

Perfect Numbers of Genesis

Stan Tenen is a brilliant researcher (with forty years experience in the Meru Foundation) into "geometric metaphor", which he describes as "... a coherent constellation of geometric models ...[that]... articulates ... that which is held in common by the many spiritual traditions of the ancient world ... as diverse as traditional meditational practices ... and the mathematics fundamental to contemporary biology, physics, and cosmology. These pages are motivated by Stan Tenen's work, and, unless otherwise noted, the illustrations and quotations are from him as source.

Rob Nixon is involved in similar research, in the course of which he has produced much useful data, including the precise order of the 78,064 letters of Genesis, which are used herein.

A web site including the page at www.mechon-mamre.org/p/pt/pt0101.htm has a side-by-side Hebrew-English version of Genesis which is used hereiu. Although the Chapter and Verse structure (and, of course, the English translation) is clearly not something that was part of the original fundamental structure of the Torah, it is something that I (being quite unfamiliar with much of the Hebrew language) need to orient myself within the Torah letter sequence. Even though the English story assigned to the letters is obviously of recent origin, it is possible that some aspects of the story do reflect some ancient meanings associated with letters in the Torah sequence.

A starting point for these pages is my conjectural idea that Perfect Numbers may be one of the keys to understanding the Torah sequence. The Perfect Numbers are numbers that are themselves the sum of their proper factors:

- $0 = 0$
- $1 = 1$
- $6 = 1 + 2 + 3$ (related to the Mersenne Prime $3 = 2^2 - 1$)
- $28 = 1 + 2 + 4 + 7 + 14$ (related to the Mersenne Prime $7 = 2^3 - 1$)
- $496 = 1 + 2 + 4 + 8 + 16 + 31 + 62 + 124 + 248$ (related to the Mersenne Prime $31 = 2^5 - 1$)
- $8,128 = 1 + 2 + 4 + 8 + 16 + 32 + 64 + 127 + 254 + 508 + 1,016 + 2,032 + 4,064$ (related to the Mersenne Prime $127 = 2^7 - 1$)
- $33,550,336$ (related to the Mersenne Prime $8,191 = 2^{13} - 1$) (since the entire Torah contains only 304,805 letters (i.e., the 22 Hebrew letters plus 5 finals), this and larger Perfect Numbers may not be directly relevant to understanding the Torah)
- and larger numbers

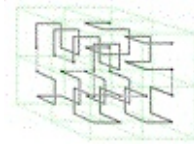
Here are the Torah places of the Perfect Numbers (smaller than 33,550,336):

Genesis Chapter 1 בְּרֵאשִׁית

0 - the letter Aleph א

1 first letter of the first word of the First Verse, the letter Bet ב (2nd letter) -

Yin/Yang distinction - Spin(1) = {-1,+1}



The structure of Bet looks to me like an element of a Net that fills all Spaces coming from the Aleph,

which in turn reminds me of the Net of Indra that encompasses All.

6 letters through the last letter Tav ת (22nd letter) of the First Word - Spin(1,3) has 6 dimensions

א. בְּרֵאשִׁית. 1 In the beginning

28 letters through the last letter Zadi-final י (27th letter) Chapter 1 Verse 1 - Spin(8) has 28 dimensions

א. בְּרֵאשִׁית, בָּרָא אֱלֹהִים, אֶת הַשָּׁמַיִם, וְאֶת הָאָרֶץ. 1 In the beginning God created the heaven and the earth.

letter 496 is the last Shin ש (21st letter) in Chapter 1 Verse 11 - 2xE8 has 496 dimensions

ח וַיִּקְרָא אֱלֹהִים לְרֻקִיעַ שָׁמַיִם; וַיְהִי-עֶרֶב וַיְהִי-בֹקֶר, יוֹם שֵׁנִי. {פ}

8 And God called the firmament Heaven. And there was evening and there was morning, a second day. {P}

ט וַיֹּאמֶר אֱלֹהִים, יִקְווּ הַמַּיִם מִתַּחַת הַשָּׁמַיִם אֶל-מְקוֹם אֶחָד, וַתֵּרָאֵה, הַיַּבֵּשֶׁה; וַיְהִי-כֵן.

9 And God said: 'Let the waters under the heaven be gathered together unto one place, and let the dry land appear.' And it was so.

י וַיִּקְרָא אֱלֹהִים לַיַּבֵּשֶׁה אֶרֶץ, וּלְמִקְוֵה הַמַּיִם קָדָא יַמִּים; וַיֵּרָא אֱלֹהִים, כִּי-טוֹב.

10 And God called the dry land Earth, and the gathering together of the waters called He Seas; and God saw that it was good.

יא וַיֹּאמֶר אֱלֹהִים, תִּדְשָׂא הָאָרֶץ דֶּשֶׁא עֵשֶׂב מְזִרְעַ זֵרַע, עֵץ פְּרִי עֹשֶׂה פְּרִי לְמִינוֹ, אֲשֶׁר זָרְעוּ-בּוֹ עַל-הָאָרֶץ; וַיְהִי-כֵן.

11 And God said: 'Let the earth put forth grass, herb yielding seed, and fruit-tree bearing fruit after its kind, wherein is the seed thereof, upon the earth.' And it was so.

Gen 1,11: "Fruit Tree Yielding Fruit
Whose Seed is Inside Itself"



Shin ש looks like a Tree of Life that Grows, Multiplies, and Evolves, branching into new forms.

Perhaps the most extreme Growth in the History of Our Universe was during Inflation, when a huge Quantum Superposition was formed in Inflationary Evolution from the Simple Initial State of Our Universe.

The Evolutionary Growth reminds me of Ganesha (Remover of Obstacles) and his Mice/Seeds.

letter 8128 is the fourth Ayin ע (16th letter) in Chapter 7 Verse 4 in the word 40 of 40 days -

Genesis Chapter 7 בְּרֵאשִׁית 7

- | | |
|---|---|
| <p>א וַיֹּאמֶר יְהוָה לְנוֹחַ, בֵּא-אִתָּהּ וְכָל-בֵּיתְךָ אֶל-הַתֵּבָה: כִּי-אֶתְךָ רָאִיתִי צַדִּיק לְפָנַי, בְּדוֹר הַזֶּה.</p> | <p>1 And the LORD said unto Noah: 'Come thou and all thy house into the ark; for thee have I seen righteous before Me in this generation.</p> |
| <p>ב מִכָּל הַבְּהֵמָה הַטְּהוֹרָה, תִּקַּח-לְךָ שִׁבְעָה שִׁבְעָה--אִישׁ וְאִשְׁתּוֹ; וּמִן-הַבְּהֵמָה אֲשֶׁר לֹא טְהוֹרָה הוּא, שְׁנַיִם--אִישׁ וְאִשְׁתּוֹ.</p> | <p>2 Of every clean beast thou shalt take to thee seven and seven, each with his mate; and of the beasts that are not clean two [and two], each with his mate;</p> |
| <p>ג גַּם מֵעוֹף הַשָּׁמַיִם שִׁבְעָה שִׁבְעָה, זָכָר וּנְקֵבָה, לְחַיּוֹת זֶרַע. עַל-פְּנֵי כָל-הָאָרֶץ.</p> | <p>3 of the fowl also of the air, seven and seven, male and female; to keep seed alive upon the face of all the earth.</p> |
| <p>ד כִּי לִימֵים עוֹד שִׁבְעָה, אָנֹכִי מִמַּטֵּיר עַל-הָאָרֶץ, אַרְבָּעִים יוֹם, וְאַרְבָּעִים לַיְלָה; וּמַחִיתִי, אֶת-כָּל-הַיְקוּם אֲשֶׁר עָשִׂיתִי, מֵעַל, פְּנֵי הָאֲדָמָה.</p> | <p>4 For yet seven days, and I will cause it to rain upon the earth forty days and forty nights; and every living substance that I have made will I blot out from off the face of the earth.'</p> |

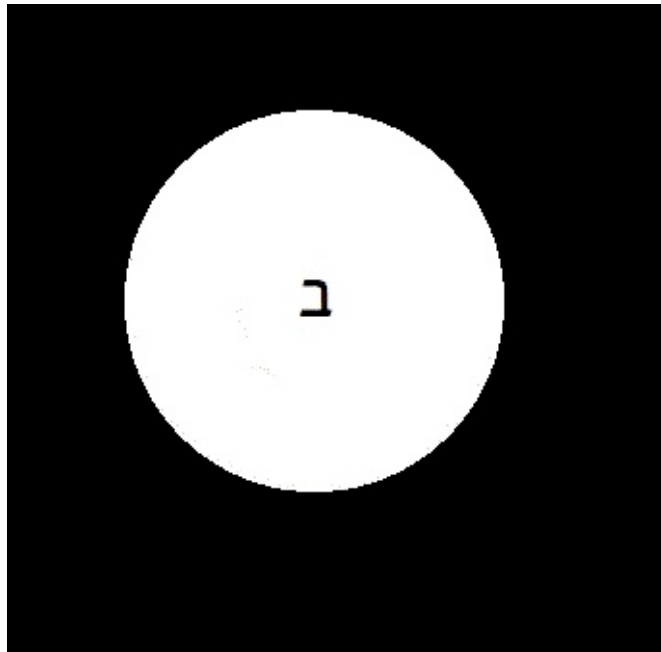
Ayin ψ has fewer branches than Shin Ψ and so represents Pruning some Branches from the Evolutionary Tree of Life.

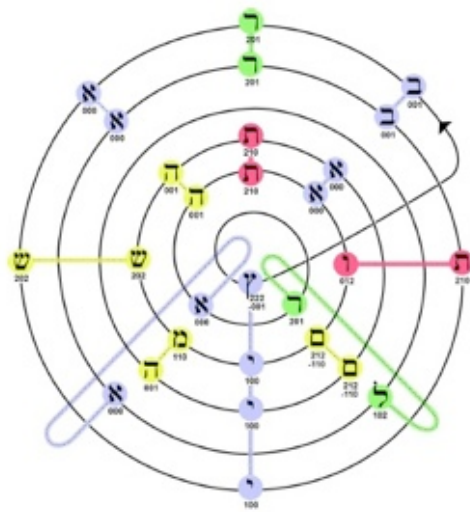
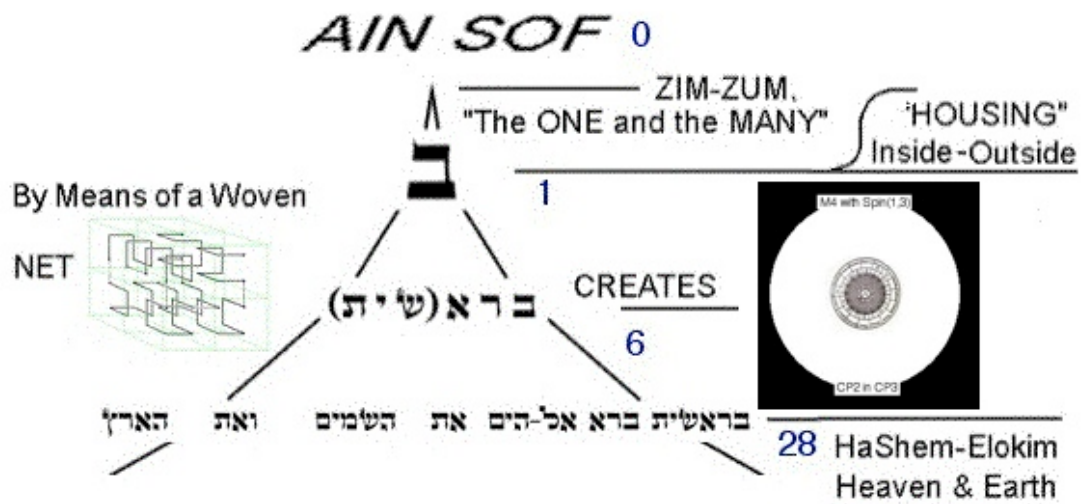
It also looks like a Fork in the Road of History, whereby Obstacles force Choices.

Perhaps the most extreme Pruning in the History of Our Universe was at the End of Inflation, when a huge Quantum Superposition underwent Decoherence to One Initial State of Ordinary Expansion of Our Universe.

The Pruning reminds me of Shiva, who places Obstacles in the Unfolding Book of History.

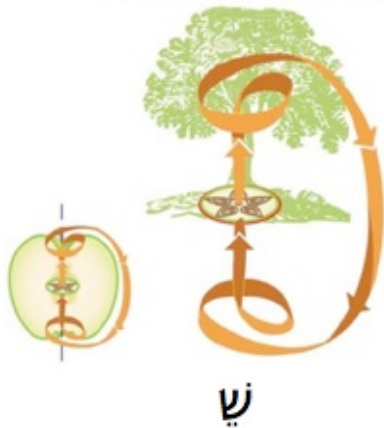
Here is some corresponding geometry, beginning with Ain Sof, which is described by Stan Tenen as "... a name that indicates an eternal phase or that which is "before" the beginning of the beginning - before the distinction that made the distinction between the two senses of the infinite. That name is Ain Sof, and it means, simply, without limit: The undifferentiated infinite as such. The Ain Sof is that which exists prior to the very possibility of distinction ...":



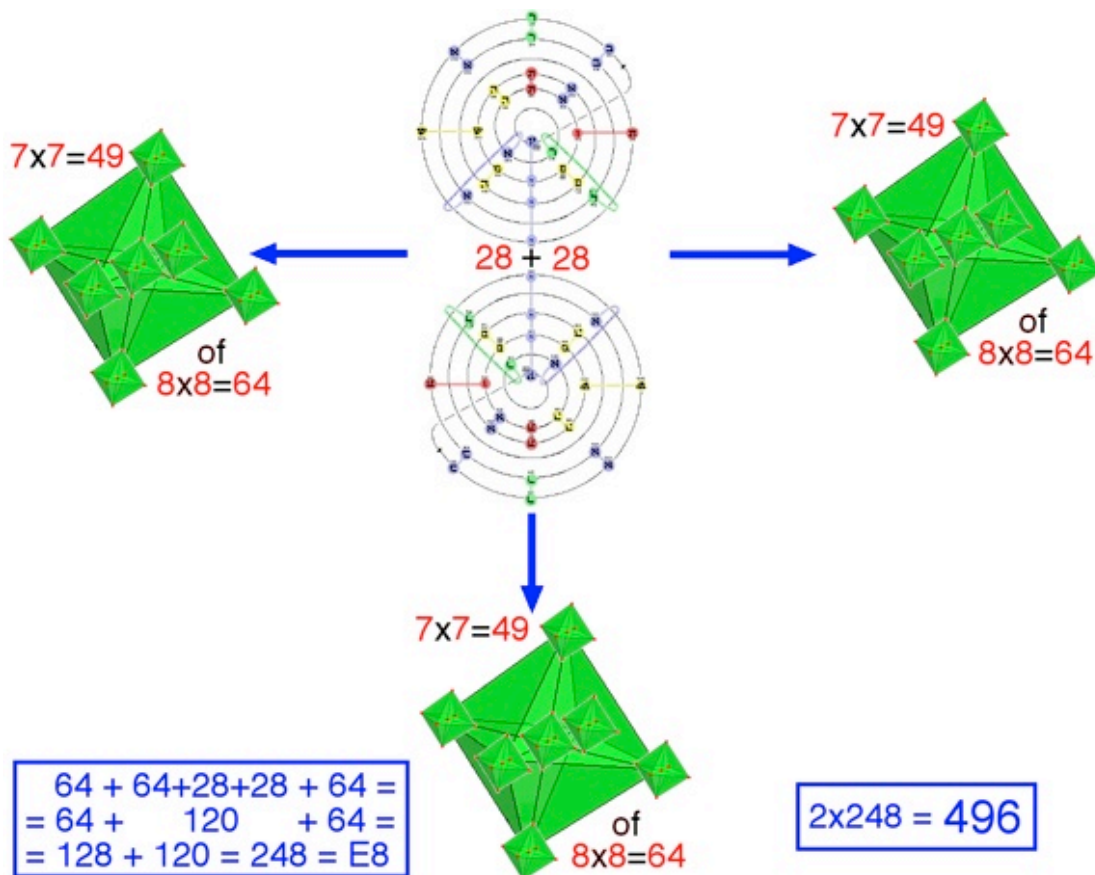
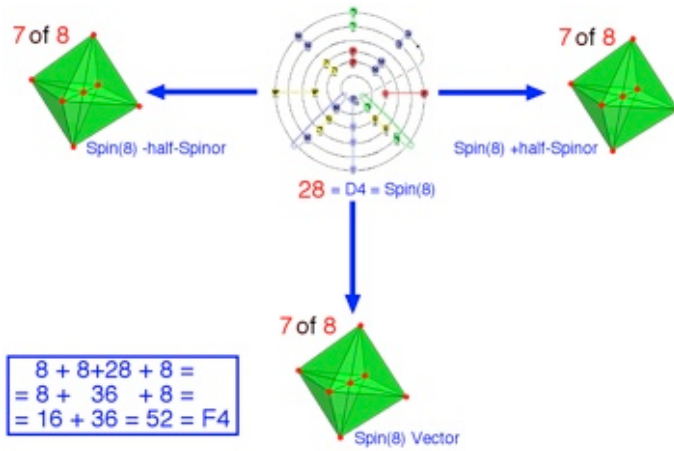


Letter 496 = 2x248 is the last Shin שׁ (21st letter) in Chapter 1 Verse 11

Gen 1,11: "Fruit Tree Yielding Fruit
Whose Seed is Inside Itself"



whose 3 branches look like the 3 branches of the D4 Triality Dynkin diagram



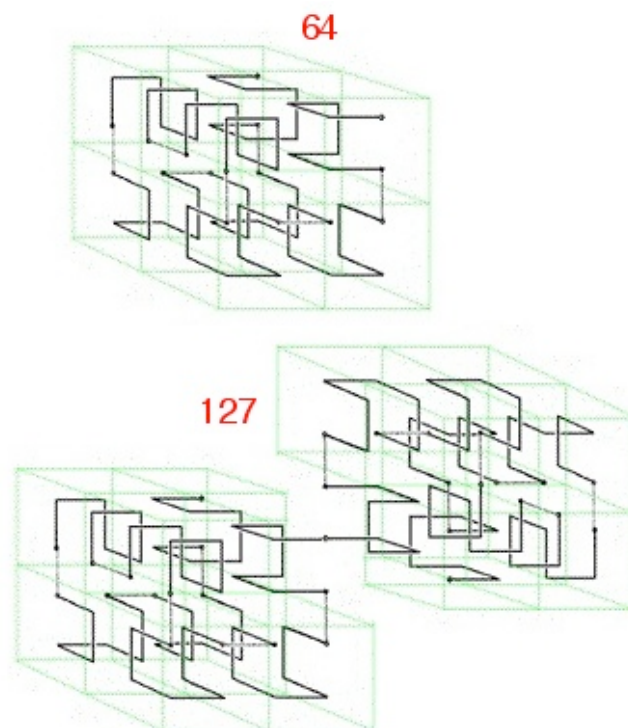
Letter 8128 = 64x127 is the fourth Ayin **ع** (16th letter) in Chapter 7 Verse 4 in the word 40 of 40 days -

"... I will cause it to rain upon the earth 40 days ... "

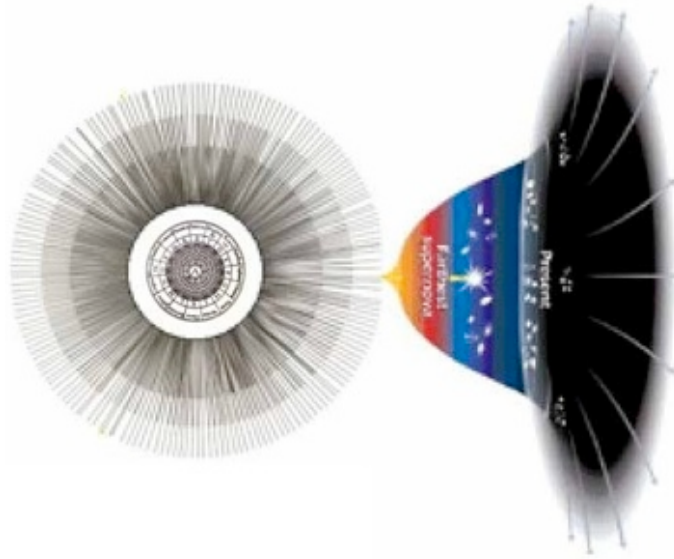
which rain (see verse 23): "... blotted out every living substance ... from the earth; and Noah only was left, and they that were with him in the ark ...".

The 2 branches of Ayin **ع** look like a fork in the Road of History leading to two futures:

- the blotted out future of most of Life on Earth
- the Continuing Life of the Ark beings.

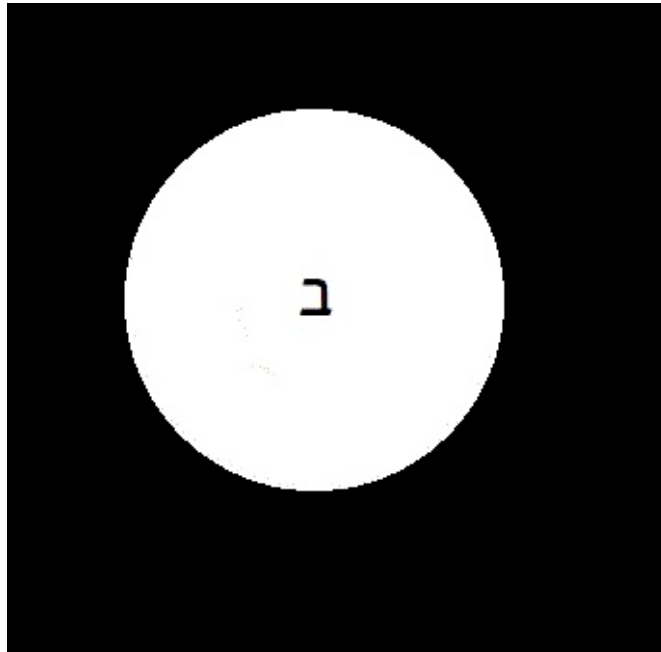


$$64 \times 127 = 8,128$$

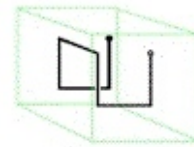


0 and 1

From the Black Void 0 of Ain Sof emerges Our Aleph \aleph Universe

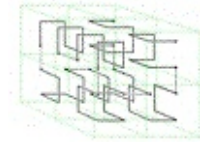


whose 1 First Element Bet β begins the Inflationary Expanding Network
Octonionic Structure

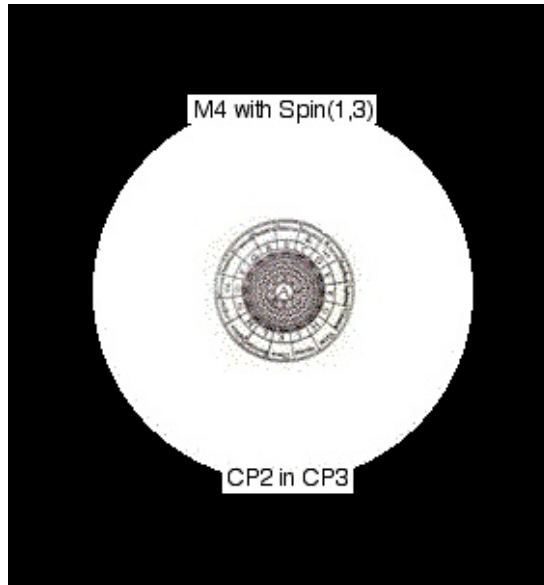


of Non-Unitary

$$6 = 3 + 3$$



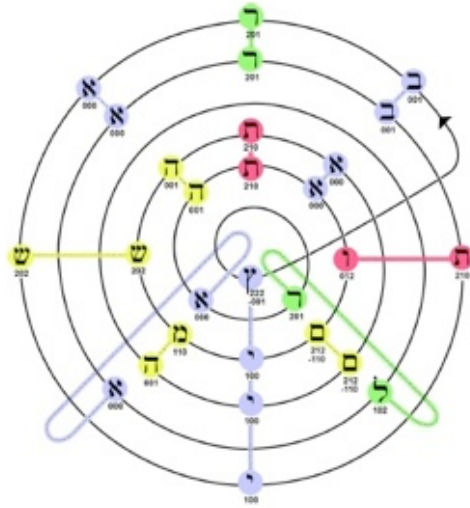
which Network continues Non-Unitary Octonionic Inflationary
Lullian Clifford Algebra $Cl(16)$ and $E8$ processes Expansion in accord with



until the End of Inflation when Quaternionic Substructure freezes out forming 8-dimensional Kaluza-Klein spacetime $M4 \times CP2$ in which $M4$ physical spacetime has local symmetry of 6-dimensional Spin(1,3) and internal symmetry space is $CP2$ which lives in 6-dimensional $CP3$.

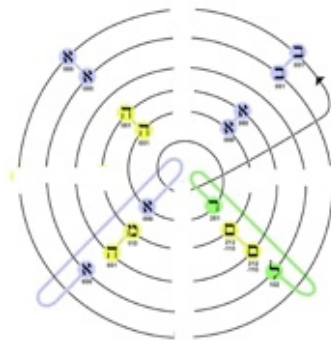
$$28 = 16 + 12$$

The 28 letters of the First Verse, when arranged in Stan Tenen's circular patterns



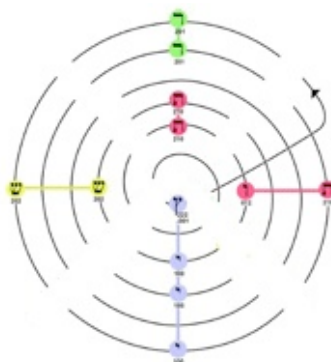
can be seen to describe the Forces of Physics:

the 16 diagonal letters



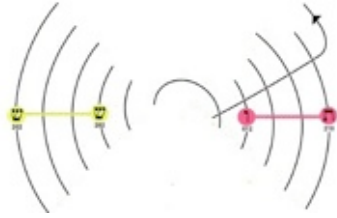
correspond to the 16 elements of $U(2,2)$ which contains the 15-dimensional Conformal Group $SU(2,2) = Spin(2,4)$ which describes Gravity;

the 12 horizontal/vertical letters



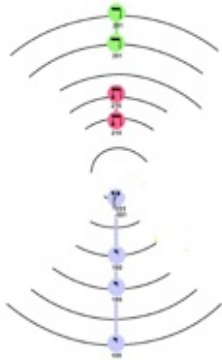
correspond to the 12 elements of the forces of the Standard Model,

where the 4 horizontal



represent the ElectroMagnetic Photon and 3 Weak Force Bosons

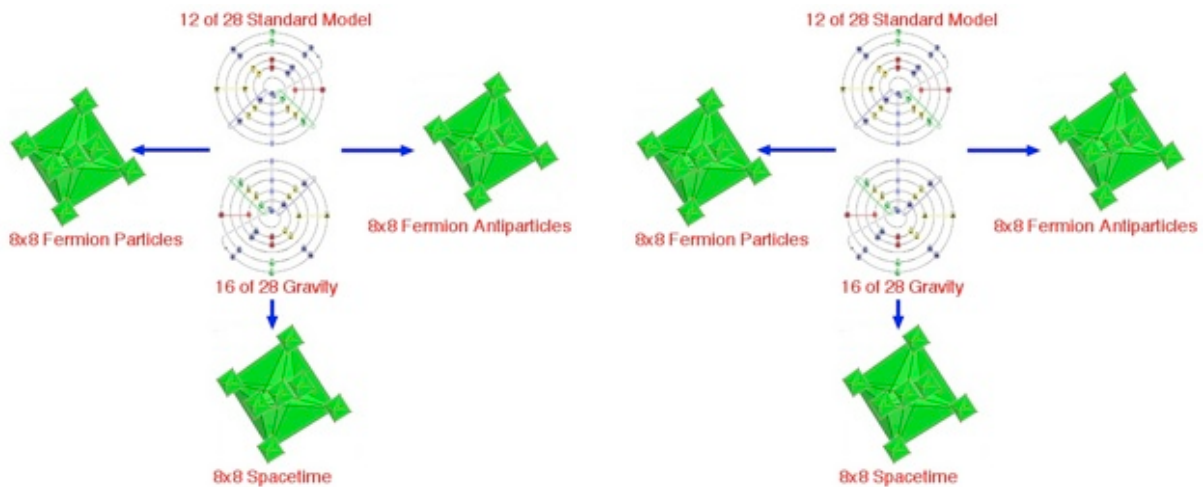
and the 8 vertical



represent the 8 Gluons of the Color Force.

$$496 = 2 \times 248$$

$$(28 + 28 + 8 \times 8) + (8 \times 8 + 8 \times 8) = 120 + 128 = 248 = E8 \text{ two copies of which give } 496$$



E8 by the McKay correspondence is related to the 3-sphere embedding of the Dodechedron/Icosahedron, whose symmetry group is the 120-element Binary Icosahedral Group (the 120 correpsonds to half of the 240 Root Vectors of E8).

Robion Kirby and Paul Melvin, in their paper "The E8-manifold, singular fibers and handlebody decompositions" (Geometry and Topology Monographs, Volume 2 (1999) pages 233-258), said: "... The E8-manifold is the 4-manifold obtained by plumbing together eight copies of the cotangent disk bundle of the 2-sphere according to the Dynkin diagram for the exceptional Lie group E8 ...

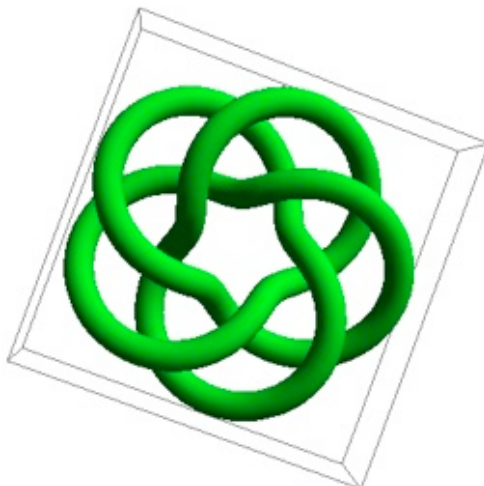


... The boundary of E8 is the Poincare homology sphere ... Alternatively, E8 may be obtained by taking the p-fold cover of the 4-ball branched over the standard Seifert surface for the (q,r) torus knot (pushed into the interior of B4) where (p, q, r) is a cyclic permutation of (2, 3, 5) ... these four 4-manifolds (E8 and the three branched covers) are diffeomorphic ...".

(The Poincare sphere looks like a dodecahedron - see [remarks below](#) for details.)

(Knots (p,q) and (q,p) are equivalent.)

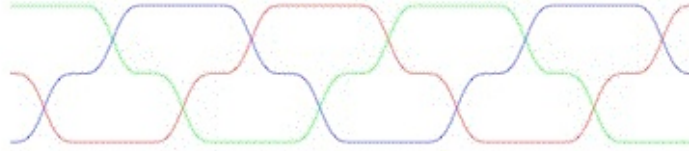
Consider one E8 (248 of the 496) as the 2-fold cover of the Seifert surface of the (3,5) torus knot (using Mathematica notation)



whose braid is



Consider a second E8 (the other 248 of the 496) with the same braid (but changing colors purple to green, green to red, and red to purple)



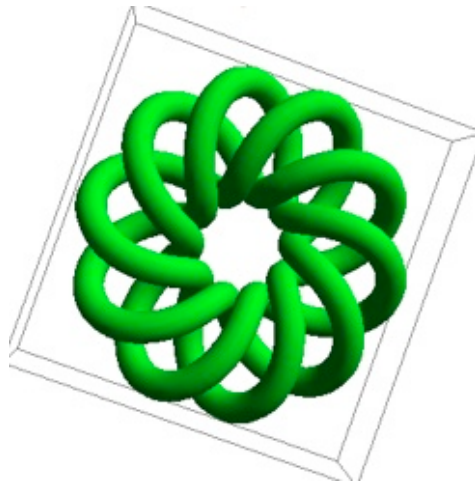
and join the two E8 braids together



to get the braid

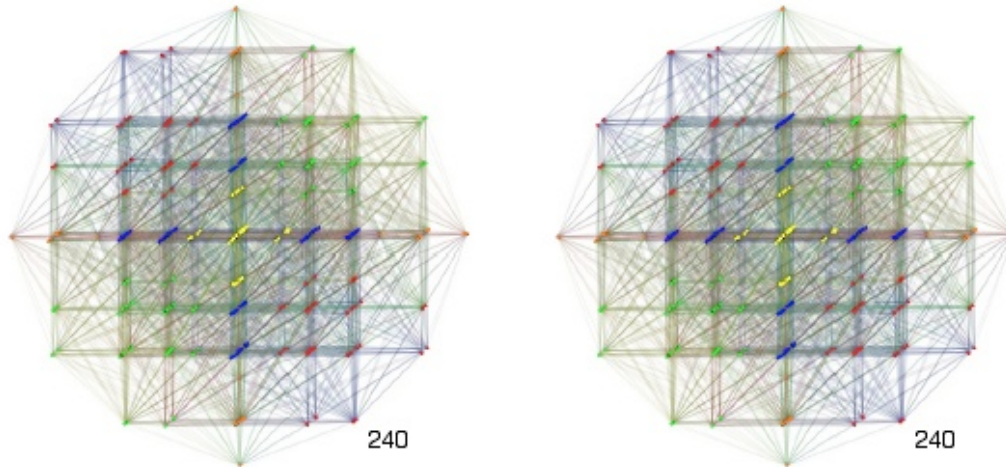


for the (3,10) torus knot (using Mathematica notation)



that represents the 496 of the two E8 combined.

496 elements of $2xE_8$ contains 480 Root Vectors of $2xE_8$

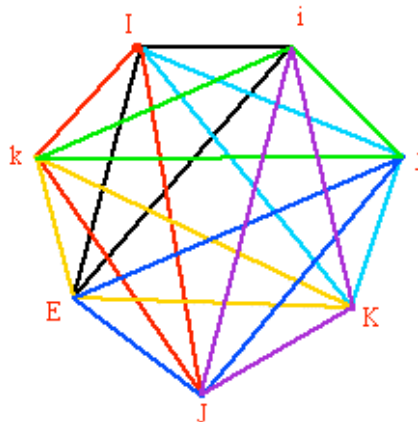


The 480 E_8 Root Vectors correspond to the 480 Octonion Multiplication Rules. The 480 multiplications are made up of two sets of 240 each, a product in one set being found in the reverse order in the other set. The two sets of 240 multiplications are called sets of opposite multiplications.

Start with the 7 imaginary octonions i, j, k, E, I, J, K . This includes 1, since $ii = jj = \dots = -1$.

You have $2^7 = 128$ sign changes. Of the 128 sign changes, the $2^3 = 8$ changes of i, j , and E do NOT give a different multiplication.

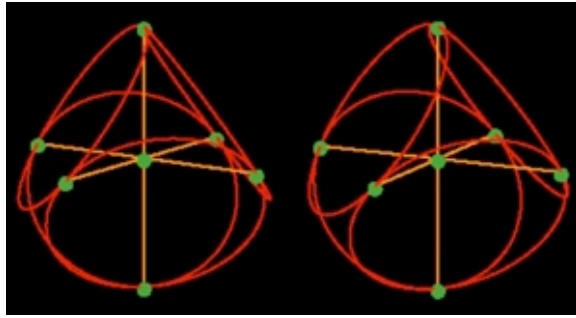
You have $7! = 2 \times 3 \times 4 \times 5 \times 6 \times 7$ permutation changes. Of the $7!$ permutation changes, those preserving the group $PSL(2,7) = SL(3,2)$ do NOT give a different multiplication. The order of $PSL(2,7)$ is $2^3 \times 3 \times 7 = 168$. It can be thought of as the group of linear fractional transformations of the vertices of a heptagon



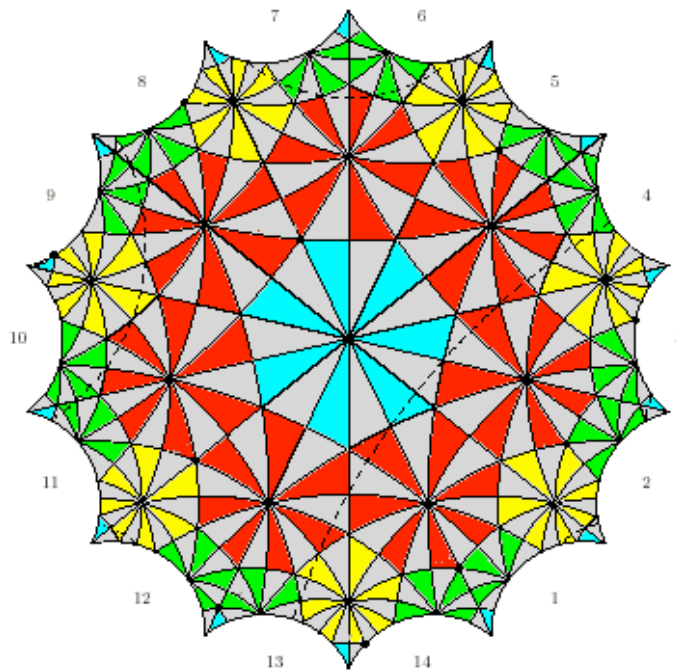
Therefore the number of different multiplications due to sign changes and permutations is:

$$128 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 / 8 \times 2 \times 2 \times 2 \times 3 \times 7 = 16 \times 5 \times 6 = 480$$

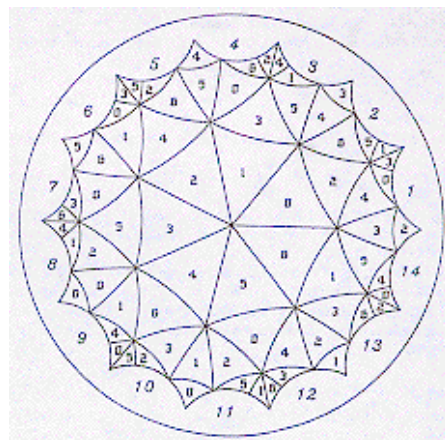
The symmetry group of the Klein Quartic Curve Equation $x^3 y + y^3 z + z^3 x = 0$ is the 168-element group $PSL(2,7) = SL(3,2)$ which Burkland Polster (The Mathematical Intelligencer 21 (1999) 38-43) shows as a 3-dim stereogram of the Fano Plane in which it is formed by the 6 vertices of an octahedron plus its center, with lines being the 3 diagonals of the octahedron plus the 4 circles which circumscribe 4 of the 8 faces of the octahedron. The resulting figure is what Arthur Young calls a heptavertion.



If you include reflections, you get $SL(2,7)$ with 336 elements which is represented by the Klein Configuration shown here as a tiling by 24 heptagons (each heptagon subdivided into 14 triangles) meeting 3 at each vertex



There is a dual tiling by 56 triangles meeting 7 at each vertex

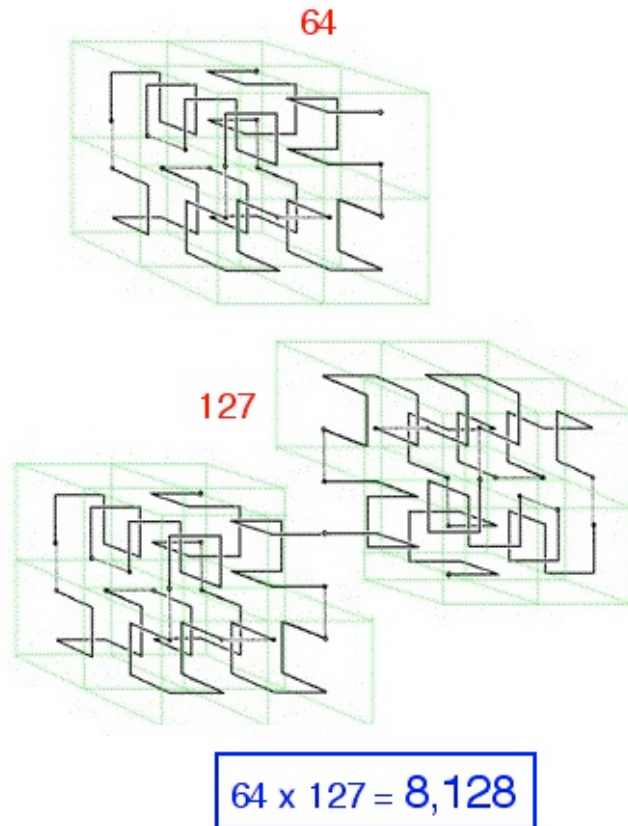


that Greg Egan has illustrated as a 3-hole torus with a 7-coloring and identifying sides $2k+1$ and $2k+6 \pmod{14}$)



As John Baez noted in his Week 214, in an E8 lattice packing of spheres, "... each one of ... the 240 neighbors of a given sphere ... touches 56 other neighbors ... this gives rise to a 56-dimensional representation of the exceptional group E7 - its smallest nontrivial representation! And ... it gives rise to a 57-dimensional manifold on which the exceptional group E8 acts - the smallest space on which it acts nontrivially! ... if you take Klein's quartic curve tiled by heptagons, and you count the vertices, you get $24 \times 7 / 3 = 56$ since each vertex is shared by 3 heptagons. ...".

$$8128 = 64 \times (128 - 1)$$

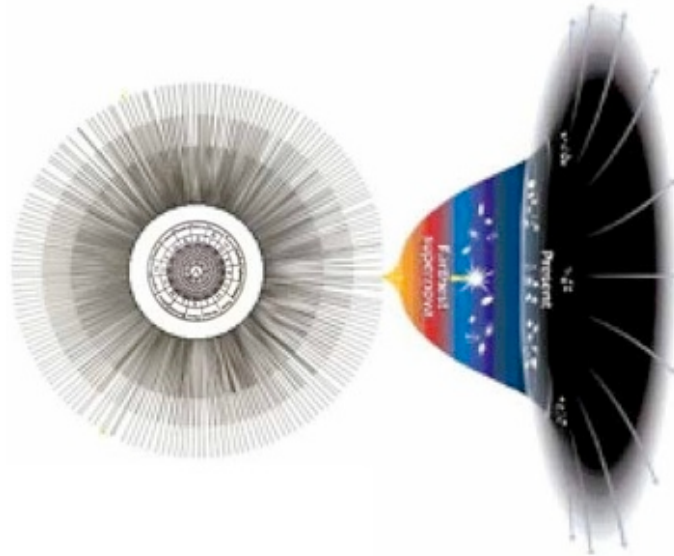


8,128 = 64 x (128 - 1) answers three questions:

How long did Inflation last ?

$$2^{64}$$

As Paola Zizzi said in gr-qc/0007006: "... during inflation, the universe can be described as a superposed state of quantum ... [qubits]. The self-reduction of the superposed quantum state ... reached at the end of inflation ... corresponds to a superposed state of ... [$10^{19} = 2^{64}$ qubits][at]... the decoherence time ... [$T_{\text{decoh}} = \sqrt{10^{19}} T_{\text{planck}} = 10^{-34}$ sec]. ...".



At the End of Inflation 2^{64} Superposition States of Our Universe undergo Decoherent Collapse into Many Worlds of the Many-Worlds Quantum Theory, only one of which Worlds is our World.

What is special about 2^{64} qubits ?

2^{64} qubits corresponds to the Clifford algebra $Cl(64) = Cl(8 \times 8)$. By the periodicity-8 theorem of real Clifford algebras that

$$Cl(K8) = Cl(8) \times \dots \text{tensor product } K \text{ times } \dots \times Cl(8),$$

we have: $Cl(64) = Cl(8 \times 8) = Cl(8) \times Cl(8) \times Cl(8) \times Cl(8) \times Cl(8) \times Cl(8) \times Cl(8) \times Cl(8)$

Therefore, $Cl(64)$ is the first (lowest dimension) Clifford algebra at which we can reflexively identify each component $Cl(8)$ with a vector in the $Cl(8)$ vector space. This reflexive identification/reduction causes decoherence. It is the reason that our universe decoheres at $N = 2^{64} = 10^{19}$.

$N_{decoh} = 2^{64} = 10^{19}$ qubits is just an order of magnitude larger than the number of tubulins $N_{tub} = 10^{18}$ of the human brain. Conscious thought is due to superposition states of those 10^{18} tubulins. Since a brain with $N_{decoh} = 10^{19}$ tubulins would undergo self-decoherence and would therefore not be able to maintain the superposition necessary for thought, it seems that the human brain is about as big as an individual brain can be. The Zizzi Self-Decoherence can be compared to GRW decoherence. Thus the Mind of Man seems to be an image of the Mind of Our Universe.

How much mass do the Particles have ?

2^{64}

The most fundamental mass would be the Planck mass, considered as the sum of all fermions that could collapse into a single Primordial Planck Mass Black Hole.

The ratios of masses of fundamental fermions are determined by E8 Physics in a manner similar to the calculations of Armand Wyler, using the mathematics of Hua Luogeng. Then the Planck mass can be

calculated as follows:

There are 8 fermion particles and 8 fermion antiparticles for a total of 64 particle-antiparticle pairs. A typical combination should have several quarks, several antiquarks, a few colorless quark-antiquark pairs that would be equivalent to pions, and some leptons and antileptons. Due to the Pauli exclusion principle, no fermion lepton or quark could be present at the vertex more than twice unless they are in the form of boson pions, colorless first-generation quark-antiquark pairs not subject to the Pauli exclusion principle. Of the 64 particle-antiparticle pairs, 12 are pions. A typical combination should have about 6 pions. If all the pions are independent, the typical combination should have a mass of $.14 \times 6 \text{ GeV} = 0.84 \text{ GeV}$. However, just as the pion mass of $.14 \text{ GeV}$ is less than the sum of the masses of a quark and an antiquark, pairs of oppositely charged pions may form a bound state of less mass than the sum of two pion masses. If such a bound state of oppositely charged pions has a mass as small as $.1 \text{ GeV}$, and if the typical combination has one such pair and 4 other pions, then the typical combination should have a mass in the range of 0.66 GeV . Summing over all 2^{64} combinations, the total mass of a one-vertex universe should give $m_{\text{Planck}} = 1.217\text{-}1.550 \times 10^{19} \text{ GeV}$.

How many Particles have been created ?

$$2^{128}$$

At the time $T_{\text{decoh}} = 10^{(-34)} \text{ sec}$ at the End of Inflation, the number of qubits is $N_{\text{decoh}} = 10^{19} = 2^{64}$.

Each qubit at the end of inflation corresponds to a Planck Mass Black Hole, which undergoes decoherence and, in a process corresponding to Reheating in the Standard Inflationary Model, each qubit transforms into $2^{64} = 10^{19}$ elementary first-generation fermion particle-antiparticle pairs.

The resulting $2^{64} \times 2^{64} = 2^{128} = 10^{19} \times 10^{19} = 10^{38}$ fermion pairs populating the Universe Immediately After Inflation constitutes a Zizzi Quantum Register of order $n_{\text{reh}} = 10^{38} = 2^{128}$.

Since, as Paola Zizzi says in gr-qc/0007006, (with some editing by me denoted by []): "... the quantum register grows with time. ... At time $T_n = (n+1) T_{\text{planck}}$ the quantum gravity register will consist of $(n+1)^2$ qubits. [Let $N = (n+1)^2$] ...", we have the number of qubits at Reheating:

$$N_{\text{reh}} = (n_{\text{reh}})^2 = (2^{128})^2 = 2^{256} = 10^{77}$$

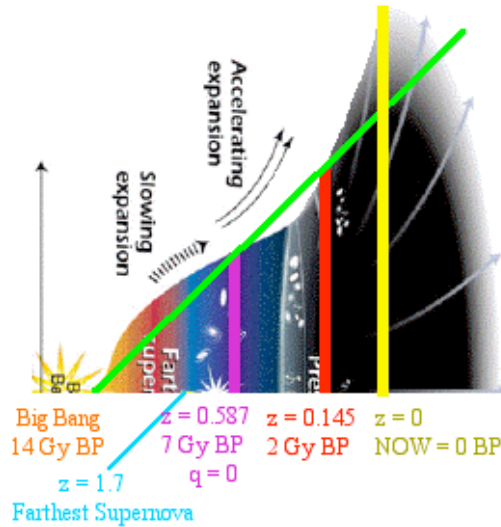
Since each qubit at Reheating should correspond, not to Planck Mass Black Holes, but to fermion particle-antiparticle pairs that average about 0.66 GeV , we have the result that the number of particles in our Universe at Reheating is about 10^{77} nucleons.

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.

The present scale of our Universe is about $R(\text{now}) = 10^{28} \text{ cm}$, so that its volume is now about 10^{84} cm^3 , and its baryon density is now about $10^{77} \text{ protons} / 10^{84} \text{ cm}^3 = 10^{(-7)} \text{ protons/cm}^3 = 10^{(-7-19-5)} \text{ gm} / \text{cm}^3 = 10^{(-31)} \text{ gm} / \text{cm}^3 =$ roughly the baryonic mass density of our Universe.

Since the critical density of our Universe is about $10^{(-29)} \text{ gm} / \text{cm}^3$, it is likely that the excess of the critical mass of our Universe over its baryonic mass is due to a cosmological constant as described by Conformal Gravity in the E8 Physics model which gives a ratio of Dark Energy : Dark Matter : Ordinary

Matter of 0.753 : 0.202 : 0.045 .

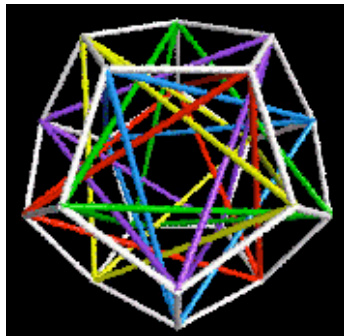


What does Poincare Dodecahedral Space (denoted S3#) look like?

Here are some images from [the WWW pages of Richard Hawkins](#), who calls S3# the Mayan Time Star. His pages contain many more images and movies that help you understand how S3# looks, and also how a lot of other things look.

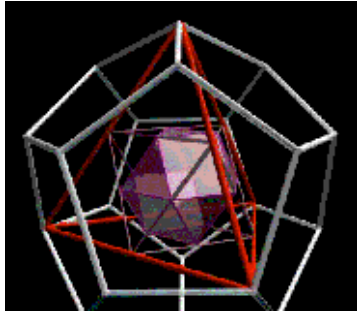
How did Richard Hawkins find out about the Time Star? [Krsanna Duran](#) says: "... I wrote an article about what the Sirians told me about five interpenetrated tetrahedra embodying and unifying all prime geometries which was published in January, 1995. Richard Hawkins read the article and sent an email to Gerald de Jong about it. Gerald de Jong constructed a computer model of the five interpenetrated tetrahedra to discover that it did all the things I said it did with extraordinary elegance. ...".

Start with a dodedecahedron.
Five tetrahedra fit inside the dodecahedron:



The alternating permutation group of the 5 tetrahedra is the 60-element icosahedral group.

Now, to see things clearly, look at just one tetrahedron. You can see symmetries more clearly when you put an octahedron inside the tetrahedron and a cuboctahedron inside the octahedron:



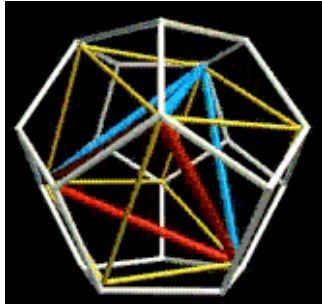
Take the one tetrahedron and put it inside a cube, with one edge of the tetrahedron in each face of the cube. Now rotate the cube around inside the dodecahedron, while you also rotate each of the 6 edges of the tetrahedron each of the 6 faces of the cube. Start like this:



then, 36 degrees later, it looks like this:



The tetrahedra edges now are parallel to the cube edges. 36 more degrees, after 72 degrees total rotation, the edges will have again formed a tetrahedron. Keep rotating. After 360 degrees, you have made 5 tetrahedra (one each 72 degrees), and this is what you have:



The cube is back like it was,
BUT THE TETRAHEDRON IS ORIENTED OPPOSITELY
with respect to the cube from its original position.

YOU HAVE TO ROTATE 720 degrees TO GET BACK LIKE YOU STARTED.

That means that, to make $S3\#$,
instead taking the quotient of $SO(3)$
by the 60-element icosahedral group,
you should
take the quotient of $S3 = Spin(3) = SU(2)$,
the double cover of $SO(3)$,
by the 120-element binary icosahedral group.

Therefore, $S3\#$ is a natural spinor space,
and
5-fold [Golden Ratio Icosahedral Symmetry](#)
is
a manifestation in 3 and 4 dimensions
of
the Milnor sphere structure of 7 and 8 dimensions.