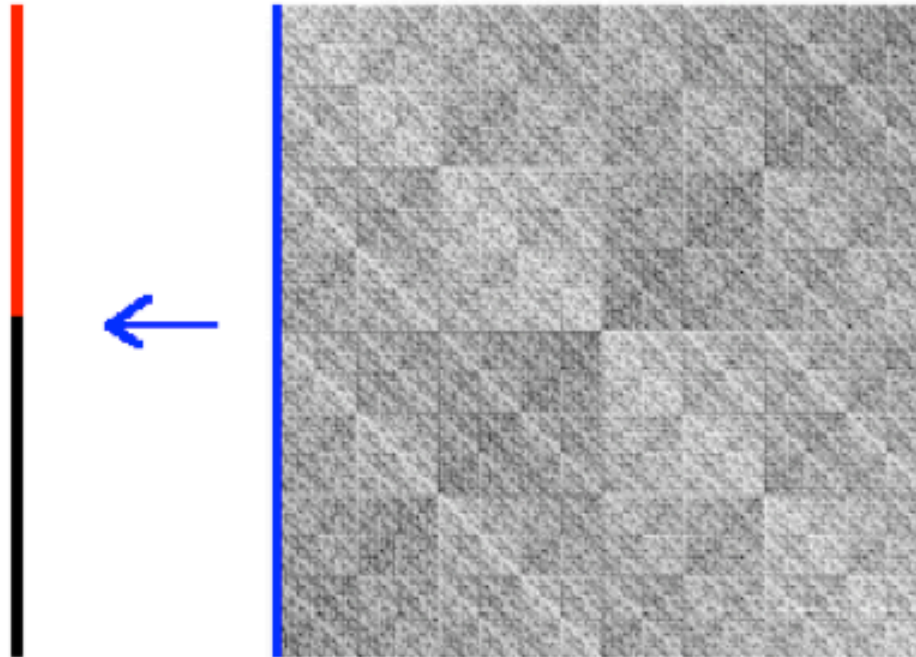


$Cl(16) = 2^{16} = 65,536$ dimensions with graded structure

1 16 120 560 1820 4368 8008 11440 12870 11440 8008 4368 1820 560 120 16 1

The 120 grade-2 BiVectors form the D8 Lie Algebra that is related to rotations in 16-dim space

The Real Clifford Algebra $Cl(16) = 256 \times 256$ Real Matrix Algebra



The 256 first-column-vectors are the Spinors of D8 that are related to entanglement of connections to 16-dim space

The 256 D8 Spinors break down into two half-Spinors

$$256 = 128 + 128$$

The 128 and 128 half-spinors are mirror images of each other so 128 can describe all useful physics by itself.

120 D8 BiVectors + 128 D8 half-Spinors = 248-dim E8

248-dim E8 lives in Cl(16) |
containing 120-dim D8 biVectors of Cl(16)

E8 / D8 = 64 + 64 Fermions = 128-dim D8 half-Spinors of Cl(16)

D8 / D4 x D4 = 64 Spacetime

D4 = 28 Standard Model (12)
with 16 Gravity + Dark Energy Ghosts

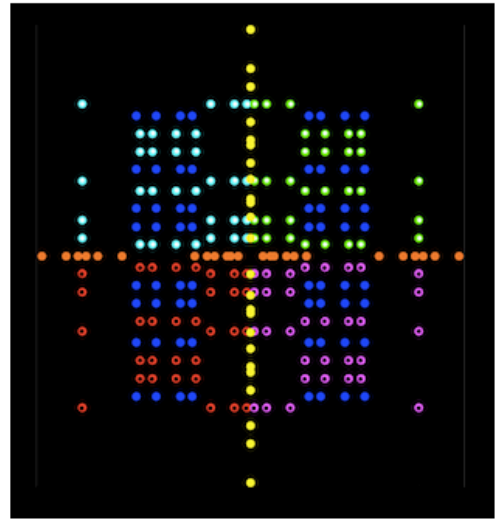
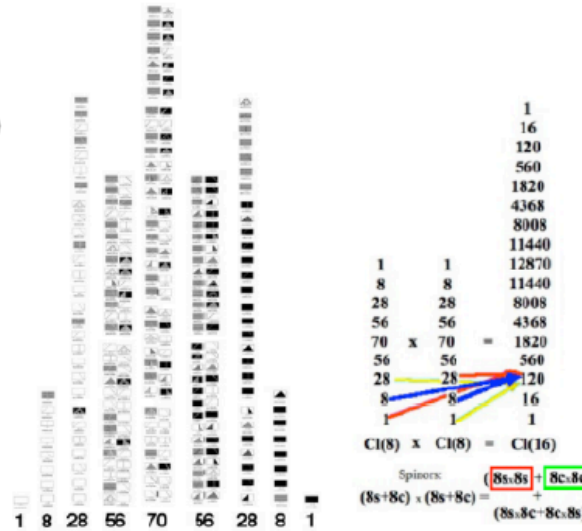
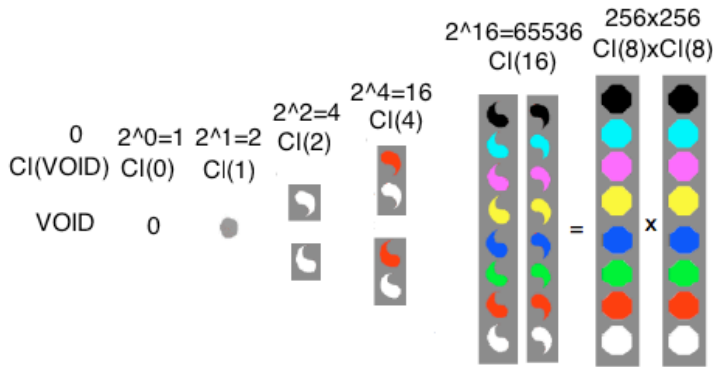
D4 = 28 Gravity + Dark Energy (16)
with 12 Standard Model Ghosts

Dimension of Clifford Algebra					
0	$2^0=1$	$2^1=2$	$2^2=4$	$2^4=16$	$2^{16}=65536$
256x256					

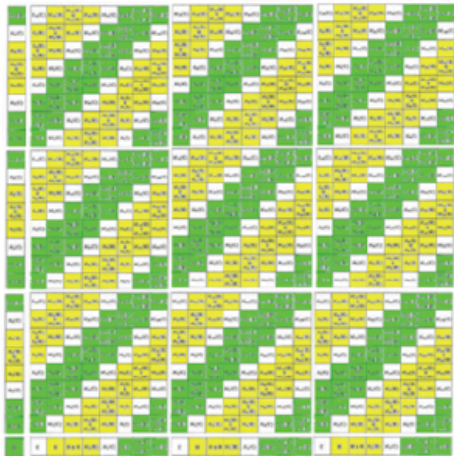
VOID \rightarrow CI(VOID) \rightarrow CI(0,0) \rightarrow CI(0,1) \rightarrow CI(0,2) \rightarrow CI(0,4) \rightarrow CI(0,16) = CI(0,8)xCI(0,8) \rightarrow CI(0,16)xCI(0,8) = CI(0,24) \rightarrow M(2,CI(0,24)) = CI(1,25) \rightarrow

\rightarrow Completion of Union of All Tensor Products of CI(1,25) = hyperfinite AQFT

CI(1,25) = CI(1,9)xCI(0,8)xCI(0,8) and CI(1,9) = CI(1,5) x CI(0,4) = CI(2,4) x CI(0,4)



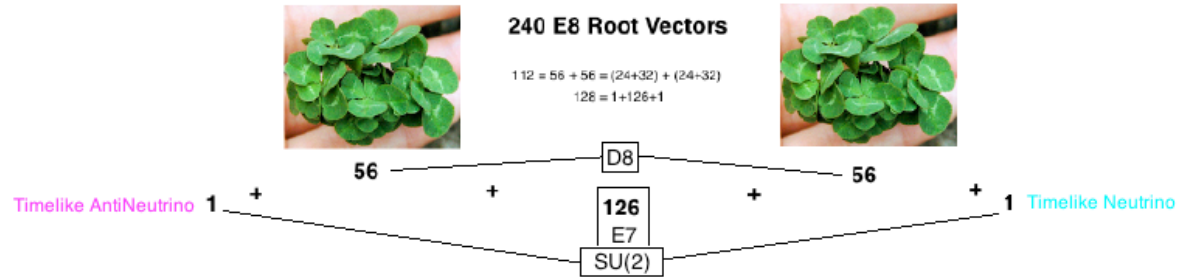
CI(16) contains $120 + 64 + 64 = 248 = E8$ with $112 + 128 = 240$ root vectors



The completion of the union of all tensor products of CI(16) = CI(8)xCI(8) produces a generalized Hyperfinite III von Neumann factor that gives the CI(16)-E8 model a natural Algebraic Quantum Field Theory

The CI(16)-E8 AQFT inherits structure from the CI(16)-E8 Local Lagrangian

The Creation-Annihilation Operator structure of CI(16)-E8 AQFT is given by the Maximal Contraction of E8 = semidirect product A7 x h92 where h92 = $92+1+92 = 185$ -dim Heisenberg algebra and A7 = 63-dim SL(8)



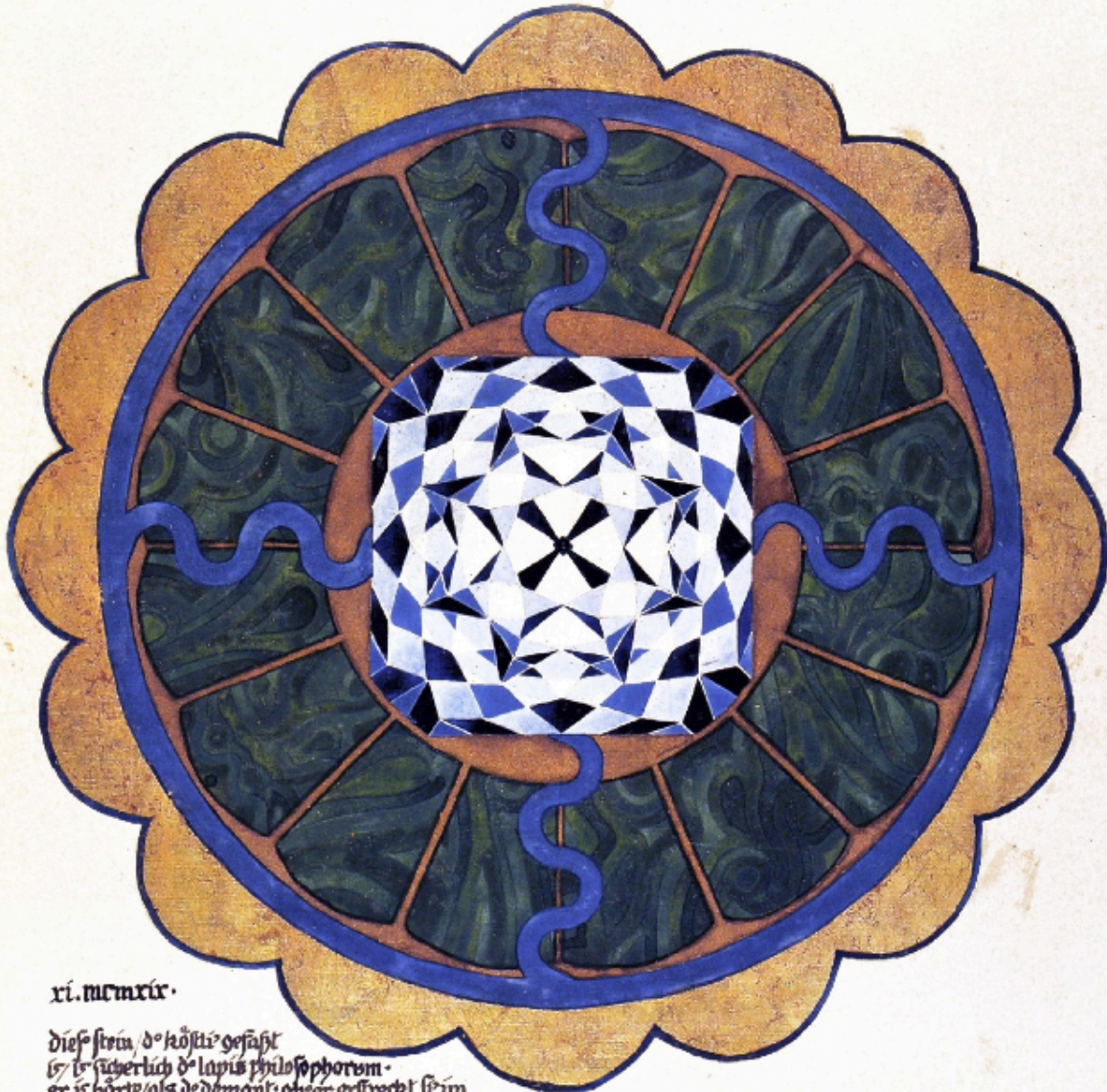
When Our Planck Scale Universe emerged from its Parent Universe by Quantum Fluctuation it was described by SO(16) symmetry of Compact E8(-248). E8 Compact Form E8(-248) with Symmetric Space E8 / Spin(16) represents Our Planck Scale Universe when it emerged from its Parent Universe by Quantum Fluctuation.



besudet am
25 Novembri
1322
das mußill hont
das für v' erf' ist
d' laberz bawm
zün kreis auf d'
vollandet / also es
do kreis auf im weltel ein
fremde gult / d' nicht z' benenien
da golt d' erf' / bebrütet es
neue le buech form' für auf rau' v'
afbe.

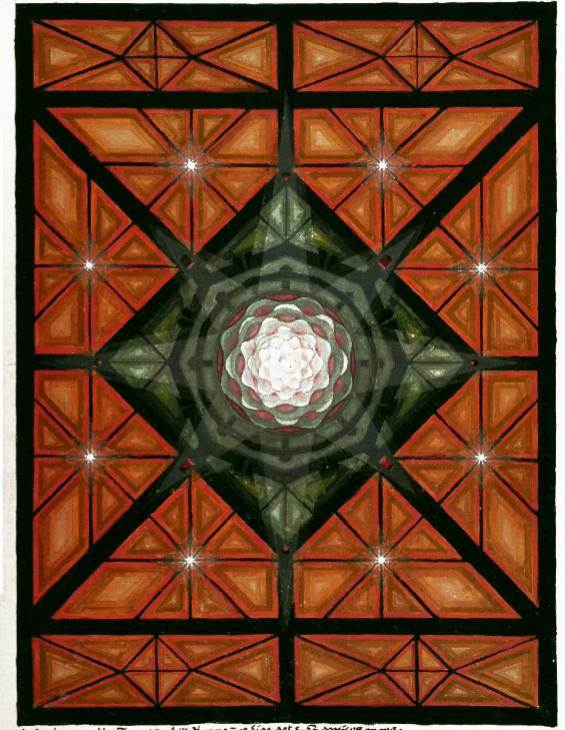
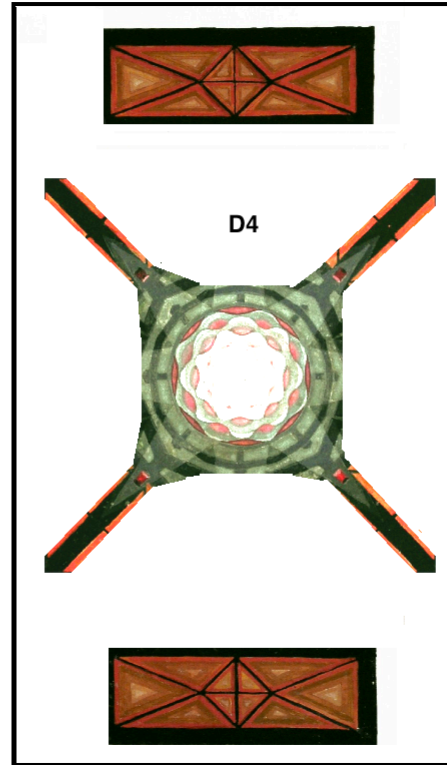
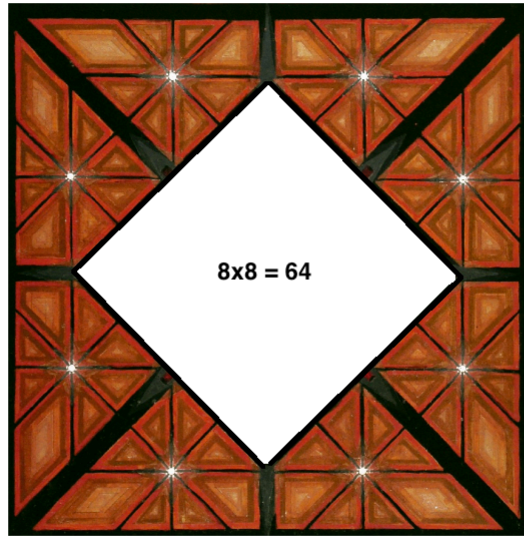
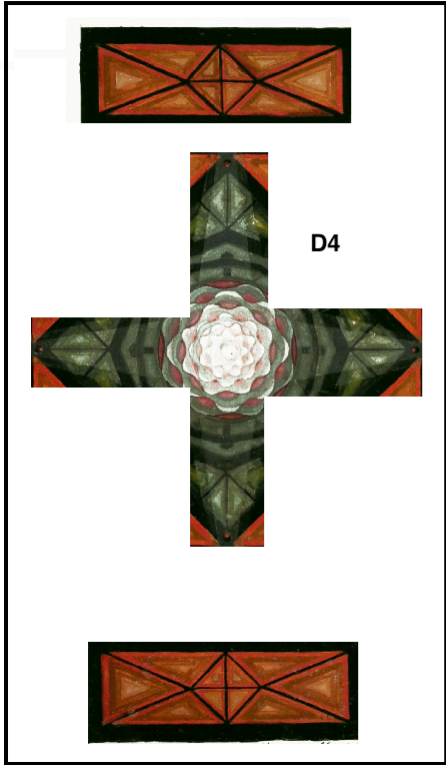
E8 Split Form EVIII E8(8) with Symmetric Space E8 / SO(8,8)
 represents
 Our Universe during Octonionic Inflation
 with Non-Unitary Quantum Processes.

121



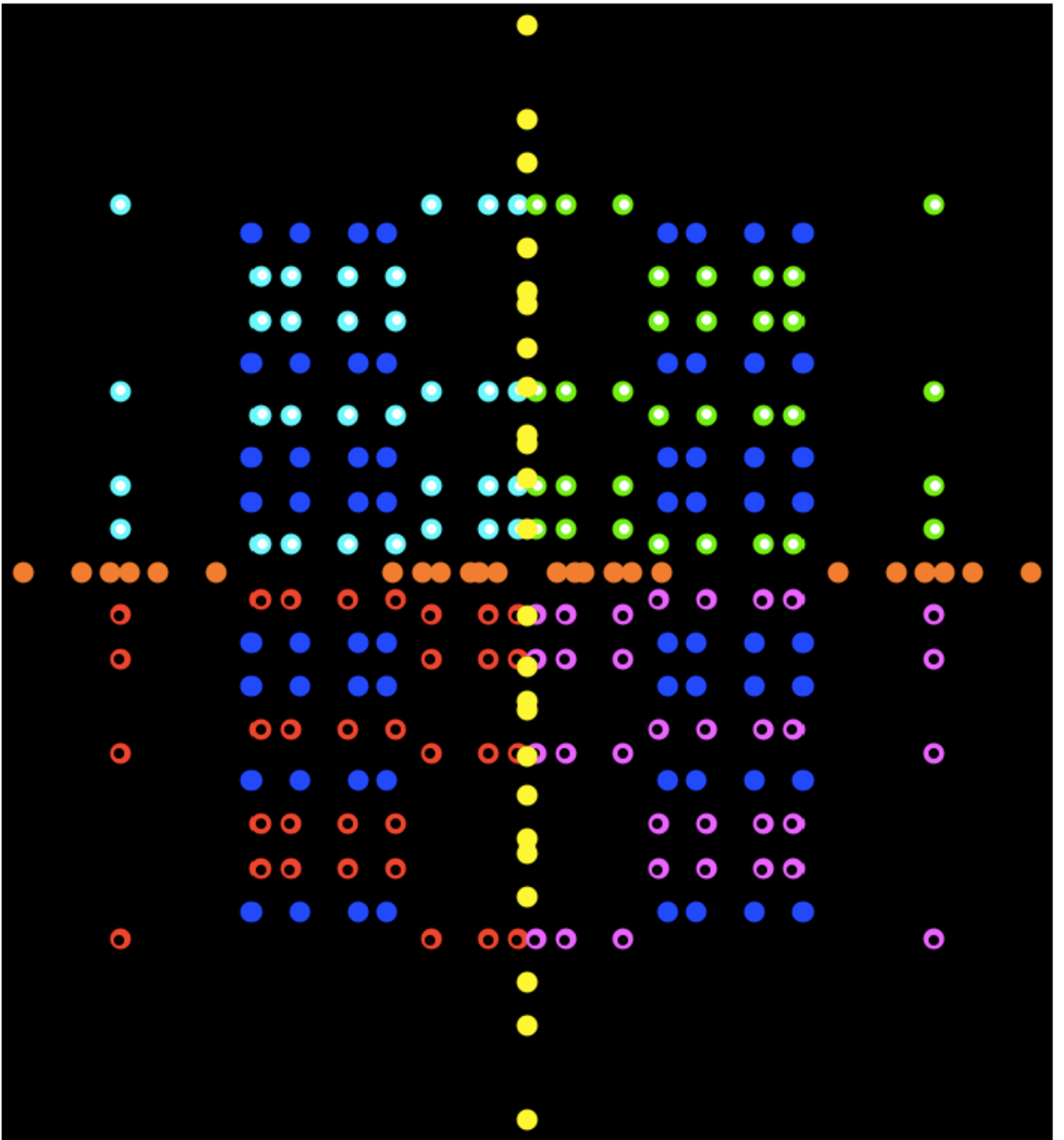
xi. mcmxix.

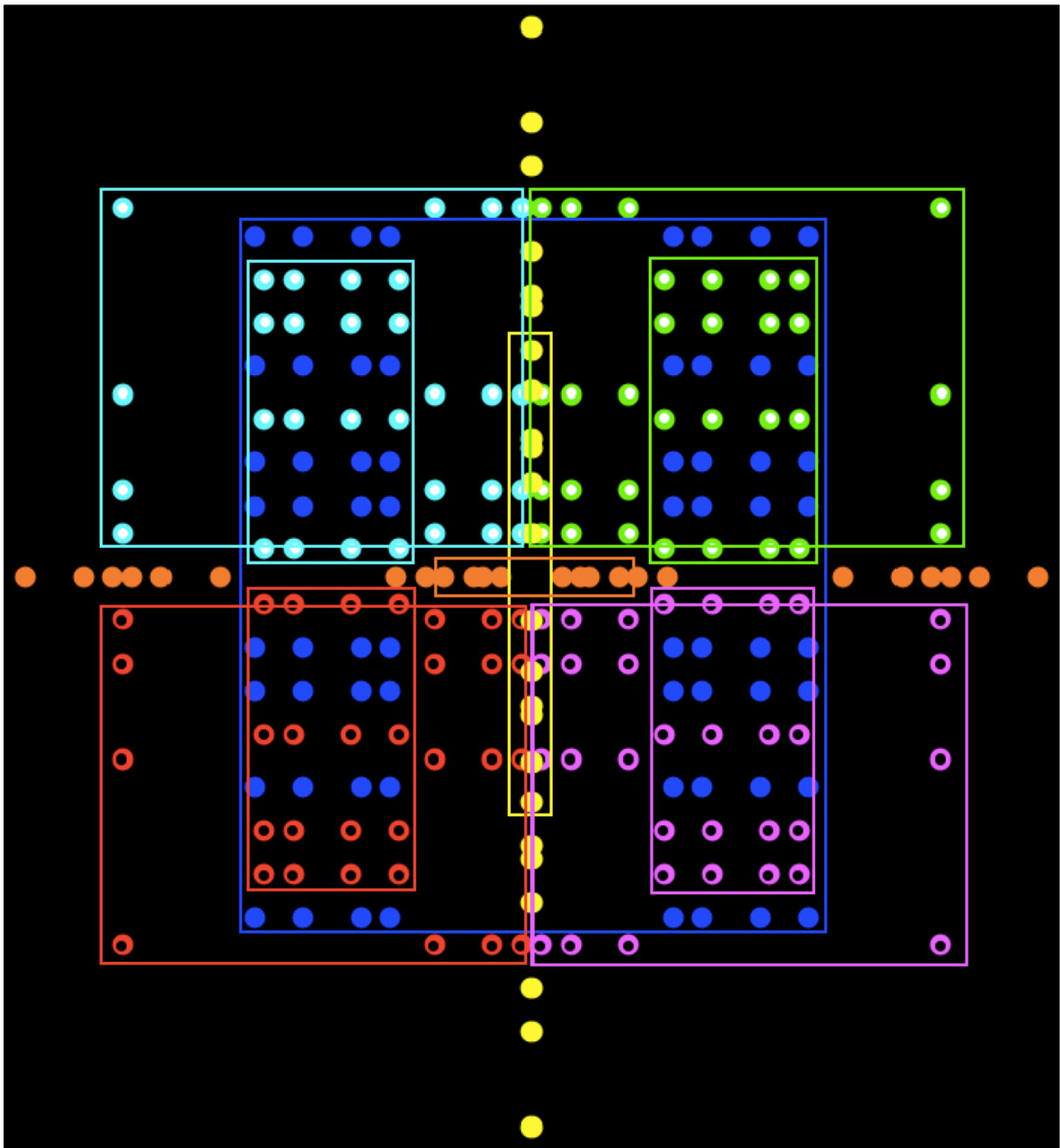
dies stein, d' köstli' gefäst
 is' ir' sicherlich d' lapis philosophorum.
 er ir' harts/ als d' demant/ ob' er erstreckt se' im
 raume von vier eig' schaft/ nämli' d' breite/ höhe/ tiefe/ v' d' zeit.
 er ir' darvon unlosbar v' du kants' dur' im hindur' geh' ohne es z' meck-. aus d' stein fließ' die vier aquariss' köme.
 dies ir' das unsterbliche kern/ das zwöl' val' v' mult' gelegt ir' v' das verhindert/ dass die spitz' d' beid' kegel h'
 berührt/ die monade/ die das pleroma' aufwiegt.



D. De Jantuarie 1710-1927 opus Hermannus Sig. aet. 52 amicis mess.







Lagrangian

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CP2

D8 / D4xD4

D4_{sm}

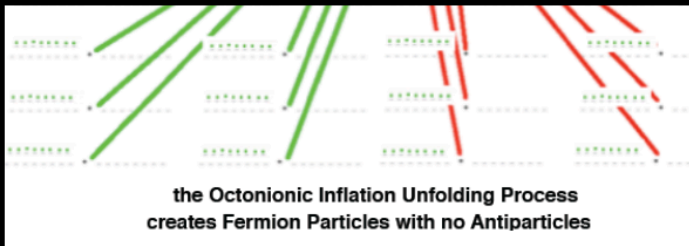
D4_{gde}

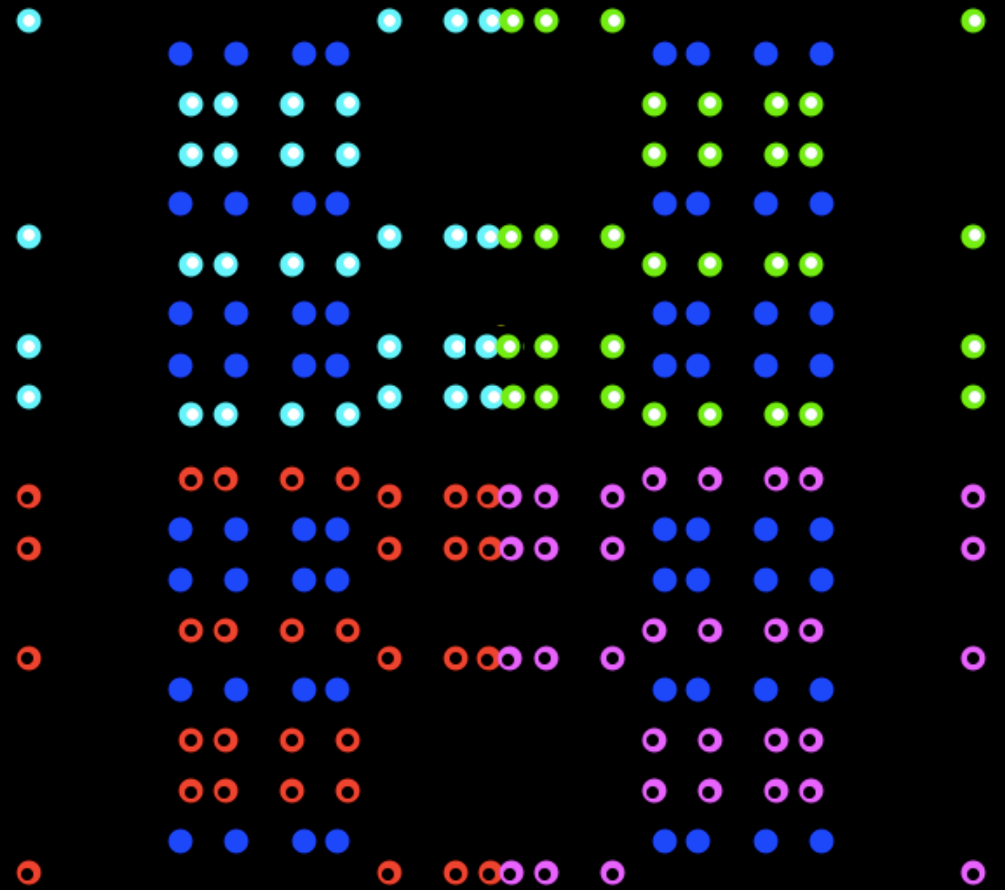
E8 / D8

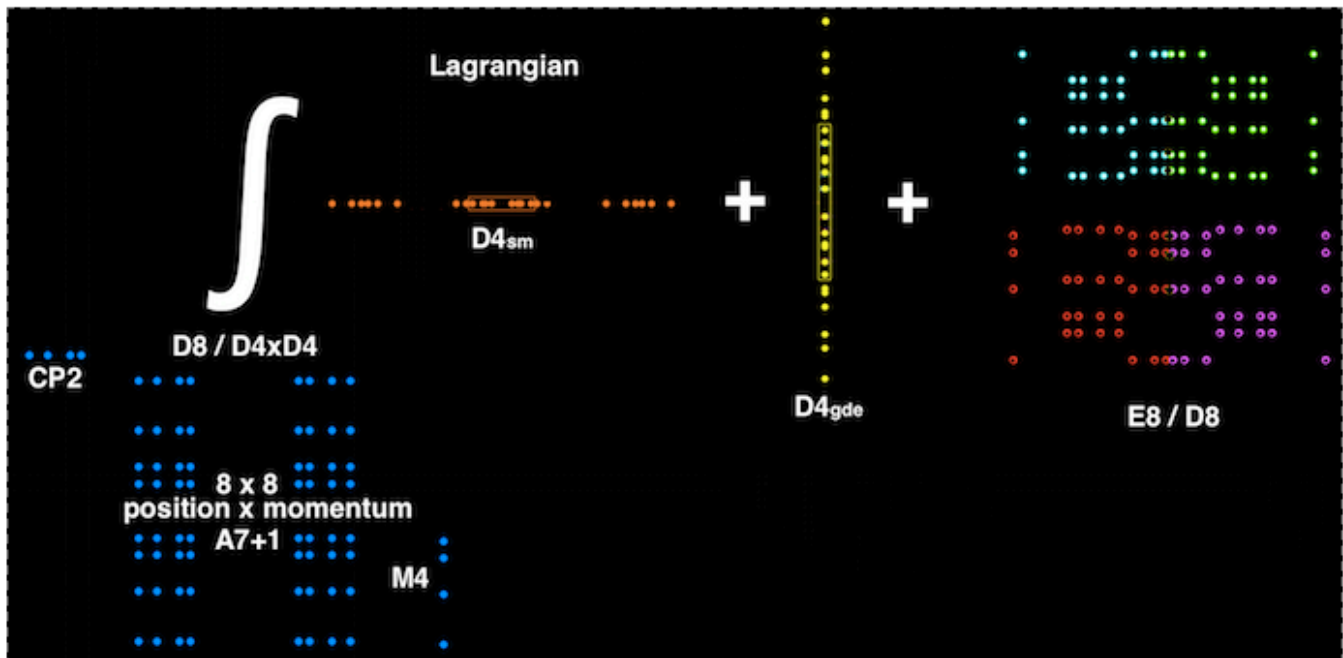
8 x 8
position x momentum

A7+1

M4



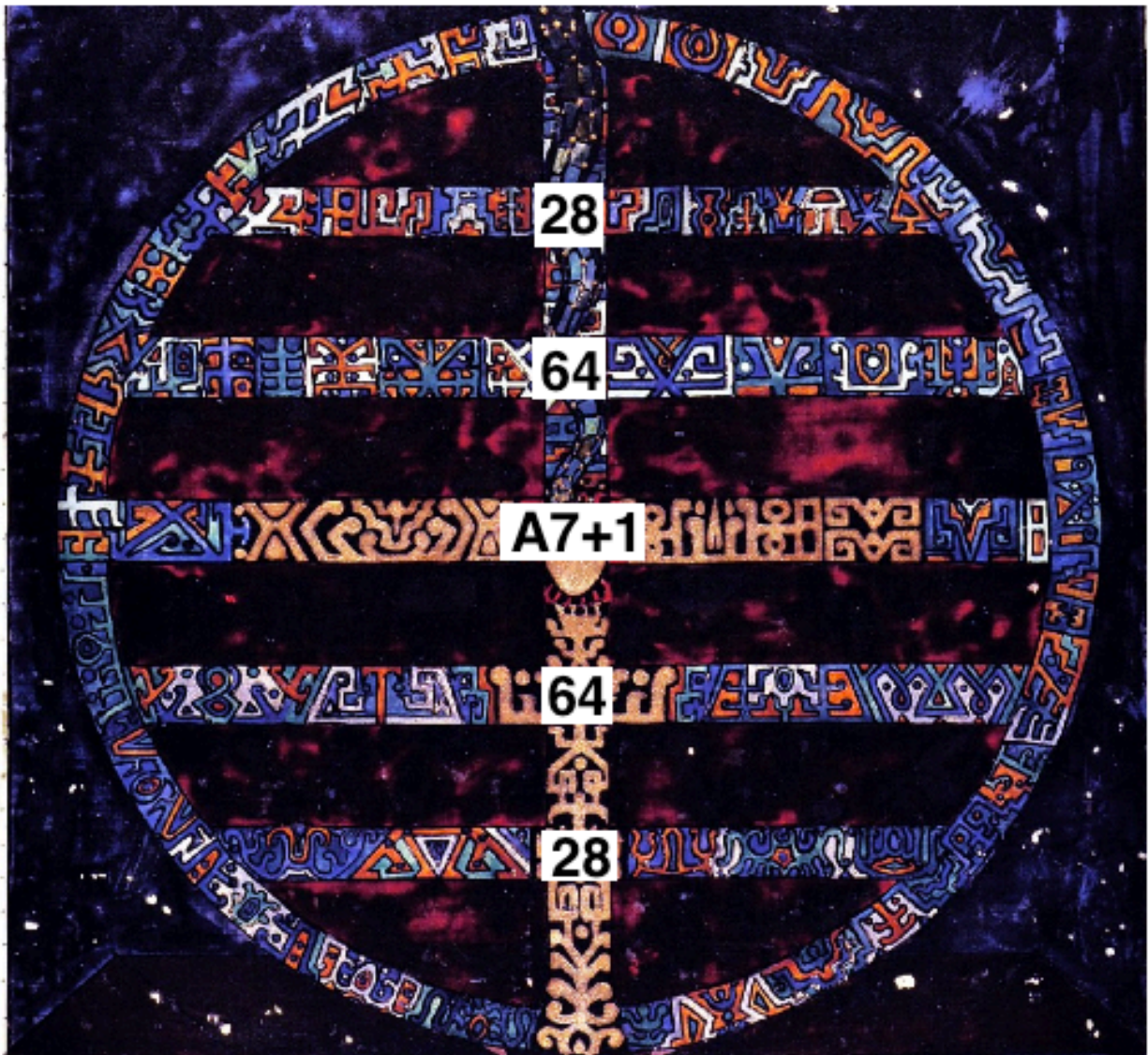




Creation-Annihilation Operators for 8 components of 8+8 Fermions
are
odd-grade-+/-1 part
of
E8 Maximal Contraction generalized Heisenberg Algebra

$$\mathfrak{h}_{92} \times \mathfrak{A}_7 = 28 + 64 + ((\mathfrak{SL}(8, \mathbb{R}) + 1) + 64 + 28)$$

(see Rutwig Campoamor-Stursberg in Acta Physica Polonica B 41 (2010) 53-77 "Contractions of Exceptional Lie Algebras and SemiDirect Products")

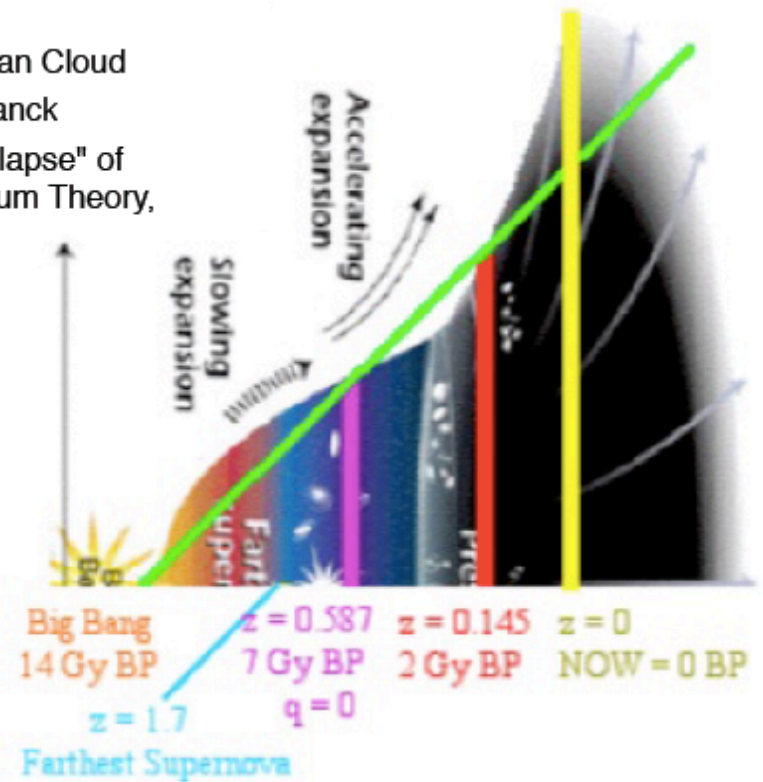
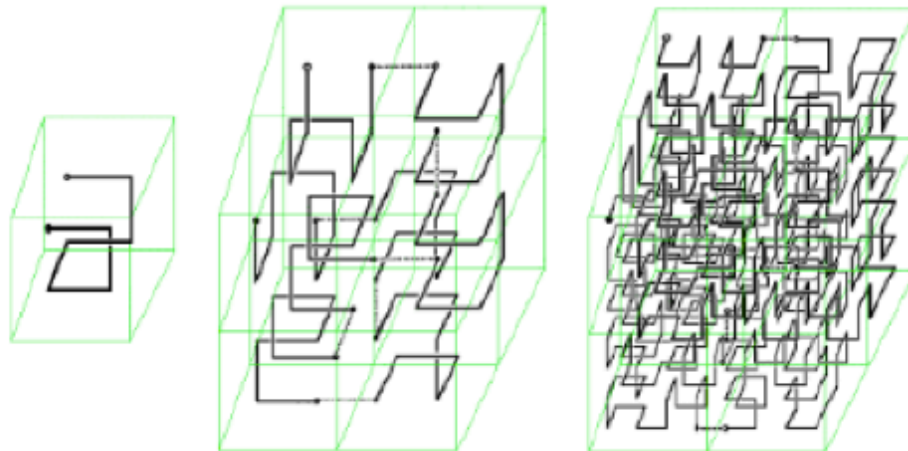
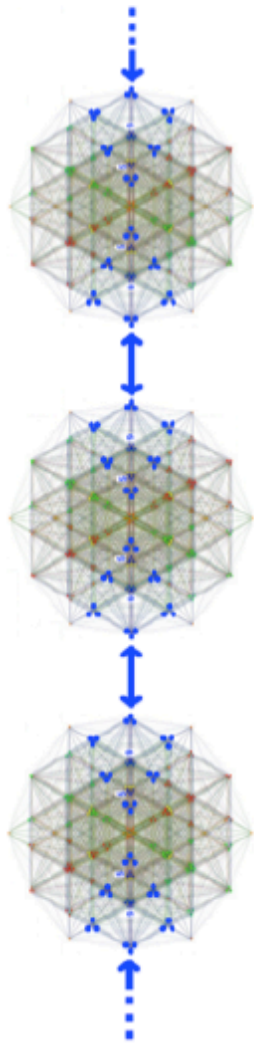


Big Bang E8(-248) : Spin(16) | Octonion Inflation E8(8) : SO(8,8) | Quaternion Conformal Evolution E8(-24) : SO*(16)

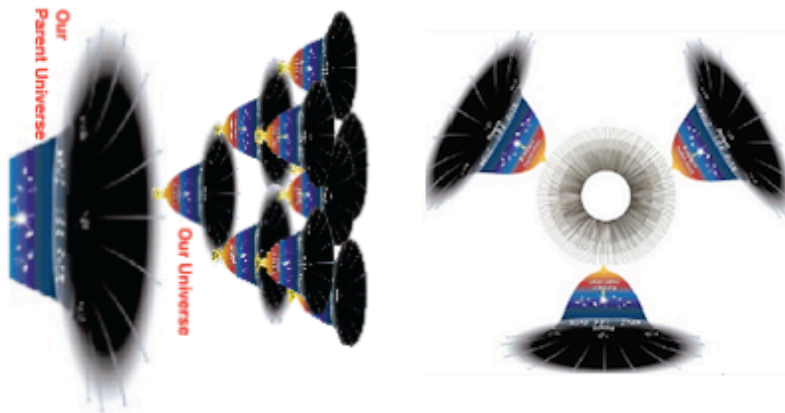
At the end of Non-Unitary Octonionic Inflation Our Universe had about $(1/2) 16^{64} = (1/2) (2^4)^{64} = 2^{255} = 6 \times 10^{76}$ Fermion Particles
 the size of our Universe was then about $10^{(-24)}$ cm
 which is about the size of a Fermion Schwinger Source Kerr-Newman Cloud

The End of Inflation time was at about $10^{(-34)}$ sec = 2^{64} Tplanck

The Zizzi Inflation phase of our universe ends with decoherence "collapse" of the 2^{64} Superposition Inflated Universe into Many Worlds of Quantum Theory,



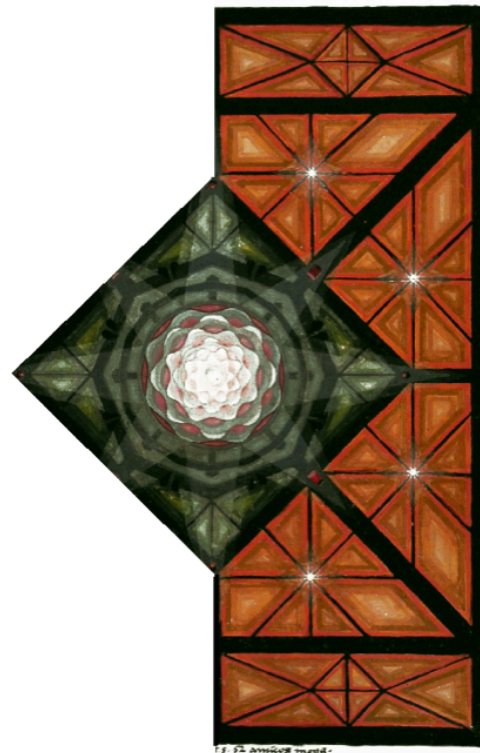
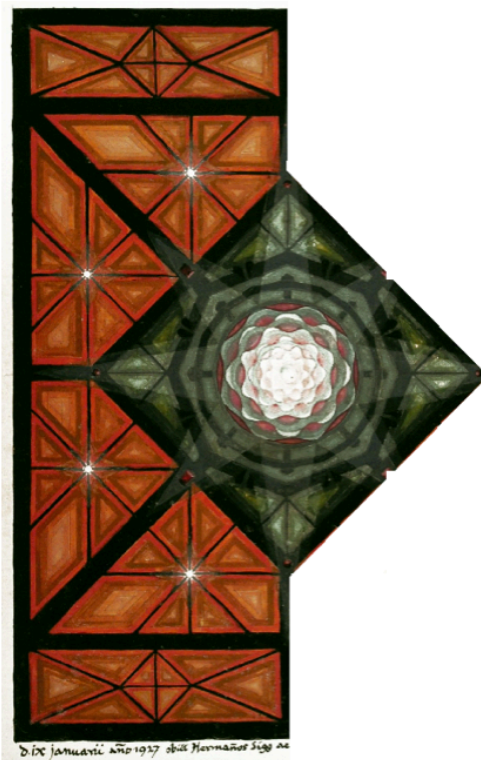
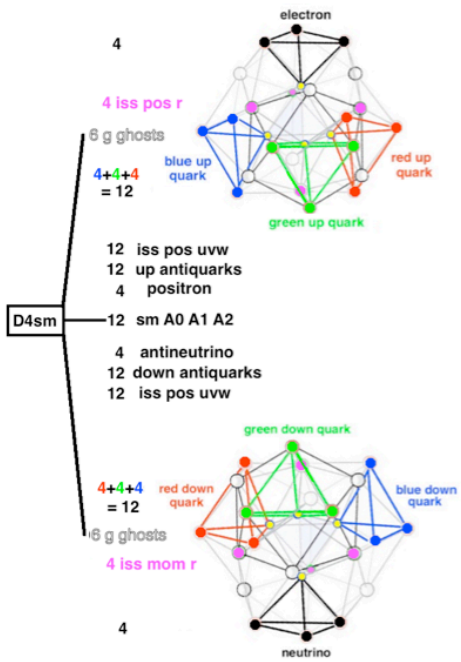
The ratio Dark Energy : Dark Matter : Ordinary Matter for our Universe at the present time is calculated to be:
 0.75 : 0.21 : 0.04



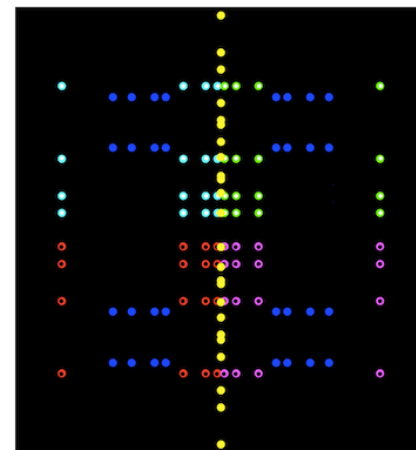
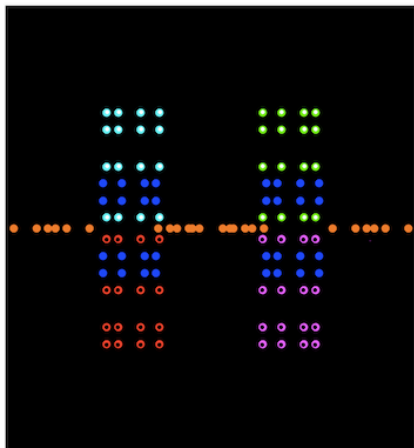
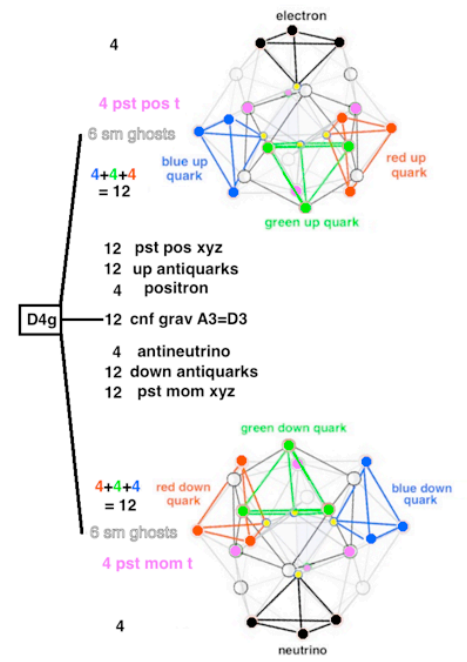
Paola Zizzi in gr-qc/0007006:

"... The self-reduction of the superposed quantum state ... corresponds to a superposed state of ... [$10^{19} = 2^{64}$ qubits] ... also the number of superposed tubulins-qubits in our brain ... leading to a conscious event. ..."

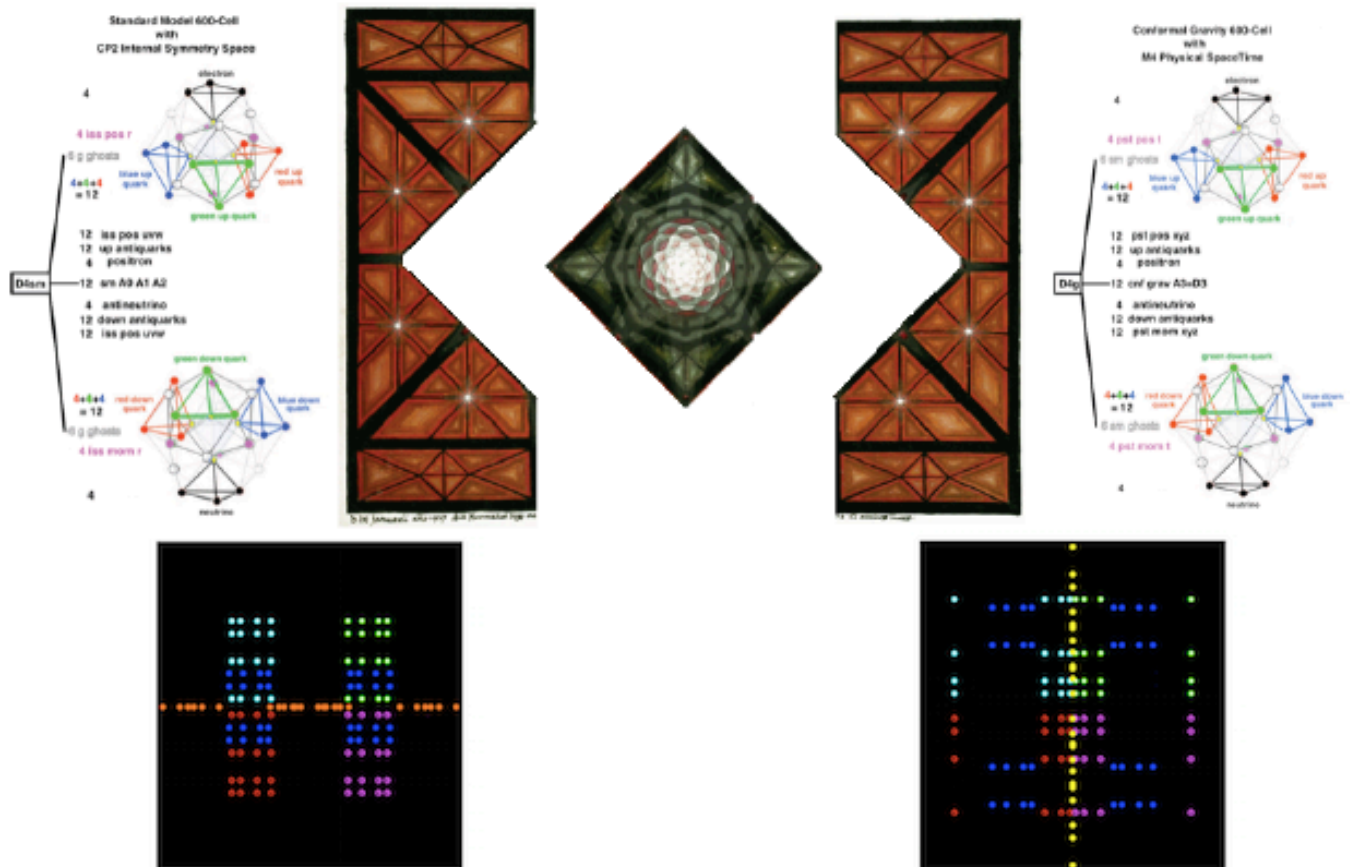
Standard Model 600-Cell
with
CP2 Internal Symmetry Space



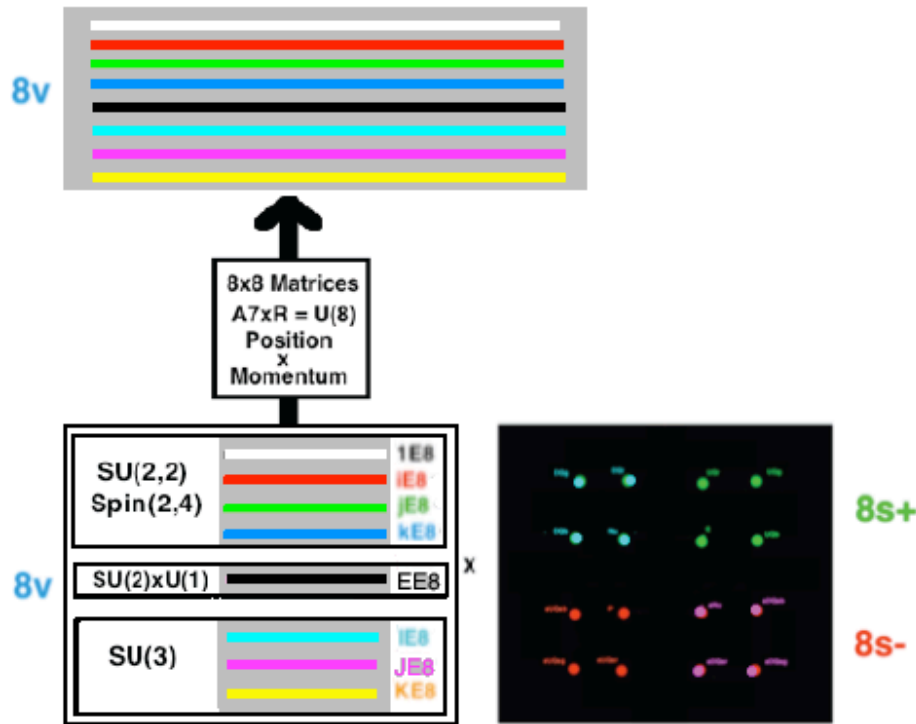
Conformal Gravity 600-Cell
with
M4 Physical SpaceTime



**Inflation ends when a preferred Quaternionic Subspacetime freezes out,
 converting 8 dim Spacetime into 4+4 dim M4 x CP2 Spacetime where
 M4 = Physical Minkowski Spacetime and
 CP2 = SU(3) / U(2) Internal Symmetry Space
 Octonionic Integral becomes two Quaternionic Integrals**



**8-dim Octonionic Spacetime was broken into
 (4+4)-dim Unitary Quaternionic M4 x CP2 Kaluza-Klein Spacetime
 with SO*(16) symmetry of EIX E8(-24).
 That transition was
 a Weyl Unitary Trick within E8(8) from SO(8,8) to SO*(16)
 followed by
 a shifting of SO*(16) symmetry from E8(8) to E8(-24)
 E8 form EIX E8(-24) with Symmetric Space E8 / SO*(16)
 represents Our Universe after End of Inflation**



Indra's Net of Schwinger Sources - Bohm Quantum Blockchain

The Cl(16)-E8 AQFT inherits structure from the Cl(16)-E8 Local Lagrangian

$$\int \text{Standard Model Gauge Gravity} + \text{Fermion Particle-AntiParticle}$$

8-dim SpaceTime

the Cl(16)-E8 model at the Planck Scale has spacetime condensing out of Clifford structures forming a Leech lattice underlying 26-dim String Theory of World-Lines with $8 + 8 + 8 = 24$ -dim of fermion particles and antiparticles and of spacetime.

Slices of 8v SpaceTime are represented as D8 branes. Each D8 brane has Planck-Scale Lattice Structure superpositions of 8 types of E8 Lattice denoted by 1E8, iE8, jE8, kE8, EE8, IE8, JE8, KE8

Stack D8 branes to get SpaceTime with Strings = World-Lines

Let Oct16 = discrete multiplicative group $\{ +/1, +/-i, +/-j, +/-k, +/-E, +/-I, +/-J, +/-K \}$.

Orbifold by Oct16 the 8s+ to get 8 Fermion Particle Types

Orbifold by Oct16 the 8s- to get 8 Fermion AntiParticle Types

Gauge Bosons from 1E8 and EE8 parts of a D8 give U(2) Electroweak Force

Gauge Bosons from IE8, JE8, and KE8 parts of a D8 give SU(3) Color Force

Gauge Bosons from 1E8, iE8, JE8, and kE8 parts of a D8 give U(2,2) Conformal Gravity

The 8x8 matrices for collective coordinates linking one D8 to the next D8 give Position x Momentum

The automorphism group of a single 26-dim String Theory cell modulo the Leech lattice is the Monster Group of order about 8×10^{53} .


When a fermion particle/antiparticle appears Tachyons create a cloud of particles/antiparticles. The cloud is one Planck-scale Fundamental Fermion Valence Particle plus an effectively neutral cloud of particle/antiparticle pairs forming a Kerr-Newman black hole. That cloud constitutes the Schwinger Source.

The Schwinger Sources are finite regions in a Complex Domain spacetime corresponding to Green's functions of particle creation / annihilation.

Its structure comes from the 24-dim Leech lattice part of the Monster Group which is $2^{24}(1+24)$ times the double cover of Co1, for a total order of about 10^{26} .

(Since a Leech lattice is based on copies of an E8 lattice and since there are 7 distinct E8 integral domain lattices there are 7 (or 8 if you include a non-integral domain E8 lattice) distinct Leech lattices. The physical Leech lattice is a superposition of them, effectively adding a factor of 8 to the order.)

The volume of the Kerr-Newman Cloud is on the order of 10^{27} x Planck scale, = roughly $10^{(-24)}$ cm.

Julian Schwinger describes Elementary Particles  as volumes of space - Sources - whose properties are determined by Green's Functions characteristic of the volumes.

In E8 Physics any Elementary Particle is immediately surrounded by a cloud of virtual particle-antiparticle pairs similar to a Kerr-Newman Black Hole with Symmetric Space - Bounded Complex Domain - Shilov Boundary structure corresponding to its Gauge Group properties.
The Poisson Kernel - Bergman Kernel defines the Green's Function.

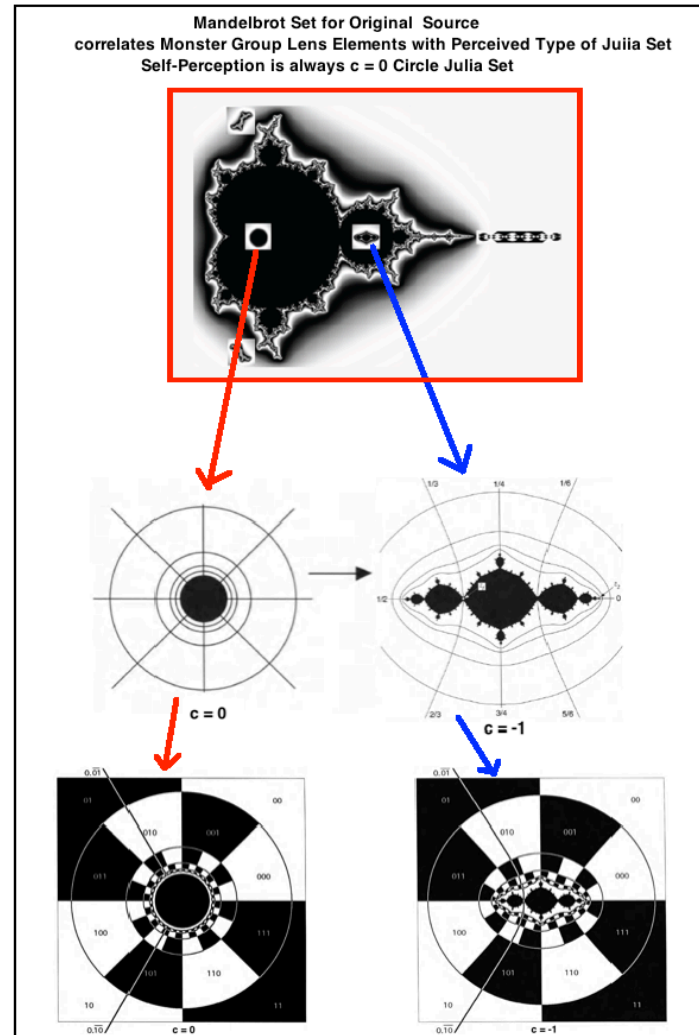
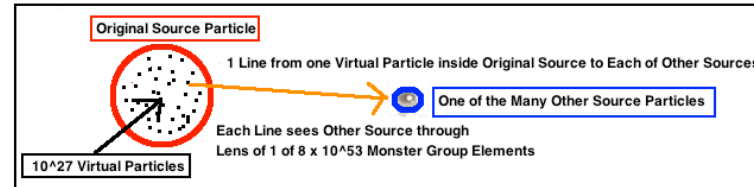
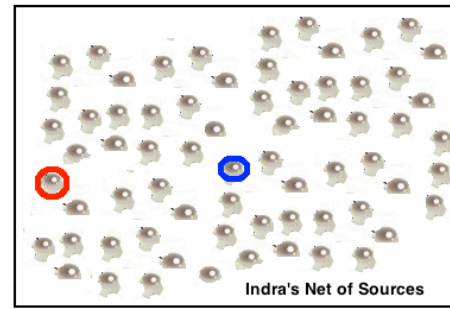
The initial Valence Particle is Planck scale. The number of Virtual Particles is determined by the Planck scale geometry of spacetime. The E8 model at the Planck Scale has spacetime condensing out of Clifford structures forming a Lorentz Leech lattice underlying 26-dim String Theory of World-Lines with $8 + 8 + 8 = 24$ -dim of fermion particles and antiparticles and of spacetime.
The automorphism group of one 26-dim String Theory cell modulo the Leech lattice is the Monster Group of order about 8×10^{53} . The Cloud structure comes from the 24-dim Leech lattice part of the Monster Group which is 2^{24} times the double cover of Co_1 , for an order of about 10^{26} . Due to superpositions of algebraically independent E8 Lattices the total number of Virtual particle/antiparticle pairs is about 10^{27} so the volume of the Kerr-Newman Cloud is on the order of 10^{27} x Planck scale, and its size should be about $10^{(27/3)} \times 1.6 \times 10^{(-33)} \text{ cm} = \text{roughly } 10^{(-24)} \text{ cm}$.

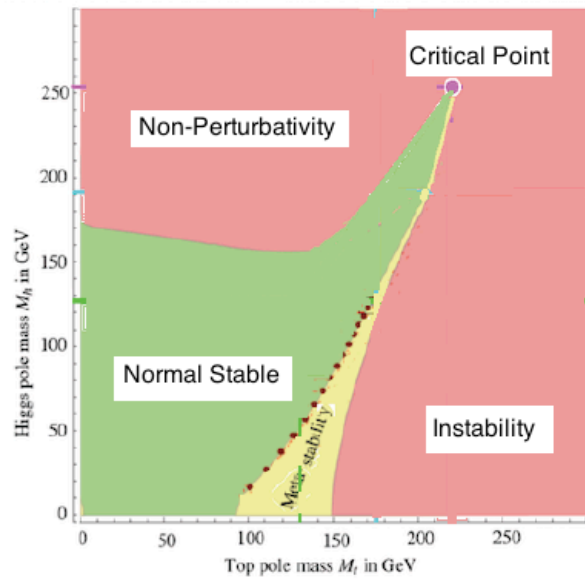
Each Schwinger Source particle-antiparticle pair should see (with Bohm Quantum Potential and Sarfatti Back-Reaction) the rest of our Universe in the perspective of 8×10^{53} Monster Symmetry so a Schwinger Source acting as a Jewel of Indra's Net of Schwinger Source Bohm Quantum Blockchain Physics can see $10^{27} \times 8 \times 10^{53} = 8 \times 10^{80}$ Other Sources of an Indra's Net.

To fit inside the initial Schwinger Source the Information Elements of all the Other Schwinger Sources of Our Universe (10^{77} or so) should be distributed as a Fractal Julia Set. There are 2^n stage-n cells in a Binary Decomposition of Julia Sets, so a stage-256 Julia level set based on Binary Decomposition has $2^{256} = \text{about } 10^{77}$ cells so Full Indra Net information can be seen / reflected by each Schwinger Source Indra Jewel.

Each Schwinger Source contains 10^{27} Virtual pairs of particles each of which can see along a connecting Line an Other Indra's Net Source which Line sees Other Sources through Monster Group Lens elements so that the Other Source appears to the Original Source to be a Julia Set.

Each Schwinger Source has a Mandelbrot Set that tells its Source what each of the many Indra's Net Source Julia set looks like by correlating Monster Group Lens Elements with Types of Julia Set. Self-Perception is always the $c = 0$ Circle Julia Set.

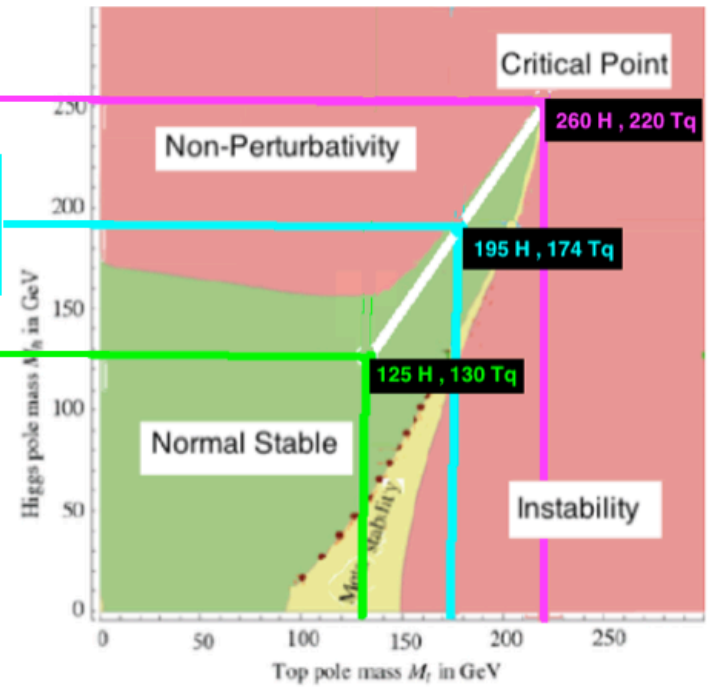


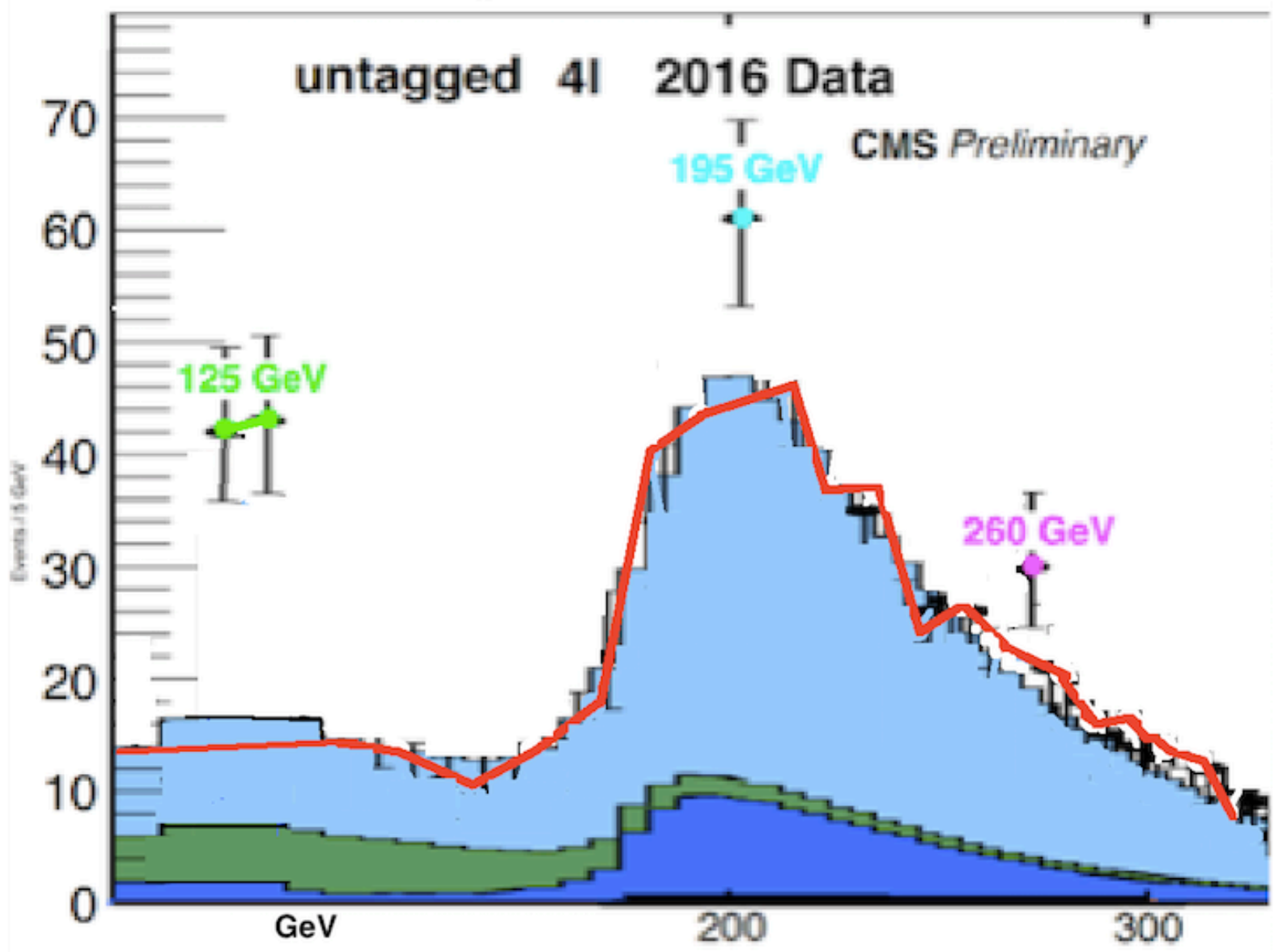
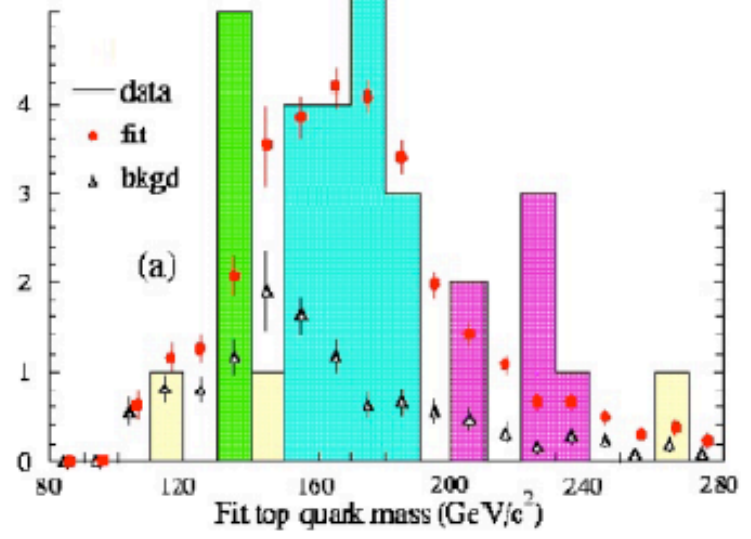
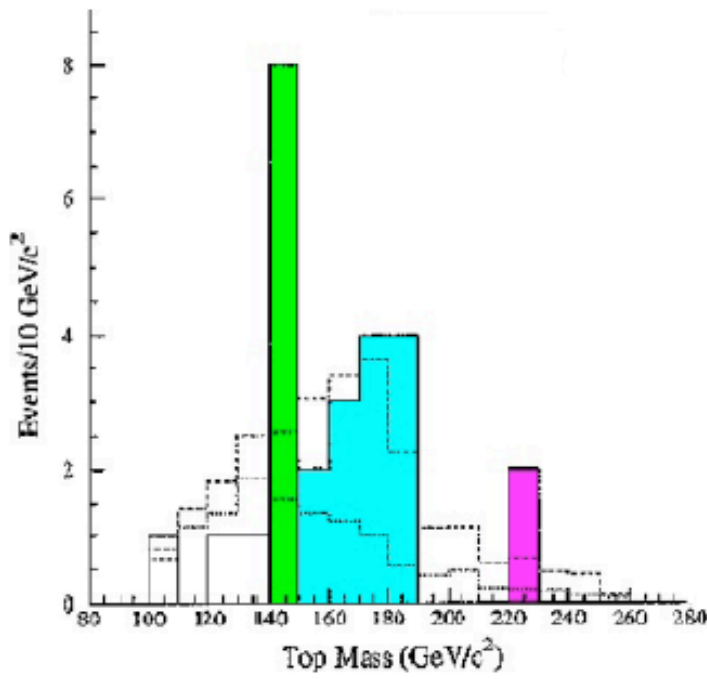


Critical Point
250 H , 220 Tq

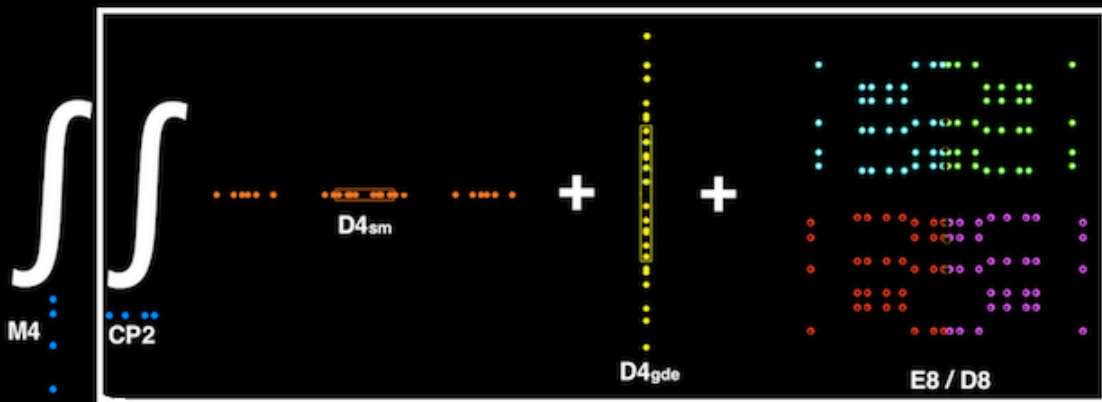
Non-Perturbativity 4+4 K-K
Composite H as Tq-Tantiq Condensate
195 H , 174 Tq

Normal Stable Ground State
125 H , 130 Tq

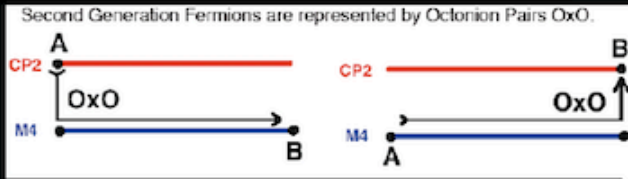
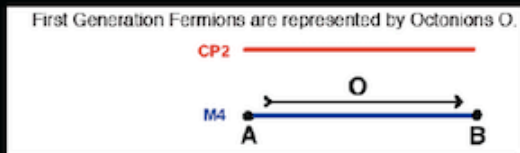




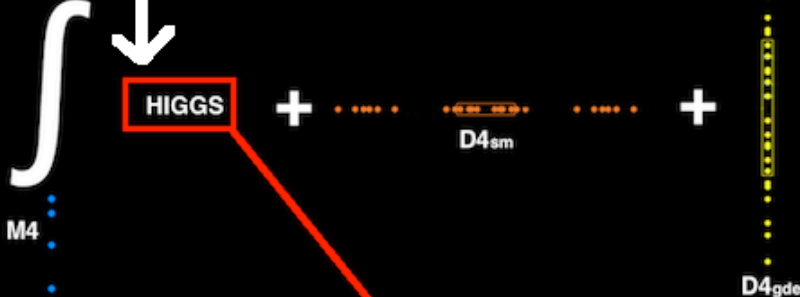
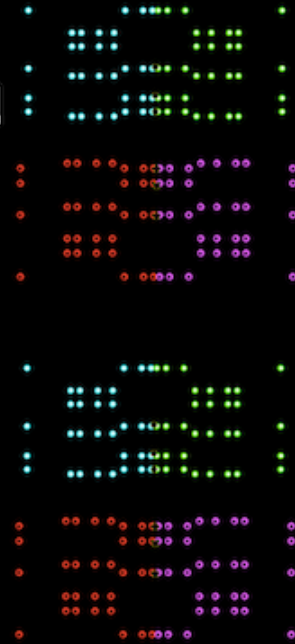
Splitting Octonionic Spacetime into Quaternionic $M4 \times CP2$ Kaluza-Klein over $CP2$ produces
Higgs by the Mayer Mechanism and
Second and Third Generation Fermions



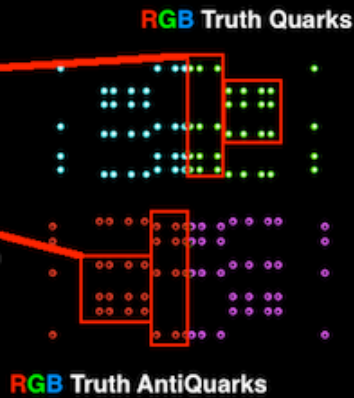
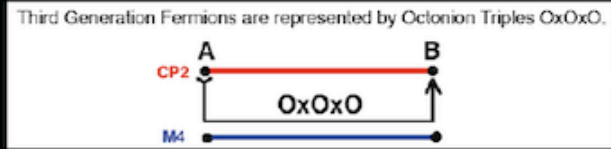
Mayer Mechanism



3 Kaluza-Klein Fermion Generations



NJL Higgs as Condensate of $T \bar{T}$



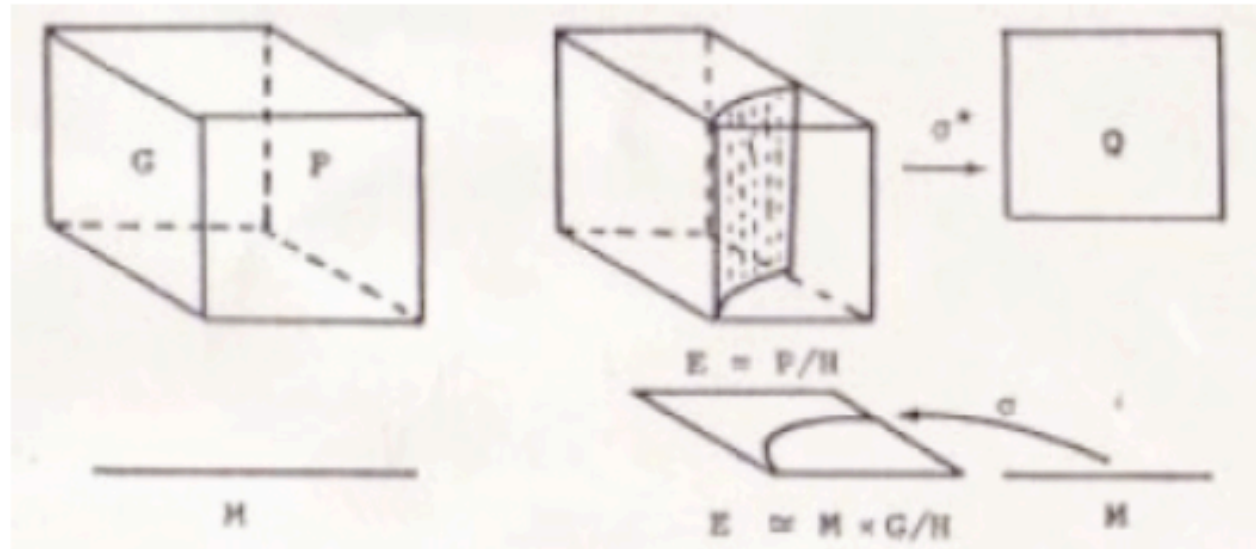
Quaternionic $E7 \times SU(2)$ structure breaks 8-dim Spacetime Octonionic Symmetry to Quaternionic (4+4)-dim Associative x CoAssociative Kaluza-Klein Spacetime

(see Reese Harvey "Spinors and Calibrations" (Academic 1990))

where $M4 = 4$ -dim Minkowski Physical Spacetime is Associative

and $CP2 = SU(3) / SU(2) \times U(1)$ Internal Symmetry Space is CoAssociative

Meinhard Mayer said (Hadronic Journal 4 (1981) 108-152): "... each point of ... the ... fibre bundle ... E ...



... consists of

a four- dimensional spacetime point x [in $M4$]

to which is attached the homogeneous space G / H [$SU(3) / U(2) = CP2$]

...

the components of the curvature lying in the homogeneous space G / H could be reinterpreted as Higgs scalars (with respect to spacetime [$M4$])

...

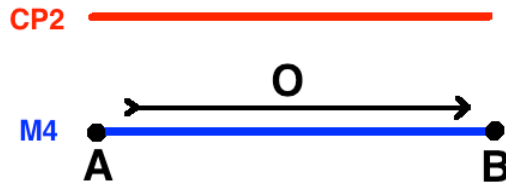
the Yang-Mills action reduces to a Yang-Mills action for the h -components [$U(2)$ components] of the curvature over M [$M4$] and a quartic functional for the "Higgs scalars", which not only reproduces the Ginzburg-Landau potential, but also gives the correct relative sign of the constants, required for the BEHK ... Brout-Englert-Higgs-Kibble ... mechanism to work. ...".

(see Appendix - Details of Mayer - Higgs)

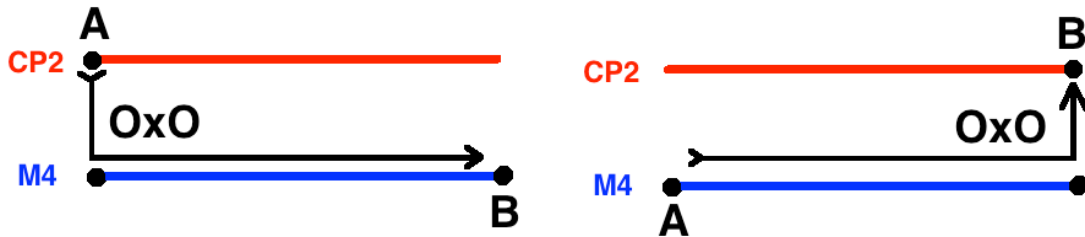
3 Generations of Fermions

In Kaluza-Klein $M4 \times CP2$ there are 3 possibilities for a fermion represented by an Octonion O basis element to go from point A to point B :

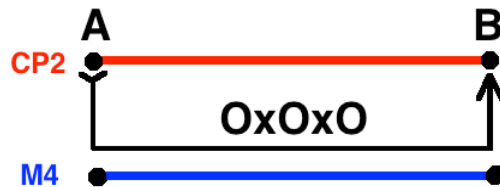
1 - A and B are both in $M4$: First Generation Fermion whose path can be represented by the single O basis element so that First Generation Fermions are represented by Octonions O .



2 - Either A or B , but not both, is in $CP2$: Second Generation Fermion whose path must be augmented by one projection from $CP2$ to $M4$, which projection can be represented by a second O basis element so that Second Generation Fermions are represented by Octonion Pairs OxO .



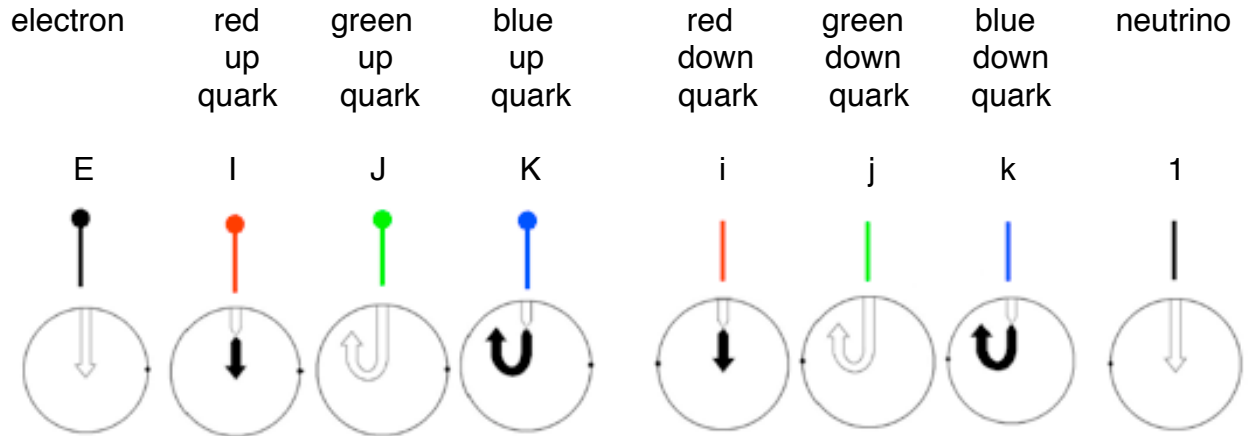
3 - Both A and B are in $CP2$: Third Generation Fermion whose path must be augmented by two projections from $CP2$ to $M4$, which projections can be represented by a second O and a third O , so that Third Generation Fermions are represented by Octonion Triples $OxOxO$.



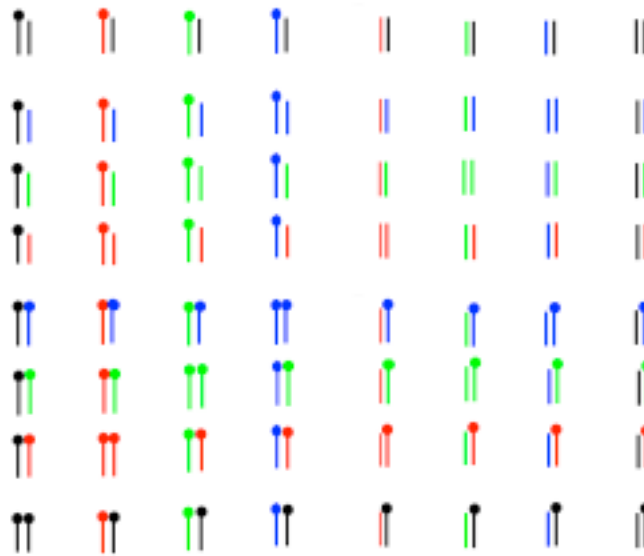
3 Generation Fermion Combinatorics

First Generation (8)

(geometric representation of Octonions is from arXiv 1010.2979)



Second Generation (64)



Mu Neutrino (1)

Rule: a Pair belongs to the Mu Neutrino if:
 All elements are Colorless (black)
 and all elements are Associative

(that is, is 1 which is the only Colorless Associative element) .

Muon (3)

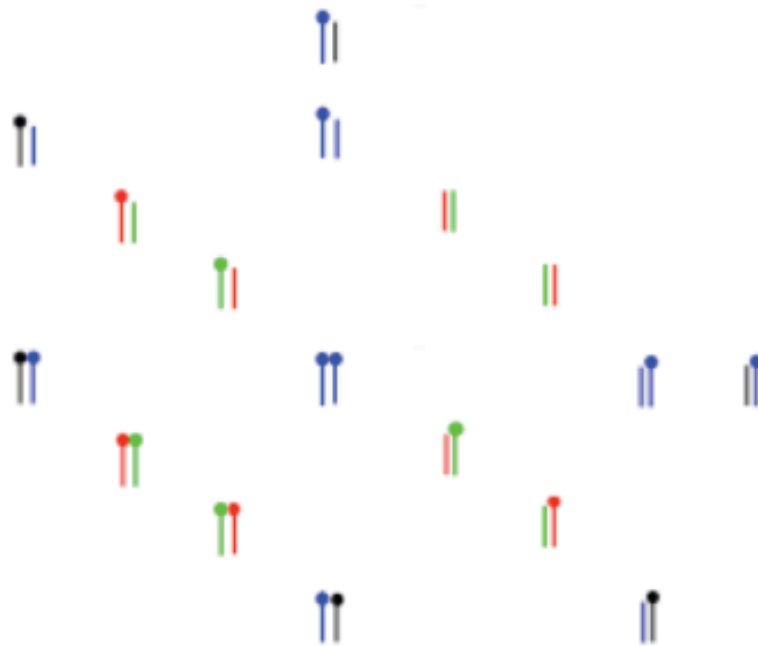
Rule: a Pair belongs to the Muon if:
All elements are Colorless (black)
and at least one element is NonAssociative
(that is, is E which is the only Colorless NonAssociative element).

Blue Strange Quark (3)

Rule: a Pair belongs to the Blue Strange Quark if:
There is at least one Blue element and the other element is Blue or Colorless (black)
and all elements are Associative (that is, is either 1 or i or j or k).

Blue Charm Quark (17)

Rules: a Pair belongs to the Blue Charm Quark if:
1 - There is at least one Blue element and the other element is Blue or Colorless (black)
and at least one element is NonAssociative (that is, is either E or I or J or K)
2 - There is one Red element and one Green element (Red x Green = Blue).



(Red and Green Strange and Charm Quarks follow similar rules)

Third Generation (512)

Tau Neutrino (1)

Rule: a Triple belongs to the Tau Neutrino if:
All elements are Colorless (black)
and all elements are Associative
(that is, is 1 which is the only Colorless Associative element)

Tauon (7)

Rule: a Triple belongs to the Tauon if:
All elements are Colorless (black)
and at least one element is NonAssociative (that is, is E which is the only Colorless NonAssociative element)

Blue Beauty Quark (7)

Rule: a Triple belongs to the Blue Beauty Quark if:

There is at least one Blue element and all other elements are Blue or Colorless (black) and all elements are Associative (that is, is either 1 or i or j or k).

Blue Truth Quark (161)

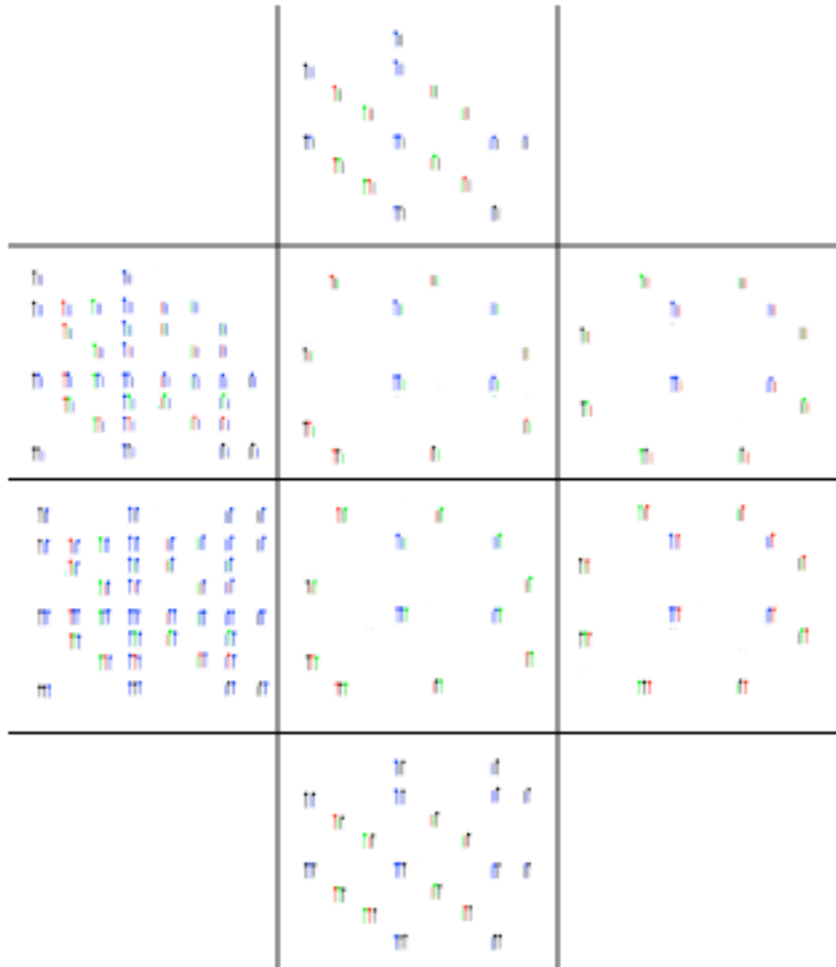
Rules: a Triple belongs to the Blue Truth Quark if:

1 - There is at least one Blue element and all other elements are Blue or Colorless (black)

and at least one element is NonAssociative (that is, is either E or I or J or K)

2 - There is one Red element and one Green element and the other element is Colorless (Red x Green = Blue)

3 - The Triple has one element each that is Red, Green, or Blue, in which case the color of the Third element (for Third Generation) is determinative and must be Blue.



(Red and Green Beauty and Truth Quarks follow similar rules)

Fermion masses are calculated as a product of four factors:

$$V(\underline{Qfermion}) \times N(\underline{Graviton}) \times N(\underline{octonion}) \times \underline{Sym}$$

The ratio of the down quark spinor manifold volume factor to the electron spinor manifold volume factor is

$$V(\underline{Qdown\ quark}) / V(\underline{Qelectron}) = V(S^7 \times RP^1) / 1 = \pi^5 / 3.$$

The third generation fermion particles correspond to triples of octonions.

There are $8^3 = 512$ such triples.

The triple $\{ 1, 1, 1 \}$ corresponds to the tau-neutrino.

The other 7 triples involving only 1 and E correspond to the tauon:

$\{ E, E, E \}$ $\{ E, E, 1 \}$ $\{ E, 1, E \}$ $\{ 1, E, E \}$ $\{ 1, 1, E \}$ $\{ 1, E, 1 \}$ $\{ E, 1, 1 \}$

The symmetry of the 7 tauon triples is the same

as the symmetry of the first generation tree-level-massive fermions, 3 down, quarks, the 3 up quarks, and the electron,

so by the Sym factor the tauon mass should be the same as

the sum of the masses of the first generation massive fermion particles.

Therefore the tauon mass is calculated at tree level as 1.877 GeV.

The beauty quark corresponds to 21 triples.

They are triples of the same form as the 7 tauon triples involving 1 and E, but for 1 and I, 1 and J, and 1 and K = red, green, and blue beauty quarks.

The seven red beauty quark triples correspond to the seven tauon triples, except that the beauty quark interacts with 6 Spin(0,5) gravitons

while the tauon interacts with only two.

The red beauty quark constituent mass should be the tauon mass times the third generation graviton factor $6/2 = 3$,

so the **red beauty quark mass is $m_b = 5.63111$ GeV**.

Triples of the type $\{ 1, I, J \}$, $\{ I, J, K \}$, etc.,

do not correspond to the beauty quark, but to the truth quark.

The truth quark corresponds to those $512 - 1 - 7 - 21 = 483$ triples,

so the constituent mass of the red truth quark

is $161 / 7 = 23$ times the red beauty quark mass,

and the **red T-quark mass is $m_t = 129.5155$ GeV**

248-dim E8 contains 120-dim D8

E8 / D8 = 64 + 64 Fermions

D8 / D4 x D4 = 64 Spacetime

**D4 = 28 Standard Model (12)
with 16 Gravity + Dark Energy Ghosts**

**D4 = 28 Gravity + Dark Energy (16)
with 12 Standard Model Ghosts**

The 24 Orange Root Vectors of the D4 of E8 Standard Model + Gravity Ghosts are on the Horizontal X-axis.



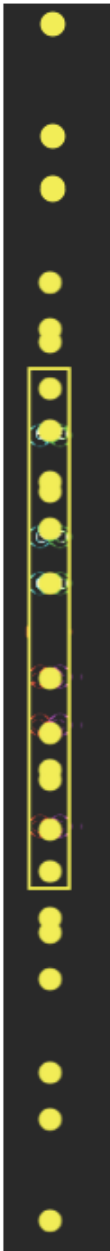
8 of them in the Orange Box represent the 8 Root Vectors of the Standard Model Gauge Groups $SU(3)$ $SU(2)$ $U(1)$.
 Their 4 Cartan Subalgebra elements correspond to the 4 Cartan Subalgebra elements of D4 of E8 Standard Model + Gravity Ghosts and to half of the 8 Cartan Subalgebra elements of E8.

The other $24-8 = 16$ Orange Root Vectors represent Ghosts of 16D $U(2,2)$ which contains the Conformal Group $SU(2,2) = Spin(2,4)$ that produces Gravity + Dark Energy by the MacDowell-Mansouri mechanism.

Standard Model Gauge groups come from $CP^2 = SU(3) / SU(2) \times U(1)$
 (as described by Batakis in Class. Quantum Grav. 3 (1986) L99-L105)

Electroweak $SU(2) \times U(1)$ is gauge group as isotropy group of CP^2 .

$SU(3)$ is global symmetry group of CP^2 but due to Kaluza-Klein $M_4 \times CP^2$ structure of compact CP^2 at every M_4 spacetime point, it acts as Color gauge group with respect to M_4 .



The 24 Yellow Root Vectors of the D4 of E8 Gravity + Standard Model Ghosts are on the Vertical Y-axis.

12 of them in the Yellow Box represent the 12 Root Vectors of the Conformal Gauge Group $SU(2,2) = Spin(2,4)$ of Conformal Gravity + Dark Energy.

The 4 Cartan Subalgebra elements of $SU(2,2) \times U(1) = U(2,2)$ correspond to the 4 Cartan Subalgebra elements of D4 of E8 Gravity + Standard Model Ghosts and to the other half of the 8 Cartan Subalgebra elements of E8.

The other $24 - 12 = 12$ Yellow Root Vectors represent Ghosts of 12D Standard Model whose Gauge Groups are $SU(3) SU(2) U(1)$.

Gravity and Dark Energy come from its Conformal Subgroup $SU(2,2) = Spin(2,4)$
(see Appendix - Details of Conformal Gravity and ratio DE : DM : OM)

$SU(2,2) = Spin(2,4)$ has 15 generators:

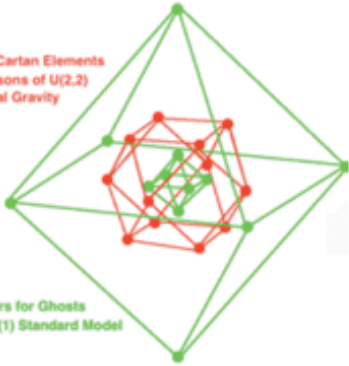
1 Dilation representing Higgs Ordinary Matter

4 Translations representing Primordial Black Hole Dark Matter

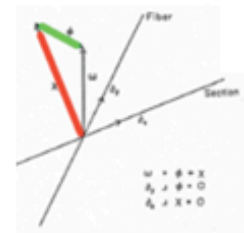
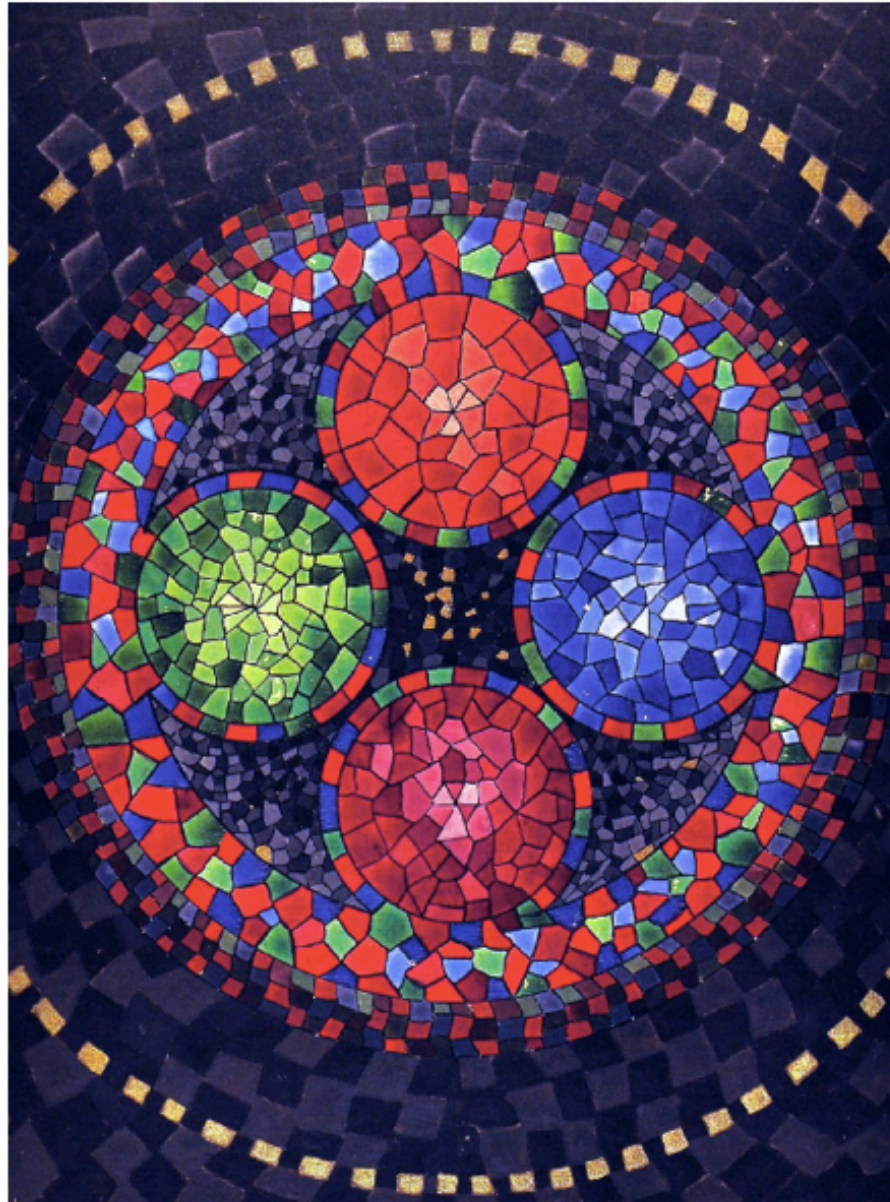
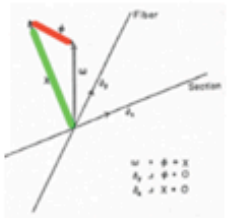
10 = 4 Special Conformal + 6 Lorentz representing Dark Energy
(see Irving Ezra Segal, "Mathematical Cosmology and Extragalactic Astronomy" (Academic 1976))

The basic ratio Dark Energy : Dark Matter : Ordinary Matter = $10:4:1 = 0.67 : 0.27 : 0.06$
When the dynamics of our expanding universe are taken into account, the ratio is calculated to be **0.75 : 0.21 : 0.04**

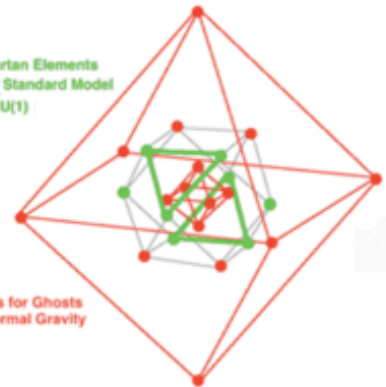
D4
 12 Root Vectors + 4 Cartan Elements
 for 16 Gauge Bosons of U(2,2)
 for Conformal Gravity



12 Root Vectors for Ghosts
 of SU(3)xSU(2)xU(1) Standard Model



D4
 8 Root Vectors + 4 Cartan Elements
 for 12 Gauge Bosons of Standard Model
 SU(3)xSU(2)xU(1)



16 Root Vectors for Ghosts
 of U(2,2) Conformal Gravity

The force strength of a given force is

$$(1 / Mforce^2) (Vol(MISforce)) (Vol(Qforce) / Vol(Dforce)^{ (1 / mforce) })$$

where:

Mforce represents the effective mass;

MISforce represents the relevant part of the target Internal Symmetry Space;

Vol(MISforce) stands for volume of MISforce and is sometimes also denoted by Vol(M);

Qforce represents the link from the origin to the relevant target for the gauge boson;

Vol(Qforce) stands for volume of Qforce;

Dforce represents the complex bounded homogeneous domain of which Qforce is the Shilov boundary;

mforce is the dimensionality of Qforce, which is

$Vol(Dforce)^{ (1 / mforce) }$ stands for a dimensional normalization factor (to reconcile the dimensionality of the Internal Symmetry Space of the target vertex with the dimensionality of the link from the origin to the target vertex).

Qforce, Hermitian symmetric space, Dforce, mforce, and Vol(Dforce) for four forces are:

Spin(5)	Spin(7) / Spin(5)xU(1)	IV5	4	RP ¹ xS ⁴
SU(3)	SU(4) / SU(3)xU(1)	B ⁶ (ball)	4	S ⁵
SU(2)	Spin(5) / SU(2)xU(1)	IV3	2	RP ¹ xS ²
U(1)	-	-	1	-

Force	M	Vol(M)	Q	Vol(Q)	D	Vol(D)
gravity	S ⁴	8pi ² /3	RP ¹ xS ⁴	8pi ³ /3	IV5	pi ⁵ /2 ⁴ 5!
color	CP ²	8pi ² /3	squashed S ⁵	4pi ³	B ⁶ (ball)	pi ³ /6
Weak	S ² xS ²	2x4pi	RP ¹ xS ²	4pi ²	IV3	pi ³ /24
e-mag	T ⁴	4x2pi	-	-	-	-

squashed S5 = Shilov boundary of complex domain of symmetric space SU(4) / SU(3) x U(1)

The relative force strengths at the characteristic energy level of each force are:

Spin(5) gravity at 10¹⁹ GeV = 1 ; GGmproton² approx 5 x 10⁻³⁹

SU(3) color at 245 MeV = 0.6286

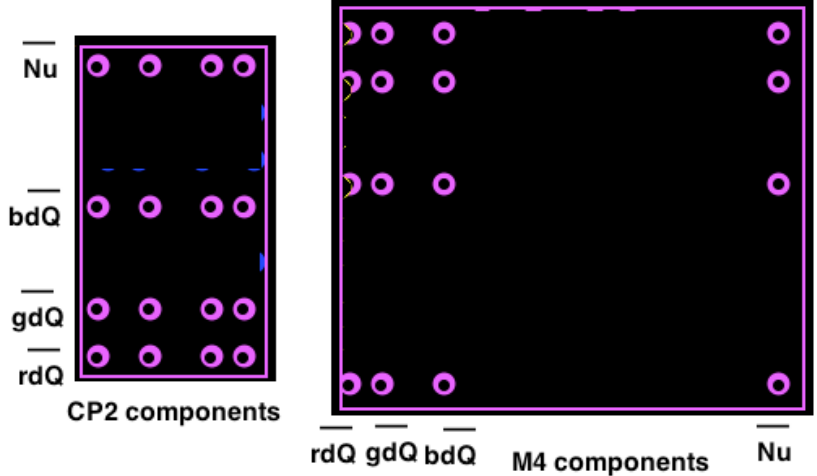
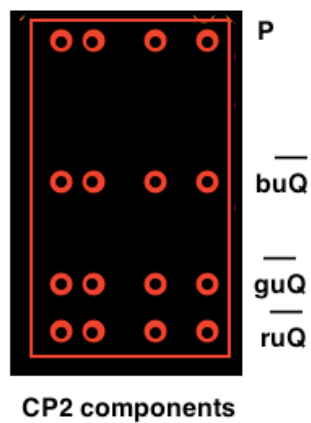
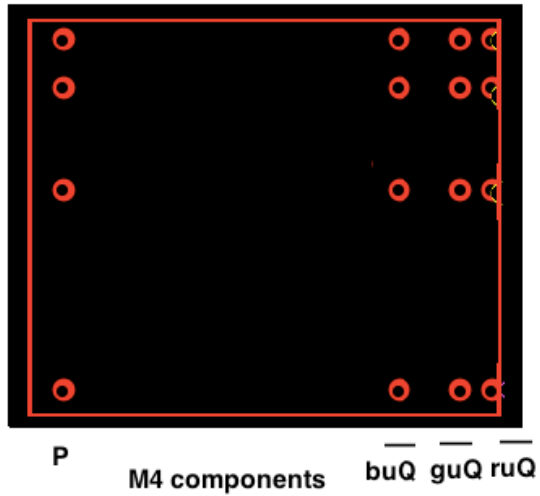
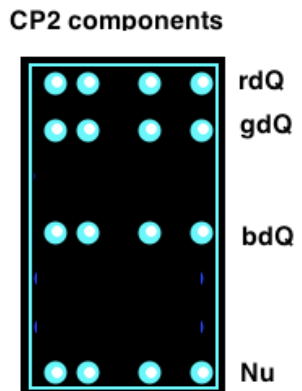
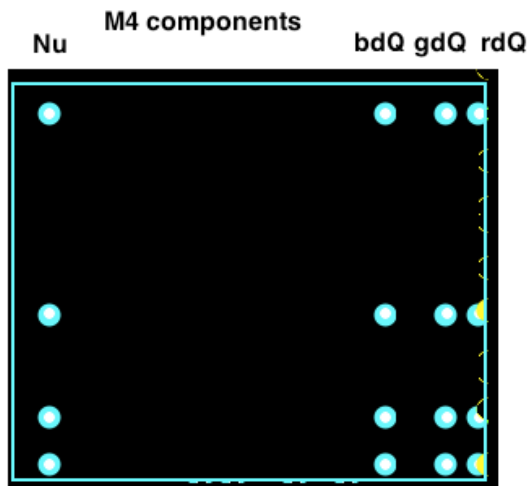
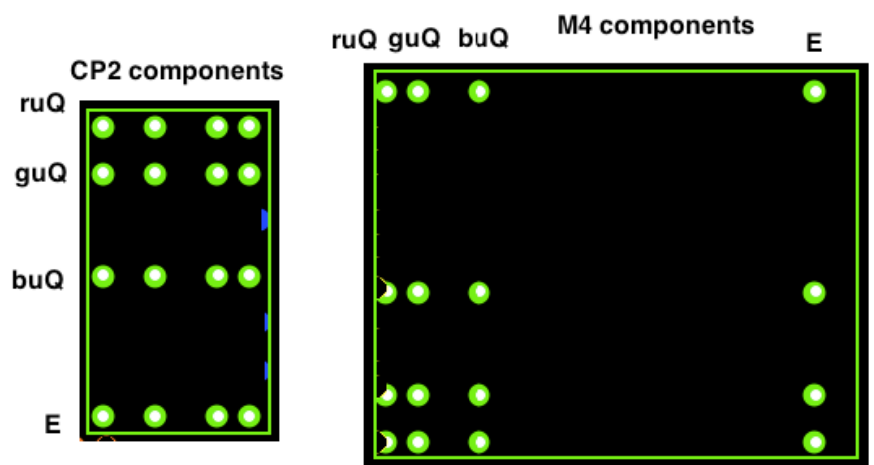
at 5.3 GeV = 0.166

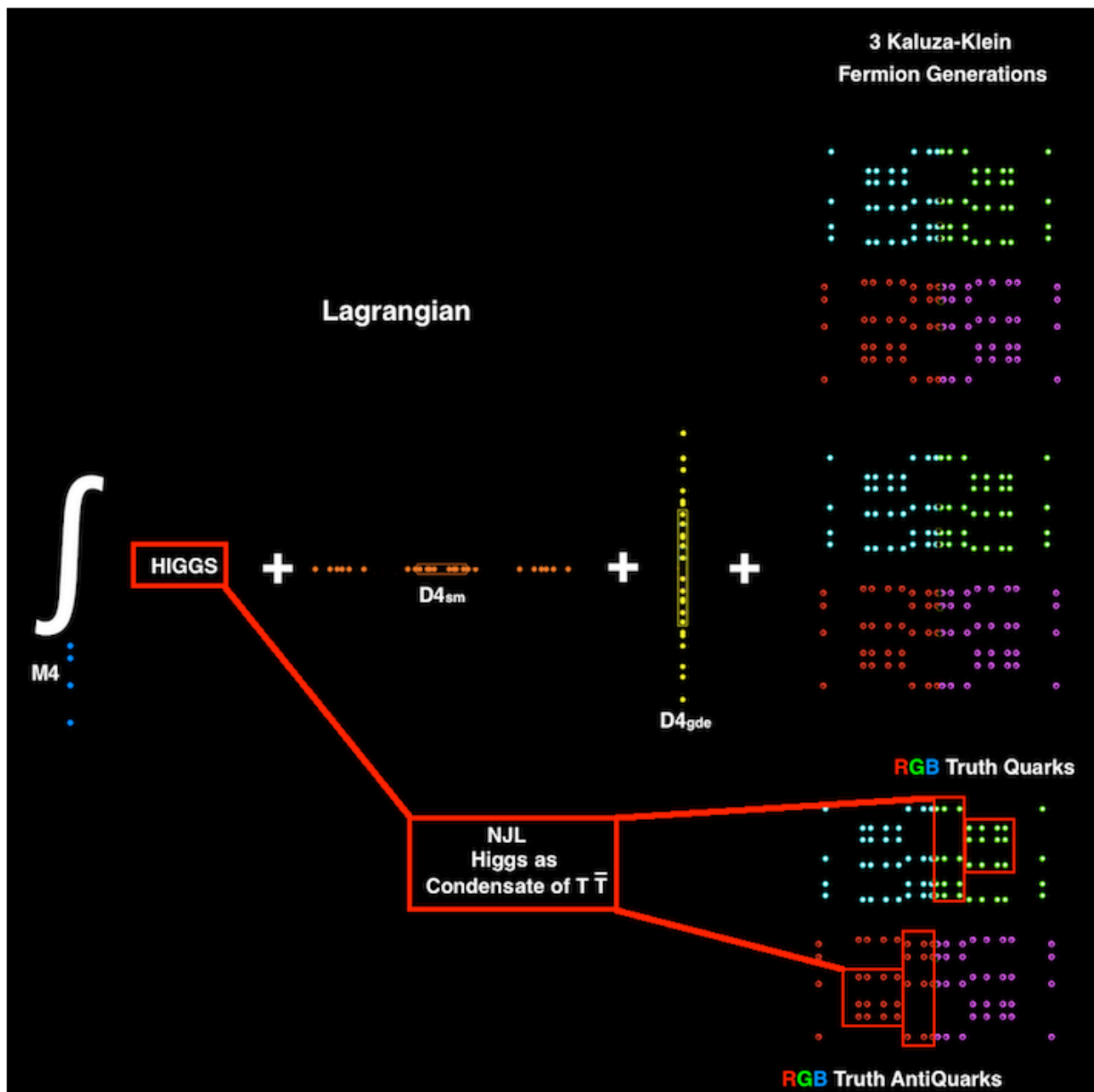
at 34 GeV = 0.121

at 91 GeV = 0.106 ; with nonperturbative effects = 0.125

SU(2) weak at 100 GeV = 0.2535 ; GWmproton² approx 1.05 x 10⁻⁵

U(1) e-mag at 4 KeV = 1/137.03608





Fermion masses are calculated as a product of four factors:

$$V(\text{Qfermion}) \times N(\text{Graviton}) \times N(\text{octonion}) \times \text{Sym}$$

The ratio of the down quark spinor manifold volume factor to the electron spinor manifold volume factor is

$$V(\text{Qdown quark}) / V(\text{Qelectron}) = V(S^7 \times RP^1) / 1 = \pi^5 / 3.$$

The third generation fermion particles correspond to triples of octonions.

There are $8^3 = 512$ such triples.

The triple $\{1, 1, 1\}$ corresponds to the tau-neutrino.

The other 7 triples involving only 1 and E correspond to the tauon:

The beauty quark corresponds to 21 triples.

They are triples of the same form as the 7 tauon triples involving 1 and E, but for 1 and I, 1 and J, and 1 and K,

which correspond to the red, green, and blue beauty quarks,

Triples of the type $\{1, I, J\}$, $\{I, J, K\}$, etc.,

do not correspond to the beauty quark, but to the Truth quark.

The Truth quark corresponds to those $512 - 1 - 7 - 21 = 483$ triples, so the

constituent mass of red truth quark is $161 / 7 = 23$ times red beauty quark

red Truth quark mass is $m_t = 129.5155 \text{ GeV}$

Here is a summary of E8 Physics model calculation results. Since ratios are calculated, values for one particle mass and one force strength are assumed. Quark masses are constituent masses. Most of the calculations are tree-level, so more detailed calculations might be even closer to observations.

Dark Energy : Dark Matter : Ordinary Matter = 0.75 : 0.21 : 0.04

Fermions as Schwinger Sources have geometry of Complex Bounded Domains with Kerr-Newman Black Hole structure size about $10^{(-24)}$ cm.

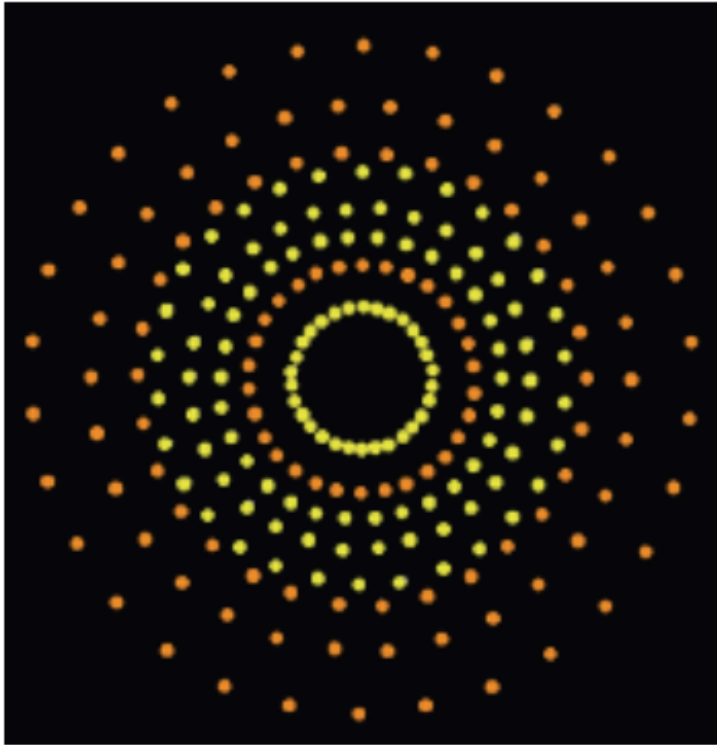
Particle/Force	Tree-Level	Higher-Order
e-neutrino	0	0 for nu_1
mu-neutrino	0	$9 \times 10^{(-3)}$ eV for nu_2
tau-neutrino	0	$5.4 \times 10^{(-2)}$ eV for nu_3
electron	0.5110 MeV	
down quark	312.8 MeV	charged pion = 139 MeV
up quark	312.8 MeV	proton = 938.25 MeV neutron - proton = 1.1 MeV
muon	104.8 MeV	106.2 MeV
strange quark	625 MeV	
charm quark	2090 MeV	
tauon	1.88 GeV	
beauty quark	5.63 GeV	
truth quark (low state)	130 GeV	(middle state) 174 GeV (high state) 218 GeV
W+	80.326 GeV	
W-	80.326 GeV	
W0	98.379 GeV	Z0 = 91.862 GeV
Mplanck	1.217×10^{19} GeV	
Higgs VEV (assumed)	252.5 GeV	
Higgs (low state)	126 GeV	(middle state) 182 GeV (high state) 239 GeV
Gravity Gg (assumed)	1	
(Gg)(Mproton ² / Mplanck ²)		$5 \times 10^{(-39)}$
EM fine structure	1/137.03608	
Weak Gw	0.2535	
Gw(Mproton ² / (Mw+ ² + Mw- ² + Mz0 ²))		$1.05 \times 10^{(-5)}$
Color Force at 0.245 GeV	0.6286	0.106 at 91 GeV

Kobayashi-Maskawa parameters for W+ and W- processes are:

	d	s	b
u	0.975	0.222	0.00249 -0.00388i
c	-0.222 -0.000161i	0.974 -0.0000365i	0.0423
t	0.00698 -0.00378i	-0.0418 -0.00086i	0.999

The phase angle d13 is taken to be 1 radian.

$E_8 = H_4 + H_4 = 120 + 120 = 240$ -vertex Witting polytope tiling of 8-dim space



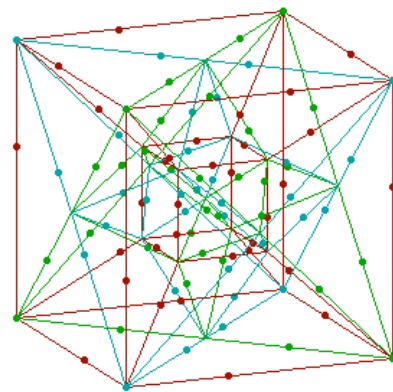
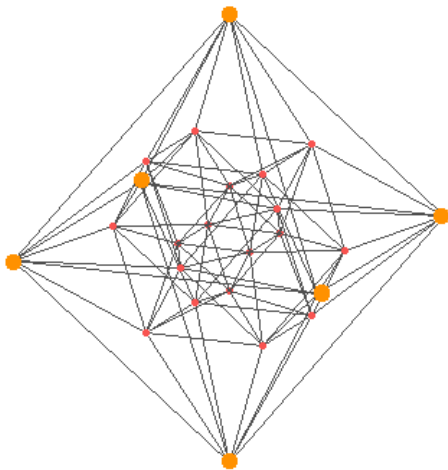
$E_8 = 120$ BiVectors + 128 half-Spinors of $Cl(16)$ Clifford Algebra
with graded structure

1 16 120 560 1820 4368 8008 11440 12870 11440 8008 4368 1820 560 120 16 1

By 8-Periodicity of Real Clifford Algebras: $Cl(16) = \text{tensor product } Cl(8) \times Cl(8)$

so with that product $E_8 = F_4 \times F_4$

$H_4 = 24$ (vertices) + 96 (edges) = 120 -vertex 600 -cell tiling of 4-dim space
with Coxeter Group determined by E_8

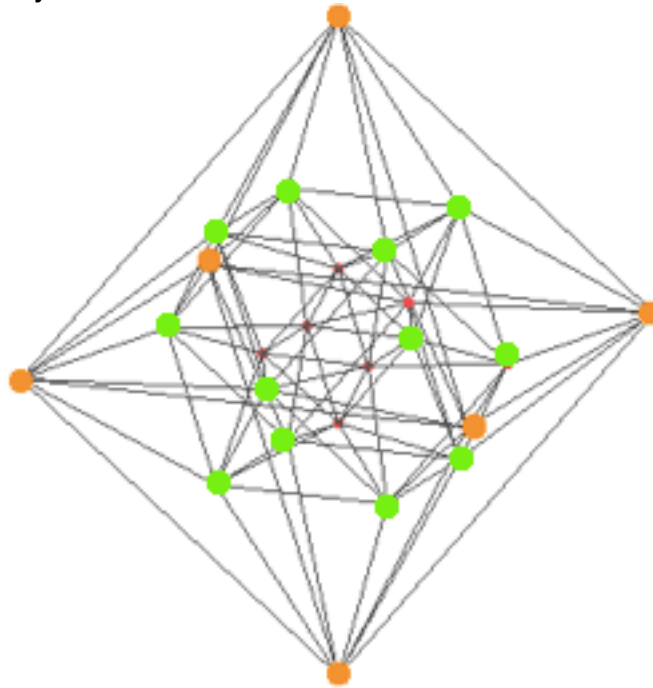


F4 = 24 cell + dual 24-cell tiling of 4-dim space

F4 = 8 Vectors + 28 BiVectors + 16 Spinors of Cl(8) Clifford Algebra
with graded structure 1 8 28 56 70 56 28 8 1
tile 4-dim space by 24-cells and their dual 24-cells

D4 24-cell tiling of 4-dim space

D4 = 28 BiVectors of Cl(8) Clifford Algebra with 24 root vectors
with graded structure 1 8 28 56 70 56 28 8 1
tile 4-dim space by 24-cells



A3 = D3 = cuboctahedral tiling of 3-dim space

A3=D3 = 15 BiVectors of Cl(6) Clifford Algebra with 12 root vectors and
with graded structure 1 6 15 20 15 6 1
tile 3-dim space by cuboctahedra
which can be seen as a central part of a 24-cell (green vertices above)

H3 = 12-Vertex Icosahedron as Jitterbug Transform of 12-Vertex Cuboctahedron
with Coxeter Group determined by D6

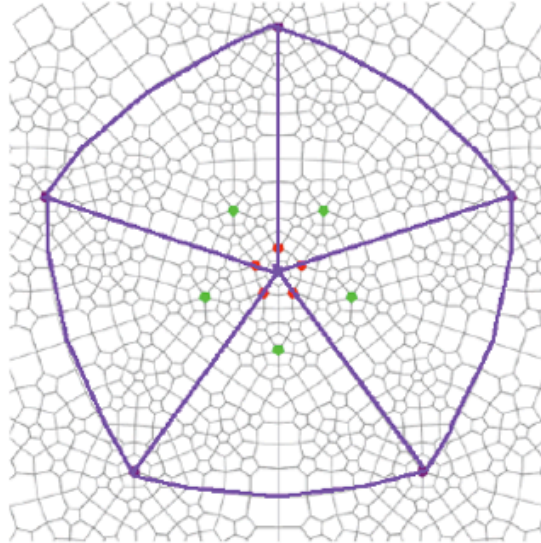


H2 Penrose STAR tilings of 2-dim space

H2 = I^5_2 = Penrose STAR tiling of 2-dim space

with Coxeter group determined by A4 which contains A2
and field extension $Q(\sqrt{5})$

The central part of the tiling has 5 pentagonal sectors

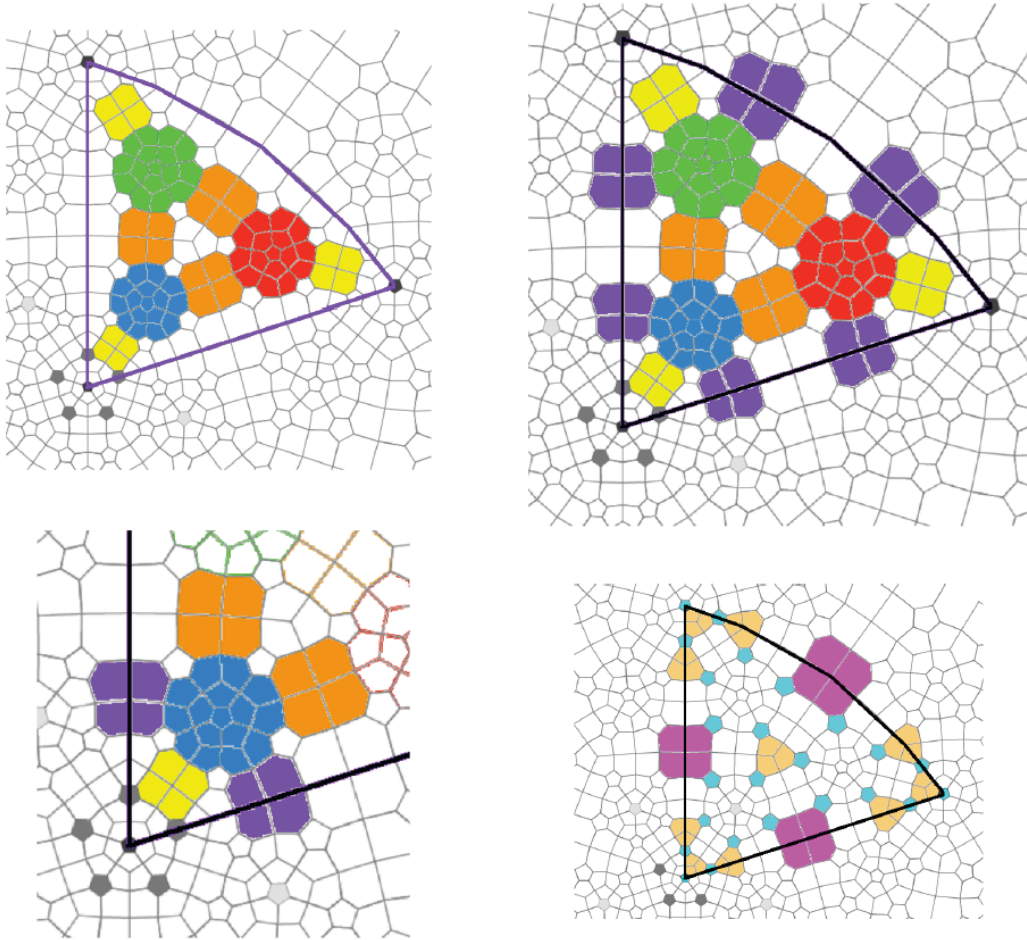


Each of the 5 pentagonal sectors of the tiling contains a 2-dim projected version of the 8-dim E8 Root Vector structure of E8 Physics corresponding to the Complex E6 subalgebra of Octonionic E8. The outer boundary of each sector is not a straight line but is curved with Conformal Symmetry and pentagonal sectors further out are conformally curved rather than straight-line pentagons.

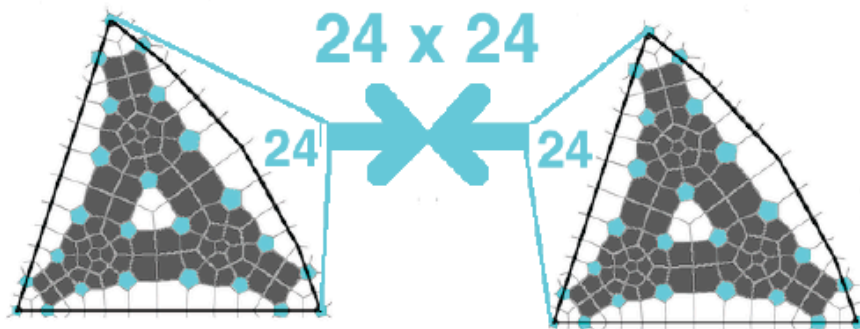
Each pentagonal sector represents the Complex part of Octonionic E8 Physics whose 240 E8 Root Vectors project to the 72 Root Vectors of E6 subalgebra of E8 which 72 E6 Root Vectors have the following physical interpretation

16 = 2x8 of which represent Complex Fermion Particles
16 = 2x8 of which represent Complex Fermion AntiParticles
16 = 2x(4+4) of which represent Complex (4+4)-dim Kaluza-Klein SpaceTime
12 of which represent the Standard Model
12 of which represent Gravity + Dark Energy

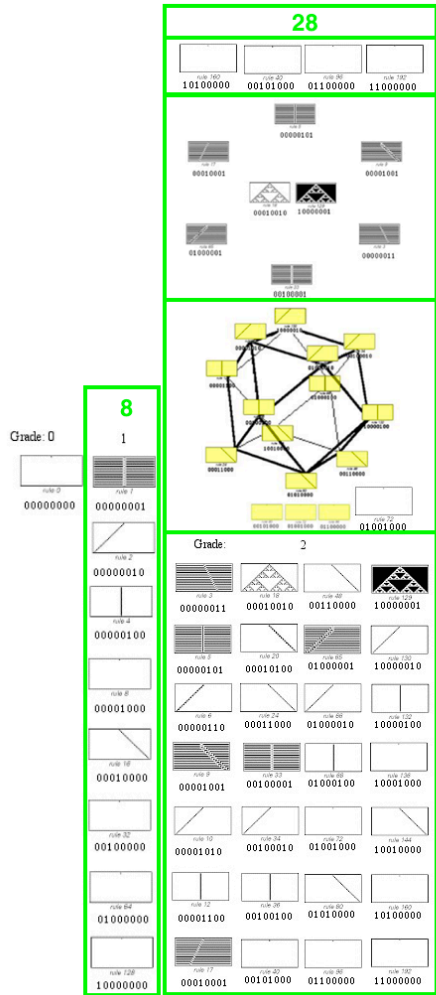
as shown in the following image of one of the pentagonal sectors:



The Bohm Quantum Potential interacts between two Pentagonal Sectors by 24 Bohm Carrier Tiles of one Pentagonal Sector carrying E8 Configuration Information and comparing it with 24 Bohm Carrier Tiles of the Other Sector carrying E8 Configuration Information. If the resulting 24 x 24 Matrix shows that the two E8 Configurations are similar, then a Bohm Quantum Potential Resonant Connection is established.



The Bohm Quantum Potential 24x24 Matrix is traceless because Configuration Resonance is sensitive to similarity rather than dilation scale and is symmetric because Configuration Resonance is symmetric between Sectors.



$$8+28+16 = 52 \text{ F4}$$

256-dim Cl(8) as Cellular Automata

16

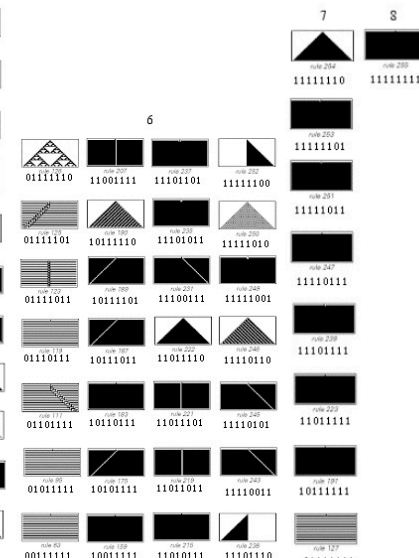
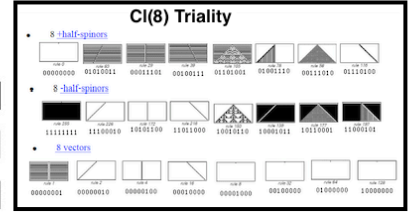
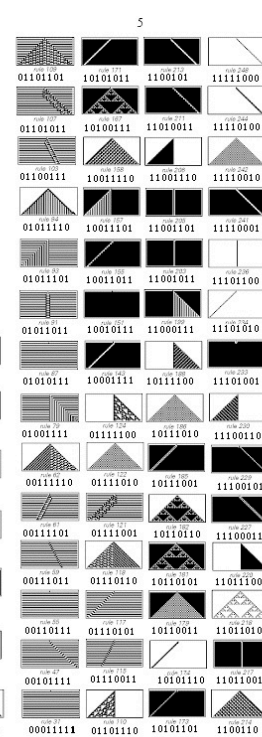
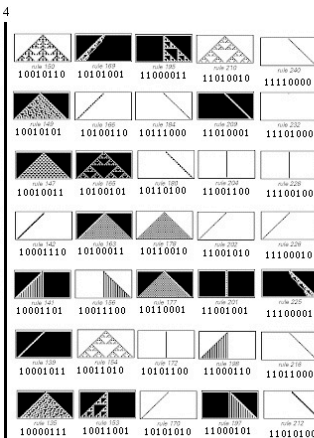
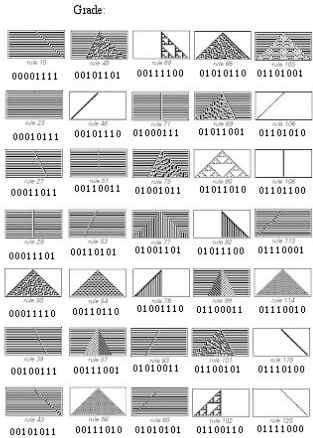
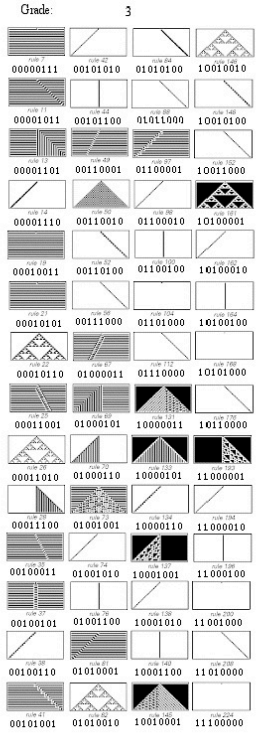
Cl(8) Primitive Idempotent has 16 Terms

$$I = (1/2)(1 + e_{1248}) (1/2)(1 + e_{2358}) (1/2)(1 + e_{3468}) (1/2)(1 + e_{4578}) = (1/16)(1 + e_{1248} + e_{2358} + e_{3468} + e_{4578} + e_{5618} + e_{6728} + e_{7138} - e_{3567} - e_{4671} - e_{5712} - e_{6123} - e_{7234} - e_{1345} - e_{2456} + e_J)$$

corresponding to 16 of the 256 Cellular Automata

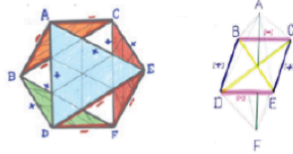
Tensor Product Cl(8) x Cl(8) = Cl(16)

$$(F4 \text{ in Cl(8)}) \times (F4 \text{ in Cl(8)}) = 8 \times 8 + 28 \times 1 + 1 \times 28 + 16 \times 16 = 120 \text{ Cl(16) BiVectors} + (128 + 128) \text{ Cl(16) Spinors} = 120 \text{ Cl(16) BiVectors} + 256 \text{ Cl(16) Half-Spinors} = E8$$

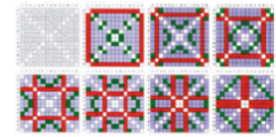


Guillermo Moreno (arXiv/math/0512517) has shown that $V(7,2) = \text{Spin}(7) / \text{Spin}(5)$ can be identified with the **Zero Divisors of Sedenions** which have $7+28 = 35$ Associative Triples and for which Zero Divisors are given by the fibration $V(7,2) \rightarrow G_2 \rightarrow S^3$ [3-sphere] and which have 4-2=2 ZD Irreducible Components and 10-dim Lie Sphere $\text{Spin}(7) / \text{Spin}(5) \times U(1)$ whose 10D correspond to $\text{Cl}(1,9) = \text{Cl}(2,8)$ Conformal over $\text{Cl}(1,7)$ that $V(15,2) = \text{Spin}(15) / \text{Spin}(13)$ is related to, but not identified with, the **Zero Divisors of 32-ons** which have $35 + 120 = 155$ Associative Triples and which have 8-2=6 ZD Irreducible Components and 26-dim Lie Sphere $\text{Spin}(15) / \text{Spin}(13) \times U(1)$ whose 26D correspond to **26D String Theory and to 26-dim traceless $J(3,0)_0$** that $V(127,2) = \text{Spin}(127) / \text{Spin}(125)$ is related to, but not identified with, the **Zero Divisors of Voudon 256-ons** corresponding to $\text{Cl}(8)$ which have $1+6+28+120+496+2016+8128=10795$ Associative Triples and which have 64-2=62 ZD Irreducible Components and 250-dim Lie Sphere $\text{Spin}(127) / \text{Spin}(125) \times U(1)$

Robert de Marrais said "... 256 ... 2^8 ions Voudons ... Moreno ... determines that the automorphism group of the ZD's of all 2^n-ions ... obey a simple pattern: for $n \geq 4$ this group has the form $G_2 \times (n-3) \times S_3$ (... order-6 permutation group on 3 elements) ... This says the automorphism group of the Sedenions' ZD's has order $14 \times 1 \times 6 = 84$... based on 7 octahedral lattices ("Box-Kites" ...

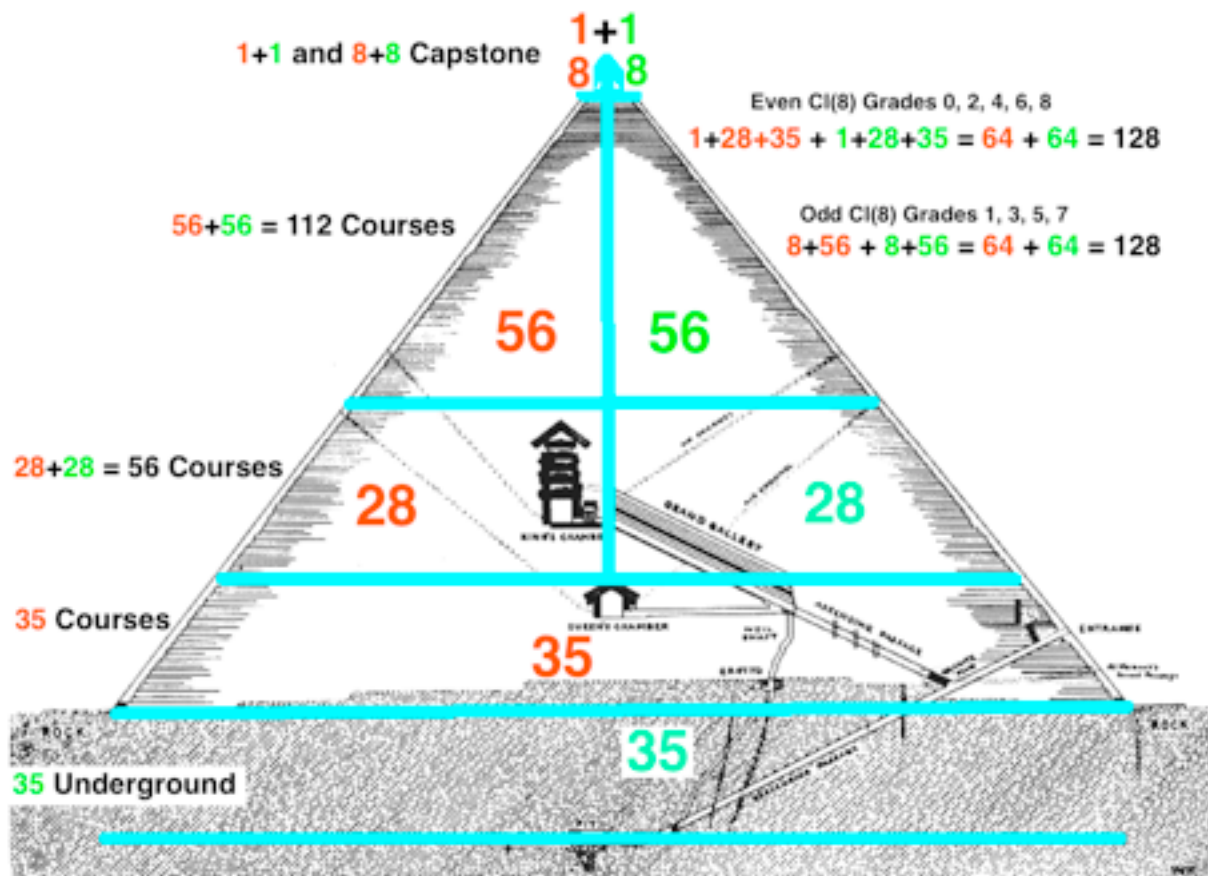


"... Harmonics of Box-Kites, called here "Kite-Chain Middens," ... extend indefinitely into higher forms of 2^n -ions. All non-Midden-collected ZD diagonals in the ... 32-ons ... belong ... to a set of 15 "emanation tables," ... they house 168 ... PSL(2,7) ... cells ... 8 ... 32-ons ... ET's ... from $S = 8$ to 15 ...

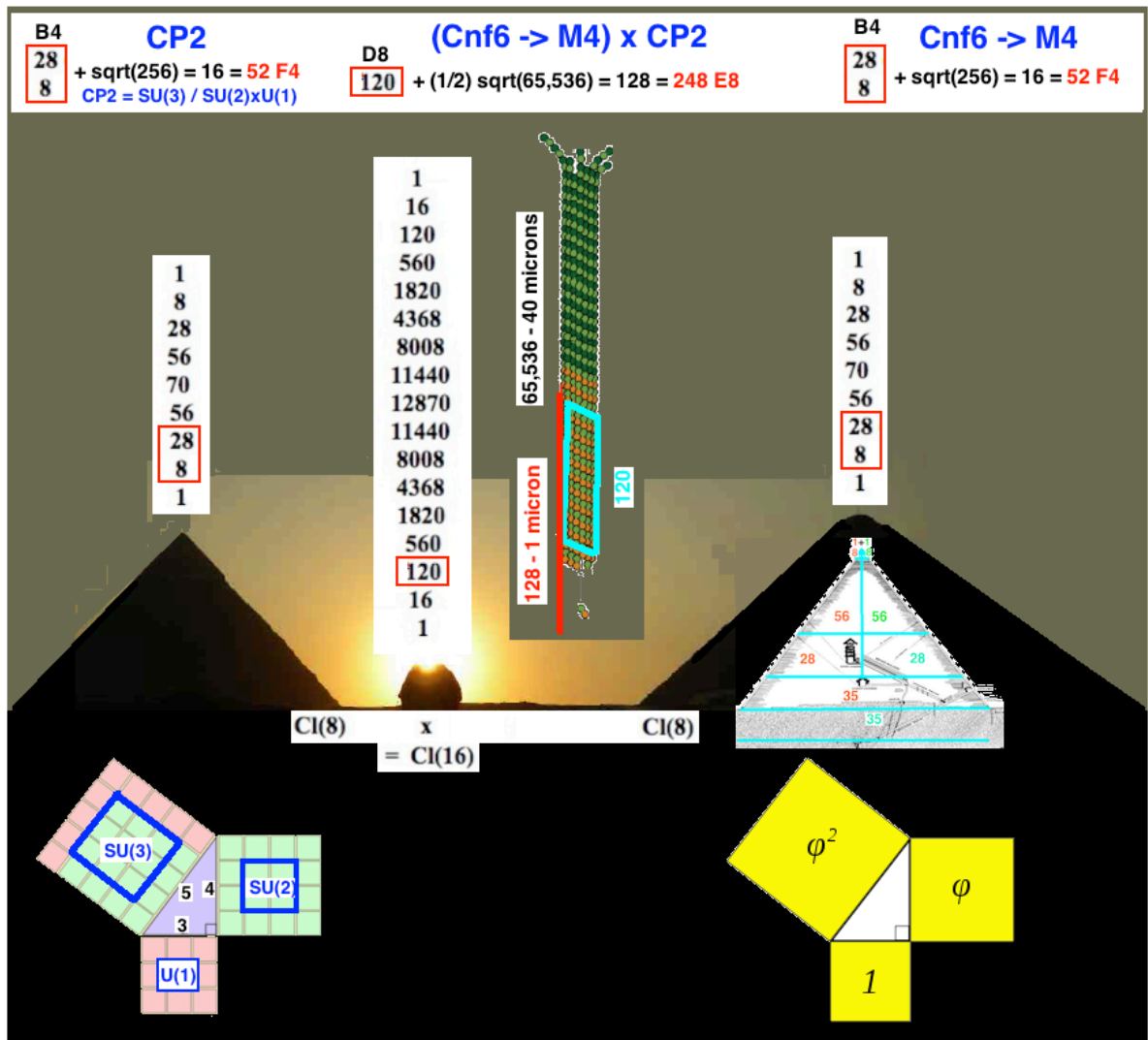


[here are] ... Emanation Tables ... ET's for $S = 15, N = 5, 6, 7$... and fractal limit ...





$$1 + 8 + 28 + 56 + (35 + 35) + 56 + 28 + 8 + 1$$



52-dim F4 of CP2 in 256-dim CI(8)

F4 / B4 = OP2 = Spinor Fermions = 8 Particles + 8 AntiParticles
 B4 / D4 = 8-dim SpaceTime = Kaluza-Klein M4 x CP2
 D4 = Spin(8) contains Spin(6) = SU(4) contains SU(3) Color Force
 SU(3) Color Force = Global Symmetry of CP2 = SU(3) / SU(2)xU(1)
 SU(2)xU(1) ElectroWeak Force = Local Symmetry of CP2

52-dim F4 of Cnf6 -> M4 in 256-dim CI(8)

F4 / B4 = OP2 = Spinor Fermions = 8 Particles + 8 AntiParticles
 B4 / D4 = 8-dim SpaceTime = Kaluza-Klein M4 x CP2
 D4 = Spin(4,4) contains Spin(2,4) of Conformal Gravity + Dark Energy



E8 Kaluza-Klein (Cnf6 -> M4) x CP2

In (CI(8) of CP2) x (CI(8) of Cnf6 -> M4) = CI(16) containing E8
 at each of the 256 points of CI(8) of Cnf6 -> M4 there are all 256 points of CI(8) of CP2

E8 / D8 = 128-dim Fermion Spinor Space = 8 components of 8+8 Fermions
D8 / D4 x D4 = A7+1 = 64 = 8-dim position x 8-dim momentum
D4 containing D3 = Spin(2,4) = A3 = SU(2,2) for Conformal Gravity + Dark Energy
D4 containing D3 = SU(4) containing Color Force SU(3)

256
 x
 256
 = 65,536

Void -> CI(Void) -> CI(0) -> CI(1) -> CI(2) -> CI(4) -> CI(16)

Kaluza-Klein Spacetime
M4 x CP2

1	16
120	120
560	560
1820	1820
4368	4368
8008	8008
11440	11440
12870	12870
11440	11440
8008	8008
4368	4368
1820	1820
560	560
120	120
16	16
1	1

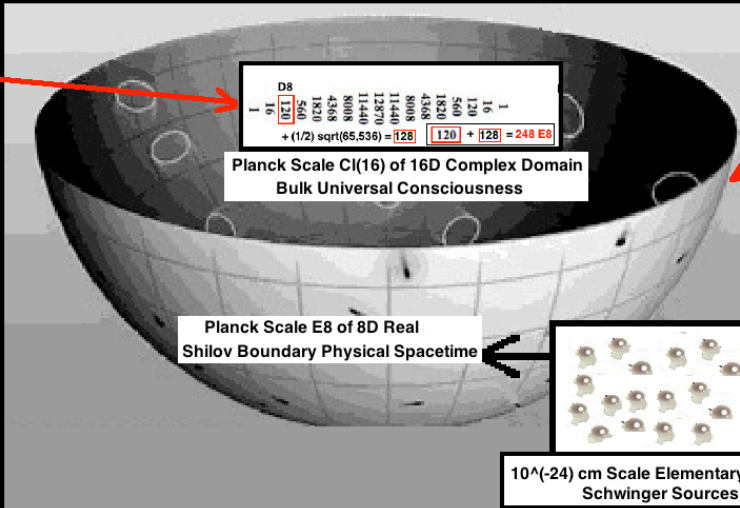
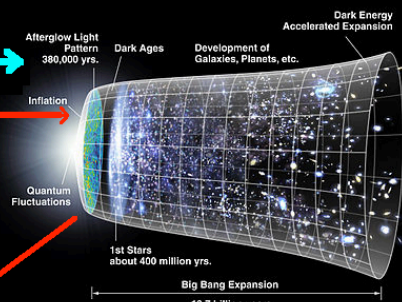
CI(8) that contains 28 = D4 for M4 Gravity

CI(8) that contains 28 = D4 for CP2 Std Model

Spinors: $(8s+8c) + (8s+8c)$
 $(8s+8c) \times (8s+8c) = (8c \cdot 8s + 8c \cdot 8c)$

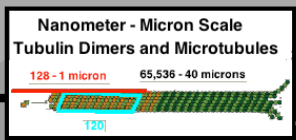
NJL Quantum Condensate

10¹⁹ E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation

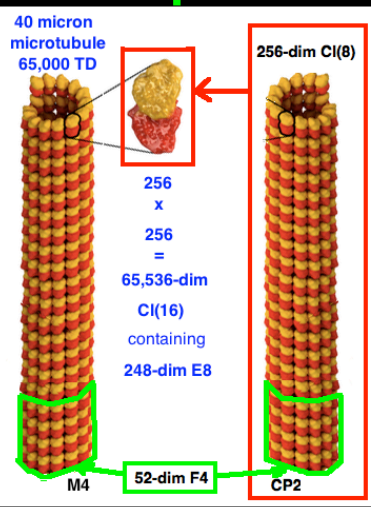


D8	16
120	120
560	560
1820	1820
4368	4368
8008	8008
11440	11440
12870	12870
11440	11440
8008	8008
4368	4368
1820	1820
560	560
120	120
16	16
1	1

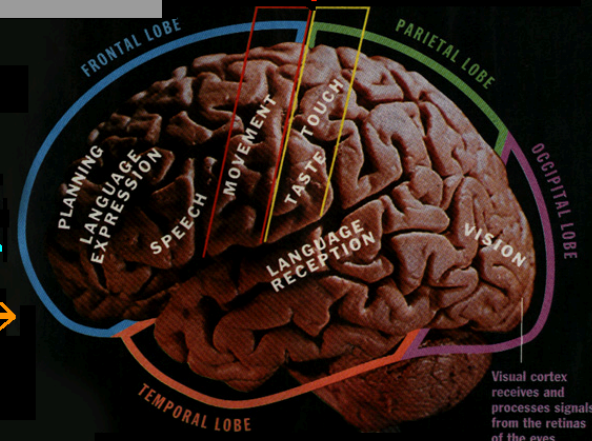
$+ (1/2) \sqrt{65,536} = 128$ $120 + 128 = 248 \text{ E8}$



Quantum Resonant Connection



Penrose-Hameroff Quantum Condensate



10¹⁹ Tubulin Dimers in a Human Brain

Void -> CI(Void) -> CI(0) -> CI(1) -> CI(2) -> CI(4) -> CI(16)

Kaluza-Klein Spacetime
M4 x CP2

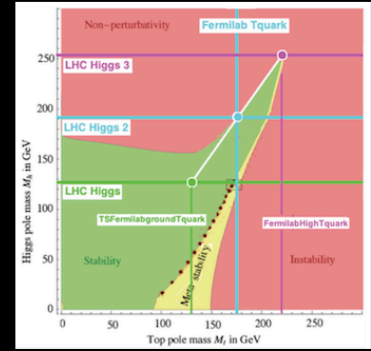
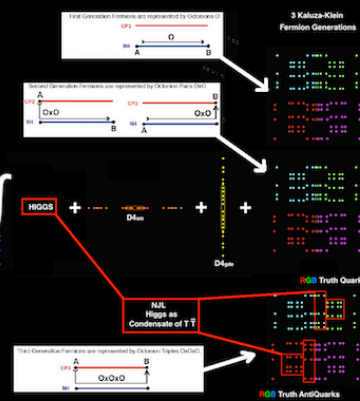
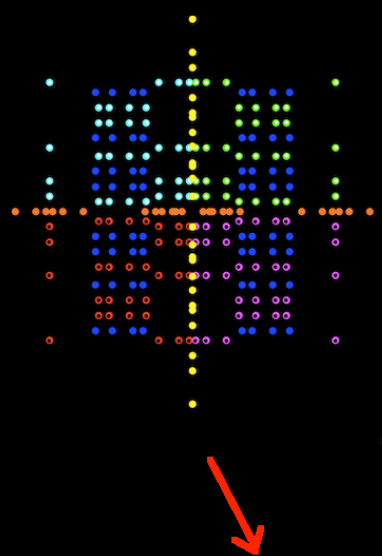
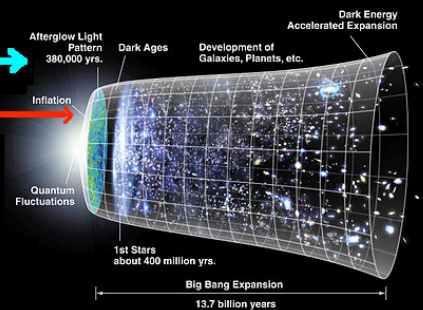
1	16
8	120
28	560
70	1820
160	4368
350	8008
700	11440
1260	12870
2002	11440
2800	8008
3500	4368
3701	1820
3003	560
2100	120
1050	16
350	1

CI(8) x CI(8) = CI(16)

Spinors: $(8s, 8s) + (8s, 8c)$
 $(8s+8c) \times (8s+8c) = (8c, 8s + 8c, 8c)$

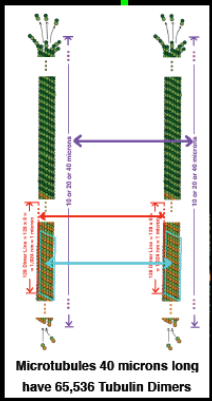
NJL Quantum Condensate

10¹⁹ E8 Lattice 240-vertex Polytope Cells in Universe at End of Inflation

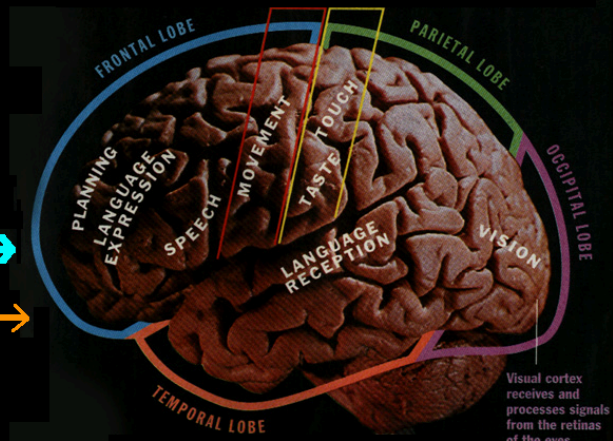


CI(0,16) x CI(0,8) = CI(0,24)
 M(2,CI(0,24)) = CI(1,25)
 Completion of Union of All Tensor Products of CI(1,25) = AQFT

Quantum Resonant Connection



Penrose-Hameroff Quantum Condensate



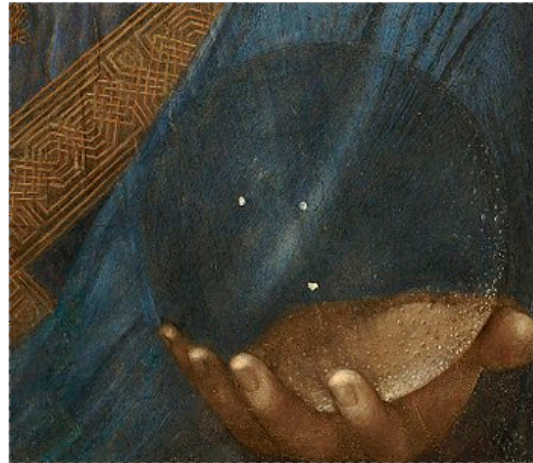
10¹⁹ Tubulin Dimers in a Human Brain

Visual cortex receives and processes signals from the retinas of the eyes

Leonardo da Vinci E8

Frank Dodd (Tony) Smith, Jr. - 2017

Wikipedia: "... Christ as Salvator Mundi (Saviour of The World) ... is a painting ... from c. 1500 ... by Leonardo da Vinci ... The painting shows Christ, in Renaissance dress, giving a benediction with his raised right hand and crossed fingers while holding a crystal sphere in his left hand ...



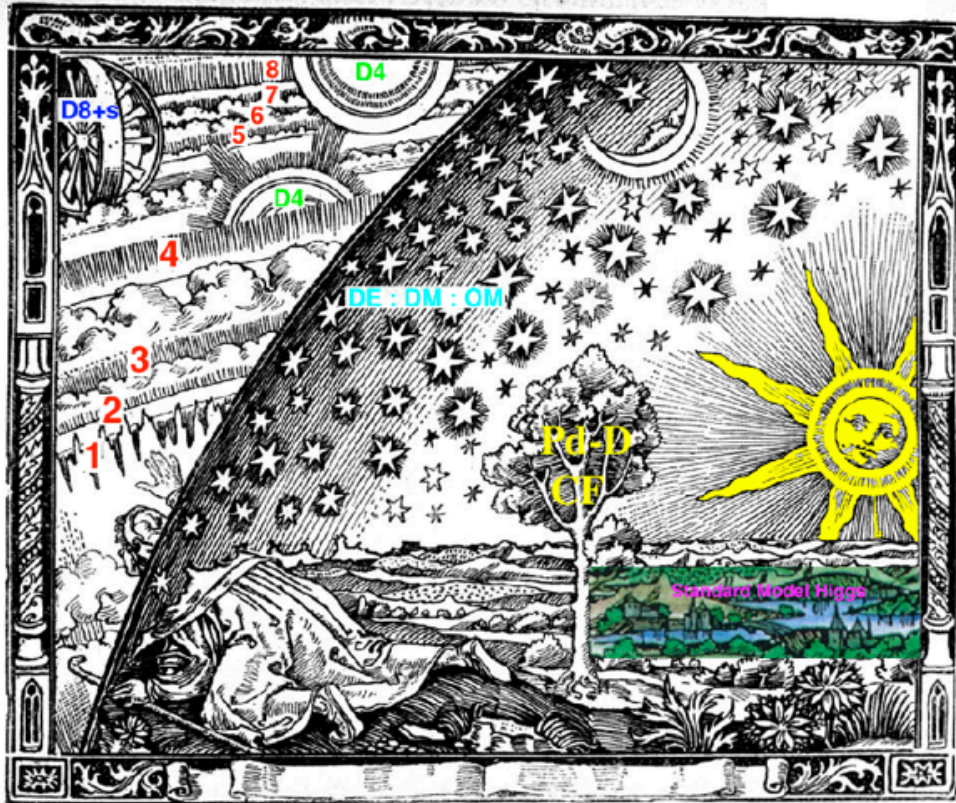
... It was ... possibly painted for Louis XII of France and his consort, Anne of Brittany ... shortly after the conquests of Milan and Genoa around 1500 [and] subsequently owned by Charles I of England and recorded in his art collection in 1649 ... Leonardo painted the orb as if it were a hollow glass bubble that does not refract or distort the light passing through it ... [instead of] ... paint[ing] the distortion that would occur when looking through a solid clear orb ...”.

Since Leonardo’s orb is a hollow sphere instead of a solid ball Leonardo’s markings are all on the surface of the 2-dim sphere boundary of the ball in 3-dim space.

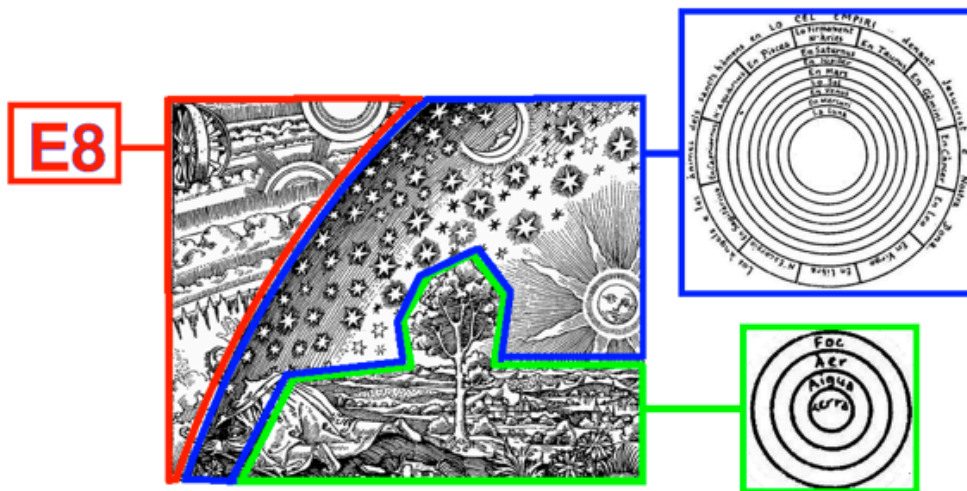
E8-CI(16) Physics (viXra 1602.0319) is based on the 240 Root Vectors of E8 which are points on the 7-dim sphere boundary of the ball in 8-dim space.

$$\begin{aligned} 248\text{-dim E8} &= 120\text{-dim D8} + 128\text{-dim D8} + \text{half-spinor} = \\ &= \text{D4xD4} + \text{8x8} + 128\text{-dim D8} + \text{half-spinor D8+s} \end{aligned}$$

The structure of E8 was depicted by Flammarion (wood engraving on page 163 of his 1888 book "L'Atmosphere Meteorologie Populaire") on a Celestial Sphere beyond our Earthly Plane and its Star-Sun-Moon-Planets Sphere (viXra 1304.0071):



Flammarion's 1888 engraving was much later than Leonardo's 1500 painting so it did not directly influence Leonardo, but its basic components were well known from at least the time of Ramon Llull (1232-1315)



who, according to R. Pring-Mill, *Studies on Ramon Llull*, Barcelona, PAM-Curial, 1991, p. 62, produced a “Scheme of the simplified aristotelian cosmos” as a circle centered by 4 layers Earth, Water, Air, and Fire and then by 7 layers Moon, Mercury, Venus, Sun, Mars, Jupiter, and Saturn and an 8th layer for the fixed Stars described by the Zodiac

and the 13th layer of Angels, Saints, and the Heavenly Empire of Jesus and G-d which I interpret as E8 Physics by which G-d governs Our Universe.
that is beyond the outer $4+7+1 = 12$ layers of Earth, Sun, Moon, Planets, Stars:



The Flammarion Celestial Sphere representation of E8 corresponds to Leonardo's Sphere with markings also representing E8.

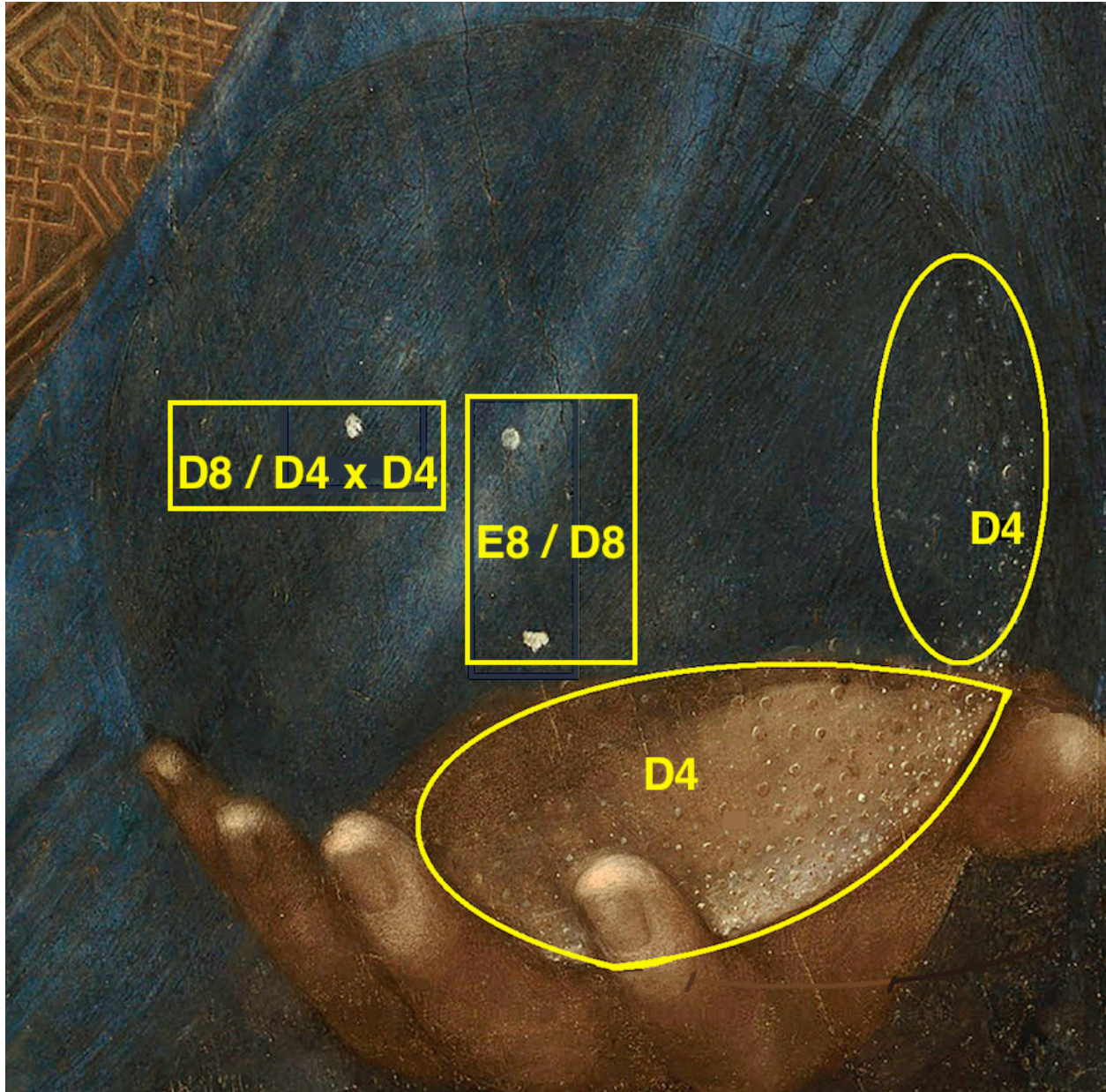
Flammarion's Celestial Sphere has two copies of D4 each with 24 Root Vectors and 128 Root Vectors from +half-spinors D8+s of D8 and 8 levels of 8 Spacetime dimensions for position x momentum = $8 \times 8 = 64$ Root Vectors thus giving $24 + 24 + 128 + 64 = 240$ Root Vectors of E8.

Flammarion's Earthly Plane and Stars-Sun-Moon-Panets Sphere corresponding to

Gravity , Dark Energy ratio DE:DM:OM , Higgs , Solar Fusion , and Pd-D Cold Fusion is not shown explicitly by Leonardo, but is represented by Leonardo as

Earthly Plane = Brown Hand and Stars-Sun-Moon-Panets Sphere = Blue Garment.

Leonardo's Celestial Sphere represents E8 in this way:



Two markings correspond to $64+64 = 128$ -dim $E8 / D8$
 (8x8 Fermion and 8x8 AntiFermion components)

The third marking corresponds to 64-dim $D8 / D4 \times D4$
 (8-dim Spacetime 8x8 Position x Momentum)

One of the D4 groups of markings corresponds to
 the Standard Model and Gravity-Dark Energy Ghosts.

The other D4 group of markings corresponds to
 Gravity-Dark Energy and Standard Model Ghosts.

24 of each D4 group of markings are D4 Root Vectors,
 the others are composite structures such as
 Gauge-Boson-bound (mesons, baryons, atoms) and Gravity-bound (black holes, planets, stars, galaxies).

E8-CI(16) Physics Calculations of Particle Masses and Force Strengths
 from Green's Functions = Kernel Functions of Schwinger Sources
 make use of Shilov Boundaries of Complex Domains whose structure
 is inherited from the geometry of E8.