Cl(16) Bulk and E8 Boundary Physics

Frank Dodd (Tony) Smith, Jr. - 2018

Abstract

Physical Spacetime is the Shilov Boundary of a Complex Domain Bulk Space.
Bulk Domain is made up of Cells carrying 65,536 Cl(16) Quantum Information Elements.
Physical Spacetime contains an Indra's Net of Schwinger Source Particles which form Atoms which in turn form Tubulin Dimers and Microtubules carrying 65,000 Quantum Information Elements.
The Spacetime Microtubules and Bulk Domain Cells have Resonant Connection by Bohm Quantum Potential, thus connecting Consciousness of Human Body with Universal Spiritual Consciousness.
The Complex Domain Buik and Shilov Boundary are also related by Poisson and Bergman Kernels.
Bergman Kernel for a Bounded Region of Spacetime is the Green's Function for that Region as a Schwinger Source carrying Charge of Symmetry of its Spacetime Region.
Schwinger Sources act as Jewels of a Universal Indra's Net with Quantum Blockchain Structure.
For each Schwinger Source to carry Information of Indra's Net it must have Fractal Structure.
Geometry of Schwinger Sources their Green's Functions allows calculation of Force Strengths and Particle Masses. For details see viXra 1701.0496 , 1701.0495 , 1602.0319 , 1711.0476 , 1801.0086

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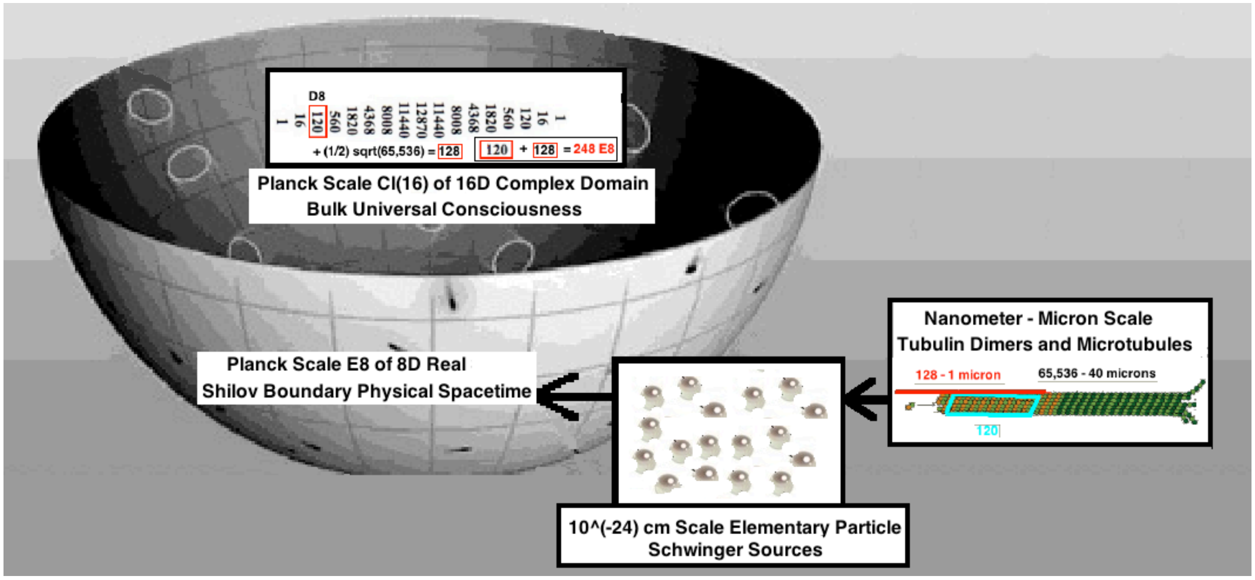
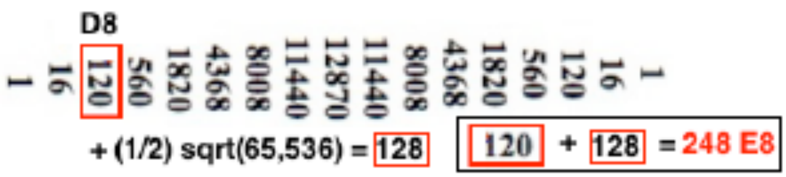


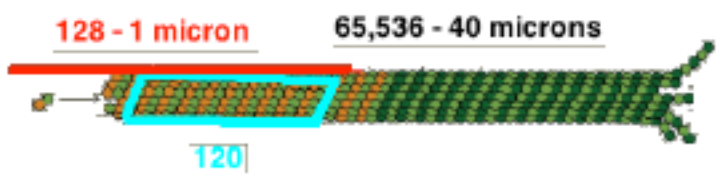
In E8 Physics (viXra 1602.0319) **Spacetime is the 8-dimensional Shilov Boundary RP1 x S7** of the **Type IV8 Bounded Complex Domain Bulk Space** of the Symmetric Space Spin(10) / Spin(8)xU(1) which **Bulk Space** has 16 Real dimensions and is the Vector Space of the Real Clifford Algebra Cl(16).
By 8-Periodicity, Cl(16) = tensor product Cl(8) x Cl(8) = Real 256x256 Matrix Algebra M(R,256) and so has 256x256 = 65,536 elements.



Cl(8) has 8 Vectors, 28 BiVectors, and 16 Spinors with 8+28+16 = 52 = F4 Lie Algebra.
Cl(16) has 120 BiVectors, and 128 Half-Spinors with 120+128 = 248 = E8 Lie Algebra.
The 248 E8 elements of Cl(16) define a Lagrangian for the Standard Model and for Gravity - Dark Energy so that 65,536 - 248 = 65,288 elements of Cl(16) can carry Bits of Information.
The Complex Bulk Space Cl(16) contains the Maximal Contraction of E8 which is H92 + A7 a generalized Heisenberg Algebra of Quantum Creation-Annihilation Operators with graded structure

28 + 64 + ((SL(8,R)+1) + 64 + 28

We live in the Physical Minkowski M4 part of Kaluza-Klein M4 x CP2 structure of RP1 x S7 **Boundary**.
(where CP2 = SU(3) / SU(2)xU(1) is Internal Symmetry Space of Standard Model gauge groups)
Our Consciousness is based on Binary States of Tubulin Dimers (each 4x4x8 nm size) in Microtubules.



MIcrotubules are cylinders of sets of 13 Dimers with maximal length about 40,000 nm so that each Microtubule can contain about 13 x 40,000 / 8 = 65,000 Bits of Information.
The Physical Boundary in which we live is a Real Shilov Boundary in which E8 is manifested as Lagrangian Structure of Real Forms of E8 with Lagrangian Symmetric Space structure:

E8 / D8 = (OxO)P2 for 8 componets of 8+8 First-Generation Fermions
D8 / D4 x D4 for 8-dim spacetime position x 8-dim spacetime momentum

D4 for Standard Model Gauge Bosons and Gravity - Dark Energy Ghosts
D4 for Gravity - Dark Energy Gauge Bosons and Standard Model Ghosts

Microtubule Information in the Boundary has Resonant Connection to Cl(16) Information in Bulk Space by the spin-2 Bohm Quantum Potential with Sarfatti Back-Reaction of 26D String Theory of World-Lines consistent with Poisson Kernel as derivative of Green's function.

The Bulk Space Domain Type IV8 corresponds to the Symmetric Space Spin(10) / Spin(8)xU(1) and is a Lie Ball whose Shilov Boundary RP1 x S7 is a Lie Sphere 8-dim Spacetime.
It is related to the Stiefel Manifold V(10,2) = Spin(10) / Spin(8) of dimension 20-3 = 17
by the fibration Spin(10) / Spin(8)xU(1) -> V(10,2) -> U(1)
It can also be seen as a tube z = x + iy whose imaginary part is physically inverse momentum so that its points give both position and momentum
(see R. **Coquereaux** Nuc. Phys. B. 18B (1990) 48-52) "Lie Balls and Relativistic Quantum Fields").

In "Harmonic Analysis of Functions of Several Complex Variables in the Classical Domains" L. K. H**ua** said: "... Editor's Foreword ... M. I. Graev ...

Poisson kernel can be defined in group-theoretic terms. Let $\mathfrak{R}$ be one of the domains considered in the book, and $\mathfrak{C}$ its characteristic manifold. Let z be a point in $\mathfrak{R}$ and C_z the group of those analytic automorphisms of $\mathfrak{R}$ which leave z invariant. It can be shown that the group C_z is transitive on $\mathfrak{C}$, i.e., transforms any point of $\mathfrak{C}$ into any other point. The measure on $\mathfrak{C}$ which is invariant under the transformations in C_z is then simply equal to the Poisson kernel.

...[Characteristic Manifold = Shilov Boundary]...

In 1935, E. Cartan [1] proved that there exist only six types of irreducible homogeneous bounded symmetric domains. Beside the four types, RI, RII, RIII, RIV there exist only two; their dimensions are 16 and 27.
[16-Complex-Dimensional E6 / Spin(10)xU(1) = (CxO)P2
27-Complex-Dimensional E7 / E6xU(1) = J(3,(CxO))]

The domain $\mathfrak{R}_{IV}$ of n-dimensional $(n>2)$ vectors

$$z=(z_1, z_2, \cdots, z_n)$$

(z_k are complex numbers) satisfying the conditions

$$|zz'|^2+1-2zz'>0, \qquad |zz'|<1.$$

The complex dimension of the four domains is mn, $n(n+1)/2$, $n(n-1)/2$, n.

The author has shown (cf. L. K. Hua [3]) that $\mathfrak{R}_{IV}$ can also be regarded as a homogeneous space of $2\times n$ real matrices. Therefore, the study of all these domains can be reduced to a study of the geometry of matrices.

The manifolds $\mathfrak{C}_{\rm I}$, $\mathfrak{C}_{\rm II}$, $\mathfrak{C}_{\rm III}$ and $\mathfrak{C}_{\rm IV}$ have real dimension $m(2n-m)$, $n(n+1)/2$, $n(n-1)/2+(1+(-1)^n)(n-1)/2$ and n, respectively.

The characteristic manifold of the domain $\mathfrak{R}_{\rm IV}$ consists of vectors of the form $e^{i\theta}x$, where $0\leqq\theta\leqq\pi$, and $x=(x_1,\cdots,x_n)$ is a real vector which satisfies the condition $xx'=1$.

$$H(z,\ \theta,\ x)=\frac{1}{V(\mathfrak{C}_{\rm IV})\,[(x-e^{-i\theta}z)(x-e^{-i\theta}z)']^{n/2}},$$

the magnitude of the volume $V(\mathfrak{C}_{\rm IV})$: $\quad V(\mathfrak{C}_{\rm IV})=\dfrac{2\pi^{\frac{n}{2}+1}}{\Gamma\left(\frac{n}{2}\right)}$.

The Bergman kernel of the domain $\mathfrak{R}_{\rm IV}$ *is*

$$\frac{1}{V(\mathfrak{R}_{\rm IV})}(1+|zz'|^2-2\bar{z}z')^{-n},$$

where, $\quad V(\mathfrak{R}_{\rm IV})=\dfrac{\pi^n}{2^{n-1}\cdot n!}$.

THE POISSON KERNEL For $\mathfrak{R}_{\rm IV}$

$$P(z,\ \xi)=\frac{1}{V(\mathfrak{C}_{\rm IV})}\cdot\frac{(1+|zz'|^2-2\bar{z}z')^{\frac{n}{2}}}{|(z-\xi)(z-\xi)'|^n},$$

where $\xi\in\mathfrak{C}_{\rm IV}$.

HARMONIC ANALYSIS ON LIE SPHERES

$$\int_{\mathfrak{R}_{\rm IV}}|zz'|^{2l}\,\Phi_{f-2l}(z,\ \bar{z})\,\dot{z}$$

$$=(N_{f-2l}-N_{f-2l-2})\frac{l!\,\Gamma(n)\,\Gamma\left(\frac{n}{2}+1\right)\Gamma\left(f+\frac{n}{2}-l\right)}{2\pi^{\frac{n}{2}}\,\Gamma\left(l+\frac{n}{2}+1\right)\Gamma(f+n-l)}\,V(\mathfrak{R}_{\rm IV}).$$

…”.

In Annals of Mathematics 55 (1952) 19-33 P. R. **Garabedian** said "...

we turn here to a more direct development of the theory of boundary value problems associated with the Cauchy-Riemann equations for analytic functions of several complex variables.

This boundary value problem is solved by means of a Dirichlet principle, and we introduce a Green's function in terms of which the solution can be expressed as a boundary integral. A formula giving the Bergman kernel function for several variables [1] in terms of this Green's function is obtained, and we thus generalize known theorems from the theory of functions of one complex variable

for analytic functions of several complex variables.

Bergman [1] defines a kernel function $k(z, t)$, analytic in z and $\bar{t}$ for $z, t \in D$

THEOREM 3. *The analytic kernel function* $k(z, t)$ *with*

$$g(t) = \int_D g(z)\, \overline{k(z, t)}\, d\tau$$

for each analytic function g *in* D *has the representation*

$k(z, t) = \Delta_z \theta(z, t)$ *in terms of the Green's function* $\theta(z, t)$.

...".

Schwinger (1951 - see Schweber, PNAS 102, 7783-7788) "... introduced a description in terms of **Green's functions ...[of]... what Feynman had called propagator**s ... 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 ...".

Wolf (J. Math. Mech 14 (1965) 1033-1047) showed that the Classical Domains (complete simply connected Riemannian symmetric spaces) representing 4-dim Spacetime with Quaternionic Structure are:

S1 x S1 x S1 x S1 = 4 copies of U(1)

S2 x S2 = 2 copies of SU(2)

CP2 = SU(3) / SU(2)xU(1)

S4 = Spin(5) / Spin(4) = Euclidean version of Spin(2,3) / Spin(1,3)

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

Schwinger (1969 - see physics/0610054) said: "... operator field theory ... replace[s] the particle with ... properties ... distributed througout ... small volumes of three-dimensional space ... particles ... must be created ... even though we vary a number of experimental parameters ... The properties of the particle ... remain the same ... 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 experimeter... must detect the particles ...[by]... collision that annihilates the particle ... the source ... can be ... an abstraction of an annilhilation collision, with the source acting negatively, as a sink ... **The basic things are ... the source functions ... describing the intermediate propagation of the particle** ...".

E8 Physics constructs the **Lagrangian** integral such that the **mass m emerges as the integral over the Schwinger Source spacetime region** of its Kerr-Newman cloud of virtual particle/antiparticle pairs plus the valence fermion so that the volume of the Schwinger Source fermion defines its mass, which, being dressed with the particle/antiparticle pair cloud, gives **quark mass as constituent mass**.

Schwinger Sources as described above are continuous manifold structures of Bounded Complex Domains and their Shilov Boundaries but 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 a single 26-dim String Theory cell modulo the Leech lattice is the Monster Group of order about 8 x 10^53.

W**hen a fermion particle/antiparticle appears in E8 spacetime** it does not remain a single Planck-scale entity because **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**.
Its **structure comes from the 24-dim Leech lattice part of the Monster Group which is 2^(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,
so the Kerr-Newman Cloud **Source should contain about 10^27 particle/antiparticle pairs and its size should be about** 10^(27/3) x 1.6 x 10^(-33) cm = roughly **10^(-24) cm**.

Each Schwinger Source particle-antiparticle pair should see (with Bohm Potential) the rest of our Universe in the perspective of 8 x 10^53 Monster Symmetry so **a Schwinger Source acting as a Jewel of Indra's Net** of Schwinger Source Bohm Quantum Blockchain Physics (viXra 1801.0086)
can see / reflect 10^27 x 8 x 10^53 = 8 x 10^80 Other Schwinger Source Jewels of Indra's Net.

How many Schwinger Sources are in the Indra's Net of Our Universe ?

Based on gr-qc/0007006 by Paola Zizzi, the Inflation Era of Our Universe ended with Quantum Decoherence when its number of qubits reached 2^64 for Cl(64) = Cl(8)^8 self-reflexivity whereby each Cl(8) 8-Periodicity component corresponded to each basis element of the Cl(8) Vector Space.
At the End of Inflation, each of the 2^64 qubits transforms into 2^64 elementary first-generation fermion particle-antiparticle pairs. The resulting 2^64 x 2^64 pairs constitute a Zizzi Quantum Register of order 2^64 x 2^64 = 2^128 .
At Reheating time Tn = (n+1) TPlanck the Register has (n+1)^2 qubits so at Reheating Our Universe has (2^128)^2 = 2^256 = 10^77 qubits and since each qubit corresponds to fermion partiilce-antiparticle pairs that average about 0.66 GeV so

the number of particles in our Universe at Reheating is about 10^77 nucleons which, being less than 10^80, can be reflected by Schwinger Source Indra Jewels.

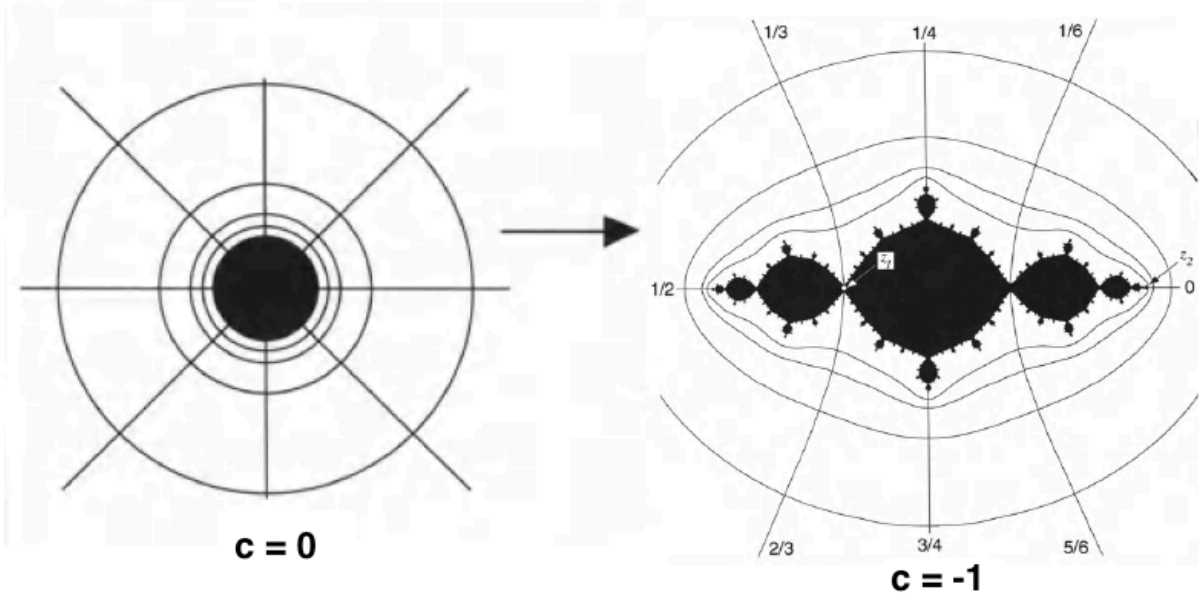
The Reheating process raises the energy/temperature at Reheating to Ereh = 10^14 GeV, the geometric mean of the Eplanck = 10^19 GeV and Edecoh = 10^10 GeV. After Reheating, our Universe enters the Radiation-Dominated Era, and, since there is no continuous creation, particle production stops, so the **10^77 nucleon Baryonic Mass of our Universe has been mostly constant since Reheating**,
and will continue to be mostly constant until Proton Decay.

How are the Elements of Indra Net Information positioned in a Schwinger Source that can reflect 10^80 Other Schwinger Source Indra Jewels ?

To be evenly distributed in a 3D cube of size 10^(-24) cm each Information Element would have a volume of 10^(-24x3) / 10^80 = 10^(-72-80) = 10^(-152) cm^3 or a size of roughly 10^(-50) cm which is much smaller than the Planck scale of 1.6 x 10^(-33) cm
so an even distribution of Information Elements is not realistic.

To fit inside a Schwinger Source the Information Elements should be distributed as a Fractal.

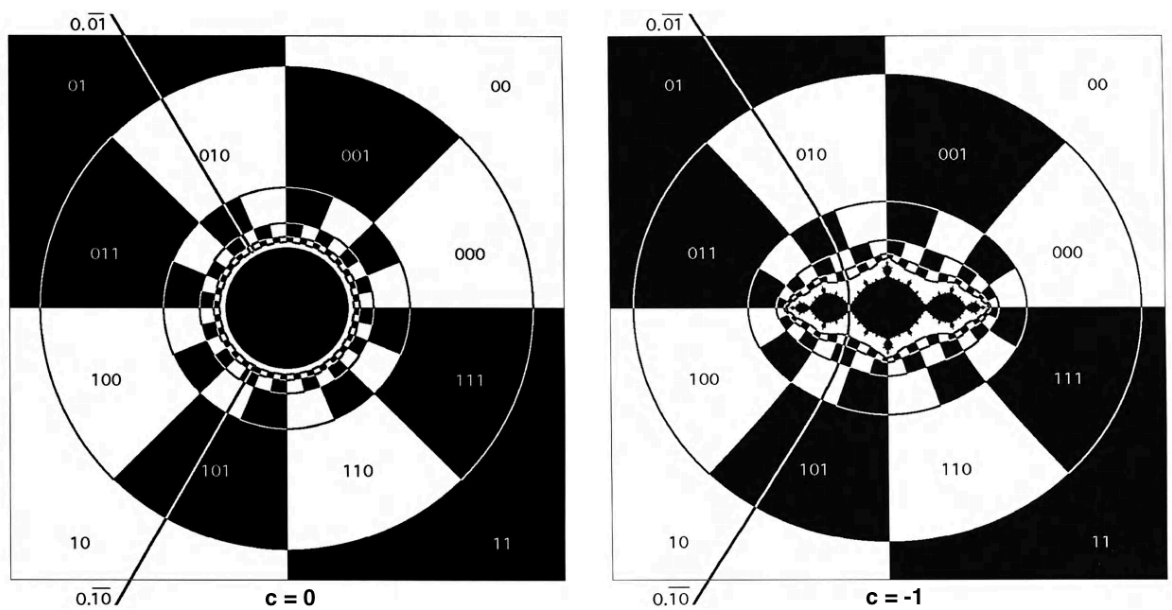
Peitgen, Jurgens, and Saupe in Chaos and Fractals (1992) say
"... Riemann Mapping Theorem ...[gives] A one-to-one correspondence between the potential of the unit disk and the potential of any connected prisoner set ... corresponding to z -> z^2 + c ...



... using c = -1 ... There are two fixed points,

z1 = (1 - sqrt(5)) / 2 and z2 = (1 + sqrt(5)) / 2

... The derivatives ... at z1 and z2 are I 1 +/- sqrt(5) I > 1 .
Thus, both fixed points are repelling and consequently points of the Julia set ...
therefore ... each will identify a field line ...
The potential function ...
induce[s] a natural decomposition of the escape set ... into level sets ...
a binary decomposition of ... level sets ... provide[s] a means of identifying field lines and dynamics ...

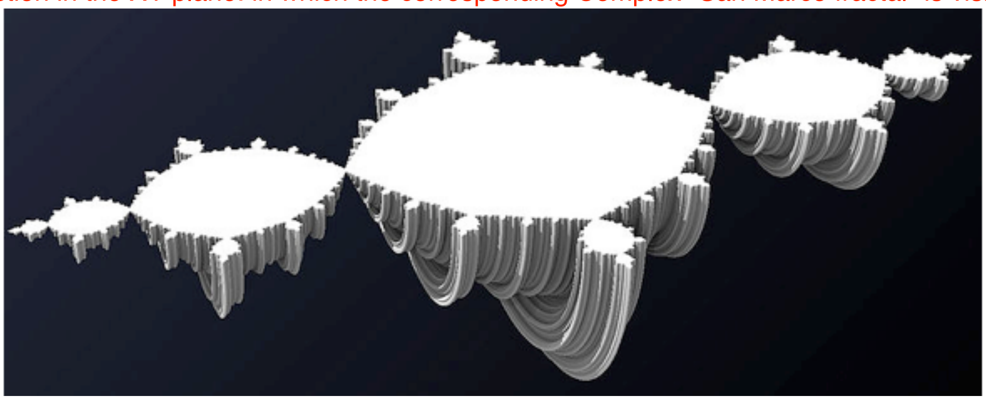


... There are 2^n stage-n cells in a level set ...".

A stage-256 Julia level set based on Binary Decompositionn has 2^256 = about 10^77 cells so Full Indra Net information can be seen / reflected by each Schwinger Source Indra Jewel.

The **2D Complex Number** Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial 1D space of RP1xS1 with c = 0 S1 circle and equivalently to c = -1 Complex Julia Set.
Each of the 2^256 Indra Schwinger Source Cells is a 1D neighborhood of an S1 Julia Set point.
RP1xS1 can represent a 2D Feynman Checkerboard.

4D Quaternion Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial 3D space of **RP1xS3 = M4** with c = 0 S3 and equivalently to c = -1 Quaternion Julia Set.
Peitgen and Richter in Beauty of Fractals say
"... A Quaternionic Julia set image by Prokofiev (wikimedia) shows the Quaternion Julia Set for c = -1 with a cross-section in the XY plane. in which the corresponding Complex "San Marco fractal" is visible:



...". Each of the 2^256 Indra Schwinger Source Cells is a 3D neighborhood of an S3 Julia Set point.
RP1xS3 can represent 4D Minkowski M4 Spacetime.

8D Octonion Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial 7D space of **RP1xS7 spacetime** with c = 0 S7 and equivalently to c = -1 Octonion Julia Set.
Each of the 2^256 Indra Schwinger Source Cells is a 7D neighborhood of an S7 Julia Set point.
RP1xS7 can represent 8D M4 x CP2 Kaluza-Klein Spacetime.

16D Sedenion Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial 15D space of **Bulk 16D spacetime** with c = 0 S15 and equivalently to c = -1 Sedenion Julia Set.
Each of the 2^256 Indra Schwinger Source Cells is a 15D neighborhood of an S15 Julia Set point.
16D Sedenion can represent 16D Bulk Domain of which RP1xS7 is Shilov Boundary.

24D Leech Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial 23D space of **26D String Theory** with c = 0 S23 and equivalently to c = -1 Julia Set for 24-ons.
Each of the 2^256 Indra Schwinger Source Cells is a 23D neighborhood of an S23 Julia Set point.
24D Leech can represent Fundamental Cells of 26D String Theory with Monster Group Symmetry.
24D Leech corresponds to B24 = Spin(10)/Spin(7) of Porteous showing Spin(10) not transitive on S31

64D Binary Decomposition gives 2^256 = 10^77 cells distributed over spatial **63D space of A7** with c = 0 S63 and equivalently to c = -1 Julia Set for 64-ons.
Each of the 2^256 Indra Schwinger Source Cells is a 63D neighborhood of an S63 Julia Set point.
64D can represent 8 Position x 8 Momentum of 8D Octonionic and (4+4)D Kaluza-Klein Spacetimes.
Cl(64) = Cl(8)^8 is self-reflexive End of Inflation with dim = 2^64 = 10^19 = 10 x Brain Tubulin Dimers.

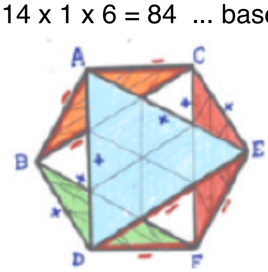
128D Binary Decomposition gives 2^256 = 10^77 cells distributed over 128D space of Half-Spinors of Cl(16) with c = 0 S255 and equivalently to c = -1 Julia Set for 256-ons.
128D also represents Geoffrey Dixon's T2 Spinor Space.

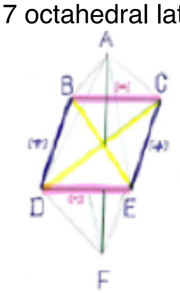
256D Binary Decomposition gives 2^256 = 10^77 cells distributed over 256D Cl(8) and Spinors of Cl(16) with c = 0 S255 and equivalently to c = -1 Julia Set for 256-ons.

16D Sedenions and Higher Cayley-Dickson Algebras have Zero Divisors

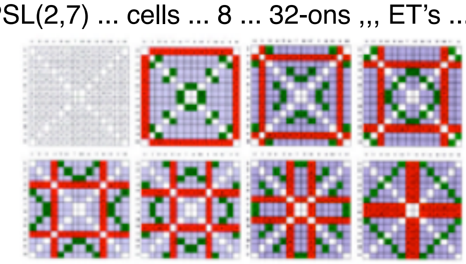
Guillermo **Moreno** (arXiv math/0512517) has shown that V(7,2) = Spin(7) / Spin(5) can
be identified with the Zero Divisors of the 4th Cayley-Dickson Algebra A4 = Sedenions
for which Zero Divisors are given by the fibration V(7,2) -> G2 -> S3
and which have 7+28 = 35 Associative Triples
and which have 4-2=2 ZD Irreducible Components and 10-dim Lie Sphere Spin(7) / Spin(5)xU(1)
whose 10D correspond to Cl(1,9) = Cl(2,8) Conformal over Cl(1,7)
and
that V(15,2) = Spin(15) / Spin(13) is related to, but not identified with,
the Zero Divisors of the 5th Cayley-Dickson Algebra A5 = 32-ons
which have 35 + 120 = 155 Associative Triples
and which have 8-2=6 ZD Irreducible Components and 26-dim Lie Sphere Spin(15) / Spin(13)xU(1)
whose 26D correspond to 26D String Theory and to 26-dim traceless J(3,O)o
and
that V(127,2) = Spin(127) / Spin(125) is related to, but not identified with,
the Zero Divisors of the 8th Cayley-Dickson Algebra A8 = 256-ons
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 Spin(127) / Spin(125)xU(1)
whose 256D correspond to 8-Periodicity building block Cl(8).

Robert de Marrais in arXiv 0804.3416 and math.RA/0207003 said "... Moreno ... determines that the automorphism group of the ZD's of all 2^n-ions ... obey a simple pattern: for n > 4, this group has the form G2 x (n-3) x S3 (... order-6 permutation group on 3 elements) ... This says the automorphism group of the Sedenions' ZD's has order 14 x 1 x 6 = 84 ... based on 7 octahedral lattices ("Box-Kites") ...

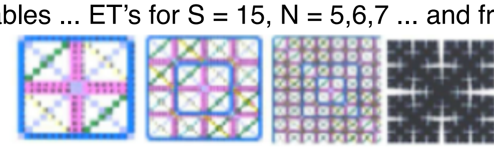




... Harmonics of Box-Kites, called here "Kite-Chain Middens," ... extend indefinitely into higher forms of 2^n -ions. All non-Midden-collected ZD diagonals in the ... 32-ons ... belong... to a set of 15 "emanation tables," ... they house 168 ... PSL(2,7) ... cells ... 8 ... 32-ons ,,, ET's ... from S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



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



..."

Calculation Results (details in viXra 1602.0319)

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 x 10^(-3) eV for nu_2
tau-neutrino	0	5.4 x 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 1.217x10^19 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 x 10^(-39)
EM fine structure	1/137.03608	
Weak Gw	0.2535	
Gw(Mproton^2 / (Mw+^2 + Mw-^2 + Mz0^2))		1.05 x 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.