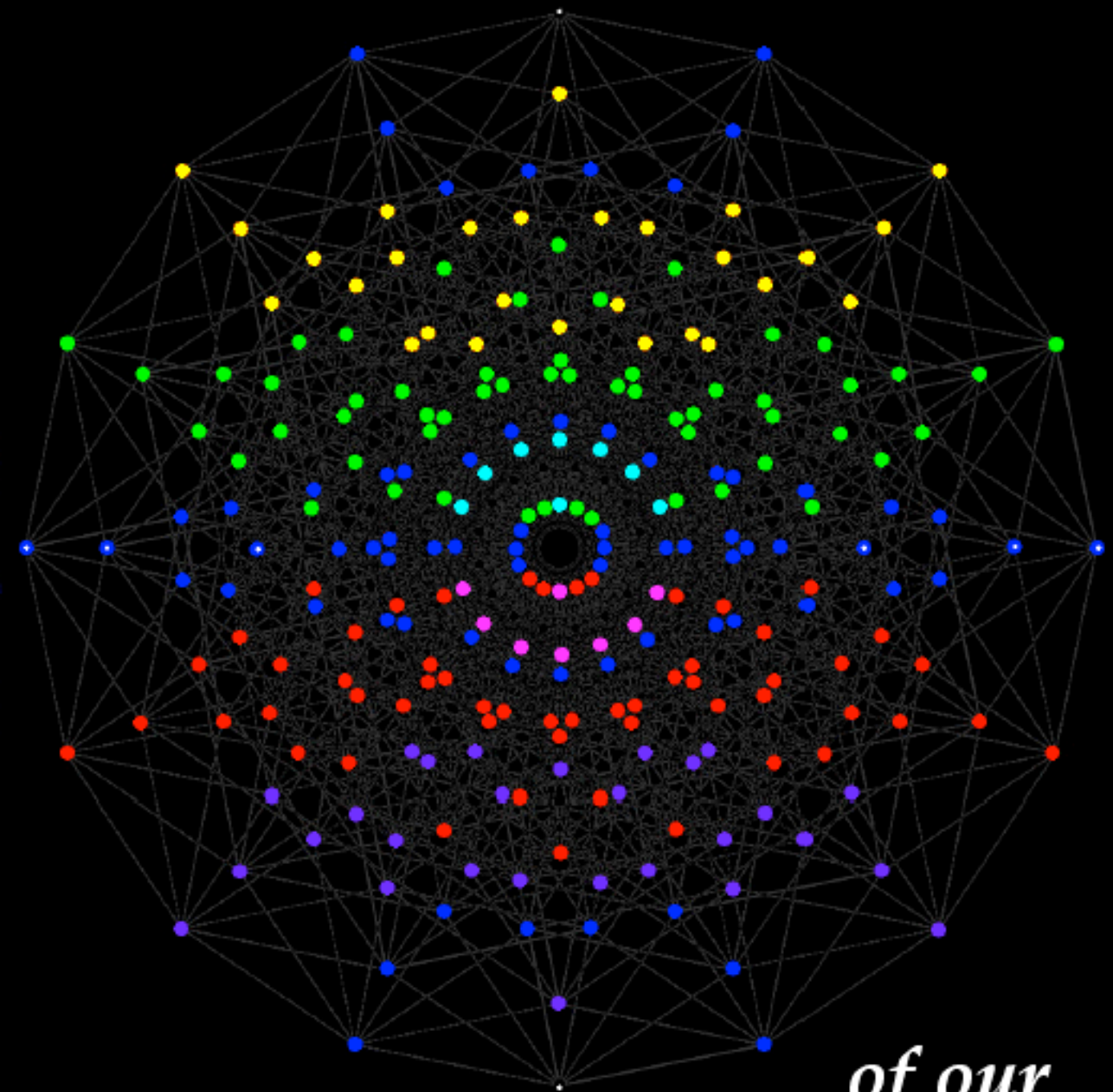
The True Lost Symbol



of our

Conscious Cl(8)^8 Universe

by Frank Dodd (Tony) Smith, Jr.

Abstract

Dan Brown in his 2009 book "The Lost Symbol" said

"... The ancients possessed profound scientific wisdom. ... Mankind ... had once grasped the true nature of the universe ... but had let go ... and forgotten. ... Modern physics can help us remember! ... the world need[s] this understanding ... now more than ever. ...",

but the rest of his book fails to provide convincing support for that statement, although it does provide a clue:

"... The secret hides within the Order Eight Franklin Square ... of the numbers 1 through 64 ...".

The purpose of this paper is to support that statement in enough detail to convince a diligent reader that following that clue can show that the statement is true. To follow the clue:

begin with the "Order Eight" Clifford Algebra Cl(8) whose 2^8 = 256 dimensions represent the 256 elements of the Ancient African IFA Oracle and the 256 Elementary Cellular Automata, so that the True Lost Symbol is the 8-dimensional HyperCube with 256 vertices as shown on the cover of this paper;

then multiply (by tensor product) 8 copies of Cl(8) to produce Cl(64) whose 2^64 dimensions represent the first 10^(-34) seconds of the Zizzi Inflation Phase of our Conscious Universe and an event of Penrose-Hameroff Human Conscious Thought;

then analyze the details of the 256 Cellular Automata and the E8 Lattices containing 256-vertex 8-dimensional HyperCubes to construct a realistic unified theoretical model of the Standard Model plus Gravity;

then analyze the Fractal Structure of the Ancient African IFA Oracle;

then apply the Ancient African IFA Oracle (and its subset the I Ching) to describe History, including the Future History of Global Finance.

Readers can find further examples and more details on my web site at www.valdostamuseum.org/hamsmith/

Frank Dodd (Tony) Smith, Jr. - 2009

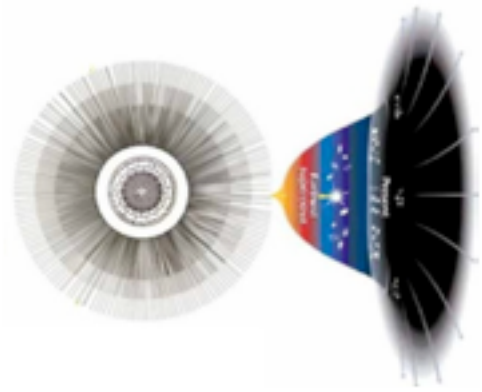
Conscious Cl(8)^8 Universe

by Frank Dodd (Tony) Smith, Jr. - 2009

What is Cl(8)^8 ?
It is the tensor product of 8 copies of Cl(8).

What is Cl(8) ?
It is an 8x8x8x8x8x8x8x8 = 2^8 = 16x16 = 256-dimensional Real Clifford Algebra
whose 256 elements are represented on the cover as a projection of
the vertices of an 8-dimensional hypercube,
which in turn represents the fundamental structure of the oldest religion
on Earth, known as IFA or VoDou, that spread with humans from Africa
to the rest of Earth. It underlies the basic structure of all human religions
including Vedism, Judaism, Platonism, I Ching, Shinto, Islam, Christianity,
and the multitude of Shamanic practices including Tarot.
The structural universality of human religions reflects the structure of the
consciousness of the human brain, which in turn reflects the consciousness
of our Universe itself.

Why 8 copies of Cl(8) ?
Cl(8)^8 has (2^8)^8 = 2^(8x8) = 2^64 = the dimensionality of Cl(64) = Cl(8x8) =
= Cl(8) x Cl(8) x Cl(8) x Cl(8) x Cl(8) x Cl(8) x Cl(8) x Cl(8)
which 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.
Paola Zizzi has shown (see gr-qc/0007006) that our Universe was a conscious
superposition of quantum states during inflation, which ended in self-decoherence
when the number of superposed states reached the reflexive identification threshhold
of 2^64 elements of Cl(64) = Cl(8)^8 and that at time Tn = (n+1) Tplanck
the quantum gravity register consisted of (n+1)^2 qubits,
so that the end-of-inflation decoherence occured at sqrt(2^64) x Tplanck =
= 2^32 x 5 x 10^(-44) sec = 4 x 10^9 x 5 x 10^(-44) sec = 2 x 10^(-34) sec
at which time the 2^64 superposed states were reduced to only one,
from which our Universe began its post-inflation expansion.



Since our post-inflation Universe is only one World of the Quantum Many-Worlds
of our Universe's coherent superposition of 2^64 quantum states at the end of inflation,
it carries only 1 / 2^64 of its entropy, thus explaining the Arrow of Time that flows
from the low entropy of our end-of inflation past to our higher-entropy present.

Since 2^64 = 2 x 10^19 is similar to the 10^18 tubulins of the human brain
whose quantum superposition and decoherence results in an event
of conscious thought as described by Penrose, Hameroff, Sarfatti, and Zizzi,
it seems that human consciousness is so similar to the consciousness of our Universe
during inflation as to justify Genesis 1:26
"... And G-d said, let us make man in our image ..."
in light of which the injunction of the 1611 English King James Genesis 1:28,
written prior to Galileo's 1632 Copernican Dialogue,
"... Be fruitful, and multiply, and replenish the earth, and subdue it ..."
may be understood as a mandate to humans that they should occupy our entire Universe
and, in order to "replenish" and "subdue" it, that they should comprehend it in detail.

Such a process of Expansion and Comprehension was described by
Masamune Shirow in Ghost in the Shell (Dark Horse Comics 1991-1995):
"... The network is of macrocosmic size, and has infinite depth.
It's like a growing tree ... life is like fruit growing on the end of the brances ...
The secrets of the Kabbala, the Norse and Chinese myths, ... the Tree of Life,
the World Tree ... these are all worthy of being called ... "the Pillar of Heaven" ...
It's the core system of the universe
that channelers ... in every era ... and ... culture ... have traditionally accessed ...
Beyond the trunk of the "tree" there should be no existence,
but the closer one gets to the end of the branches, the more growth one finds ...
and the branches are continually touching, separating, entangling, and bearing fruit ...
everything is linked to everything else. ...".

As a PEAR web site said: "... the basic processes by which consciousness
exchanges information with its environment, orders that information, and interprets it,
also enable it to ... avail itself of some control over its reality.
This model regards the concepts ... such as ...wave mechanical resonance,
as fundamental characteristics of consciousness ...".
Resonance among the 10^18 tubulin electrons is important in achieving and maintaining
coherent superposition states among them,
and resonance with other entities (whether or not in the same World of the Many-Worlds)
is important in Dark Energy arrays of Josephson Junctions and in PSI phenomena
including what Terence McKenna said in a 1993 OMNI interview "... From 75,000 to
about 15,000 years ago ... Human beings created an altruistic communal society;
then ... For 10,000 years ... we've pursued an agenda of beasts and demons. ...

We are at the breakpoint ... All evolution has pushed for this moment, and there is no going back. What lies ahead is ... freedom and transcendence ... to expand infinitely into pleasure, caring, attention, and connectedness. ...
It's like when a woman comes to term ... if the child is not ... launched ... toxemia will set in ...".

Here is an outline of our Human Condition:

A little less than 15 billion years ago, our Universe emerged from the Void.

4 billion years ago, our Earth and Moon were orbiting our Sun.

2 billion years ago, bacteria built a nuclear fission reactor in Africa.

100,000 years ago, Humans were expanding from the African home-land to Eurasia and beyond.

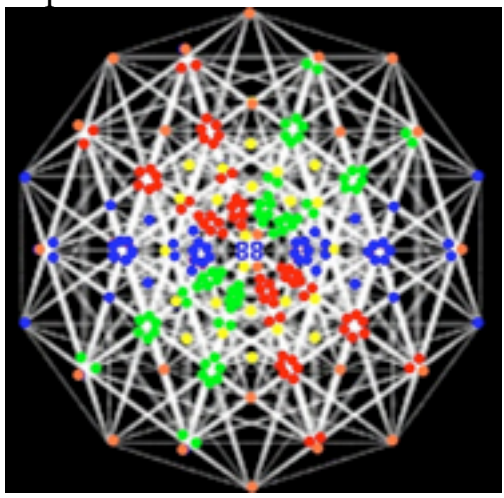
12,000 years ago, Africans developed IFA Oracle divination based on the square of 16 = 16x16 = 256 = = 2^8 corresponding to the vertices of an 8-dimensional hypercube and to the binary 2-choice Clifford algebra Cl(8) and so to related ones such as Cl(8)xCl(8) = Cl(16). Since the number of sub-hypercubes in an 8-dimensional hypercube is 6,561 = 81x81 = 3^8, the IFA Oracle has N=8 ternary 3-structure as well as binary 2-structure:

N	2^N	3^N
0	1	
1	2	3
2	4 =2x2	9 = 3x3
3	8	27
4	16 = 4x4	81 = 9x9
5	32	243
6	64 = 8x8	729 = 27x27
7	128	2187
8	256 = 16x16	6561 = 81x81

As ancient African games such as Owari show, binary 2-structure corresponds to static states and ternary 3-structure corresponds to dynamic states. Mathematically, using binary 2-choice static states to define dynamics on 3 ternary neighbor states produces the 256 elements of Elementary Cellular Automata.

The African Oracle patterns spread throughout the Earth, so that by the 13th century parts of them were found in:

India used the 240 parts of the Rig Veda's first sukt. The 240 corresponds to the 240 Root Vectors



of the E8 Lie algebra that is constructed from Cl(8)xCl(8) = Cl(16).

Judaism used the 248 positive Commandments plus the 365 negative Commandments given to Moses during the 50 days from Egypt to Sinai.
The 248 correspond to the 248-dim E8 Lie algebra that is constructed from Cl(8)xCl(8) = Cl(16).
The 365 is constructed by looking at one of the 1792 = 7x256 sub-hypercubes of 6-dim in the 8-dim hypercube, effectively cutting off the ternary 3-structure at N= 6

```
N        2^N                    3^N
0                         1
1                       2   3
2                     4       9 = 3x3
3                   8           27
4                16               81 = 9x9
5              32                   243
6            64                       729 = 27x27
7         128
8      256
```

and then making a 27x27 Magic Square with (729+1)/2 = 365 as its its central Magic Square number.

Plato, to construct a musical scale, used the full N=8 binary 2-structure but only N=5 of the ternary 3-structure

```
N        2^N                    3^N
0                         1
1                       2   3   =  2 + 1
2                     4       9   =  4 + 4+1
3                   8           27   =  8 + 12+6+1
4                16               81   = 16 + 32+24+8+1
5              32                   243=32+80+80+40+10+1
6            64
7         128
8      256
```

Plato used the numbers 256 and 243 to form the ratio 256/243, which, along with 9/8,
let him construct the the first octave as:
1 9/8 81/64 4/3 3/2 27/16 243/128 2
by using the multiplicative intervals:
9/8 9/8 256/243 9/8 9/8 9/8 256/243

China used the 64 possibilities of the binary I Ching and the 81 possibilities of the ternary Tai Hsuan Ching, effectively cutting off the binary 2-structure at N= 6 and the ternary structure at N= 4

```
N        2^N                    3^N
0                        1
1                    2   3
2                4       9 = 3x3
3            8           27
4          16              81 = 9x9
5        32
6      64
```

Japan used the 128 possibilities of Shinto Futomani Divination and the Triad: Jewel-Mirror-Sword, effectively cutting off the binary 2-structure at N = 7 and the ternary 3-structure at N=1

```
N        2^N                    3^N
0                        1
1                    2   3
2                4
3            8
4          16
5        32
6      64
7    128
```

Adding 3 of the ternary 3-structures to 16 of the binary 2-

structures gives the number 19 of the 19x19 board of the game Go (the Chinese version, Wei Qi, may have originally had a 17x17 board).

Mediterranean Africa used the 16 possibilities of the Ilm al Raml, effectively cutting off the binary 2-structures at N = 4 and eliminating the ternary 3-structures

N	2^N	3^N
0		1
1	2	
2	4	
3	8	
4	16	

As noted about Japan, adding 3 of the ternary 3-structures to 16 of the binary 2-structures gives the number 19, but in Mediterranean Africa the most significant use of the number 19 is in the Quran, which is written in Arabic with a basic message that G-d is ONE, and the Arabic number-value of the Arabic letters of the word ONE is 6+1+8+4 = 19. Rashad Khalifa, whose mathematical analysics of the Quran confirmed the primacy of the number 19, was murdered in 1990 in his Mosque in Arizona because of the results of his analysis.

In the early 13 th century Ibn Arabi (born in Spain, died in Damascus) wrote the “Bezels of Wisdom” describing his Sufi Islamic World-View using terms consistent with the processes of Quantum Theory:

“mumkinat” = quantum possibile Worlds of the Many-Worlds, or Bohmian beables;
“qada” = decoherence of quantum superposition of possibilities, or choice at an Event of a World of the Many-Worlds;
“qadar” = outcome of qada = the World or State that comes into existence as the outcome of an Event;
“al-khalq al-jadid” = the branching of the Worlds of the Many-Worlds that occurs at an Event.

According to the book Sufism and Taoism, by Toshihiko Izutsu (California 1983): “…Ibn Arabi says that … the world in its entirety ... transforms itself kaleidoscopically from moment to moment ... 'new creation' (al-khalq al-jadid) ... ordinary people are not aware of the process … If a man happens to obtain the true knowldege of qadar, the knowledge surely brings him a perfect peace of mind and an intolerable pain at the same time.
The unusual peace of mind arises from the consciousness that everything in the world occurs as it has been determined from eternity. ... Instead of struggling in vain for obtaining what is not in his capacity, he will be happy … He must be tormented, on the other hand, by an intense pain at the sight of all the so-called 'injustices', 'evils', and 'sufferings' that reign rampant around him, being keenly conscious that it is not in his 'preparedness'

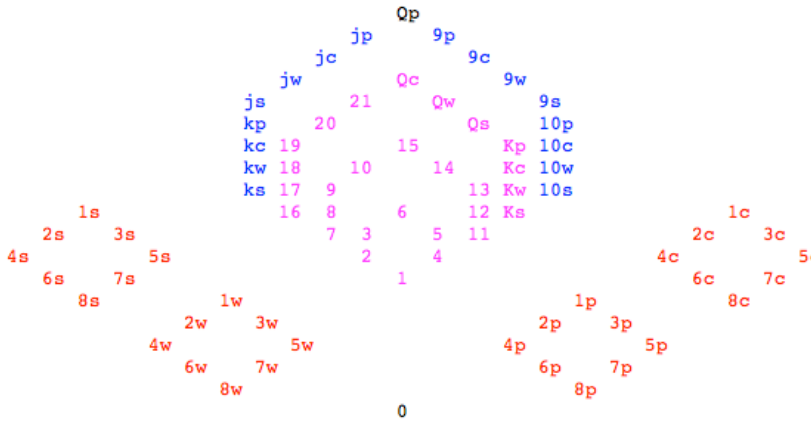
to remove them from the world. ...".

Describing the kaleidoscopic process of qadar in specific physical detail requires, in addition to the processes of Ibn Arabi, a specific mathematical framework.
Near the end of the 13th century, Ramon Llull of Mallorca studied the 16 possibilities of the Ilm al Raml and realized that they had a Fundamental Organizational Principle that he summarized in a Wheel Diagram

with 16 vertices connected to each other by 120 lines.
If the 16 vertices represented a 16-dimensional vector space, then the 120 lines connecting pairs of vectors represented 120-dimensional bivectors of rotations in that 16-dimensional vector space.
That total geometry is described by the Real 16-dimensional Clifford Algebra Cl(16).

Cl(16) not only describes rotations in vector space, but also spinors that describe left-handed and right-handed properties with respect to the space.
Half-spinors of Cl(16) have 128 dimensions.
When you combine the 120 bivectors of Cl(16) with the 128 half-spinors of Cl(16), you get the 248-dimensional object called the exceptional Lie Algebra E8.
In 8-dimensional space, 240 of the 248 generators of E8 form the 240 Root Vectors of E8.
Cl(16) factors into the tensor product of two copies of the Real 8-dimensional Clifford Algebra Cl(8):
Cl(16) = Cl(8)xCl(8)
Since Cl(8), based on an 8-dimensional vector space, has 256 dimensions, and 256 = 16x16,
we have come full circle to the 16x16 possibilities of the ancient African Oracle.

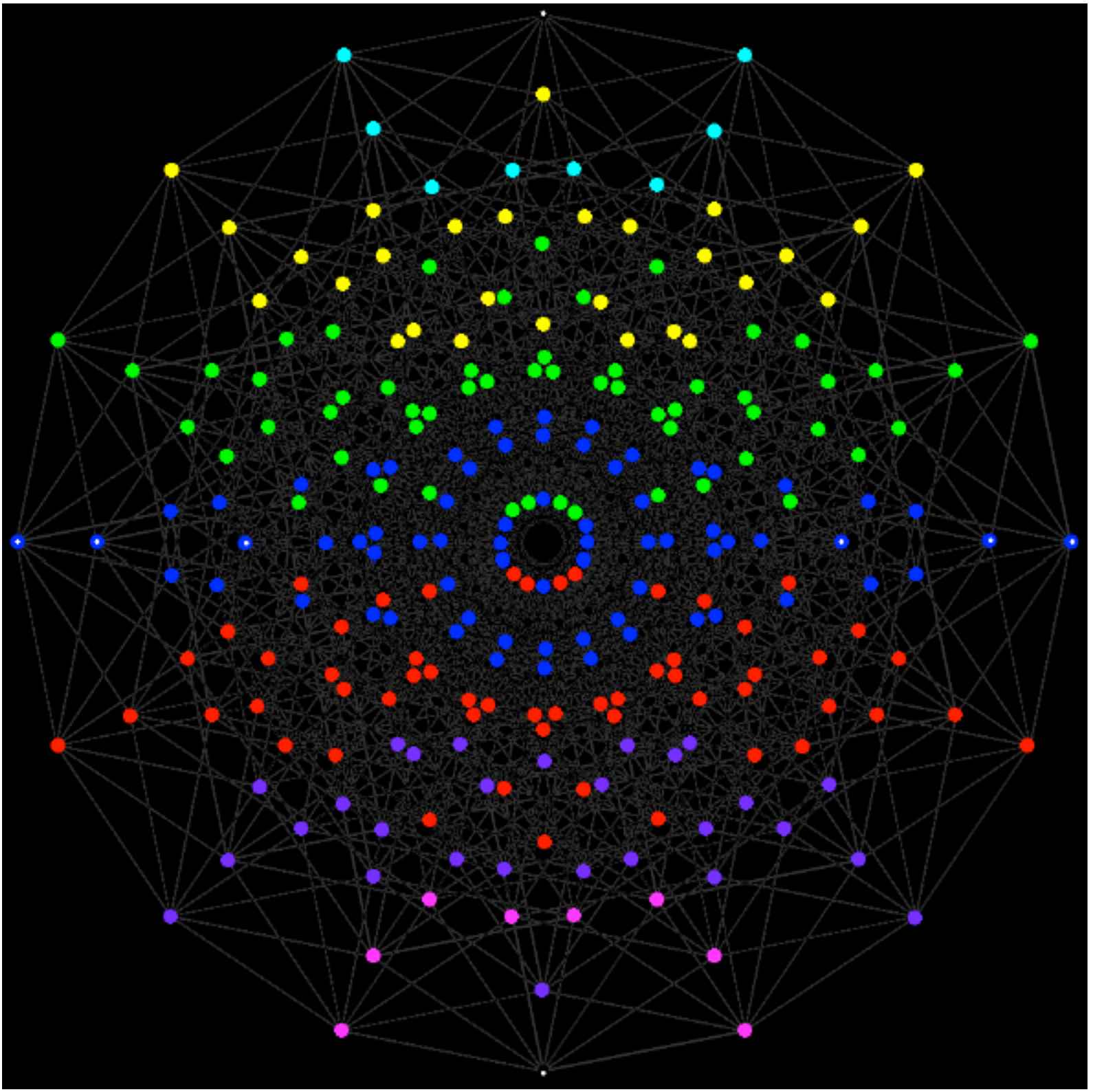
However, Ramon Llull was not as interested in making a physics model by combining his Cl(16) mathematical structure with Ibn Arabi's quantum processes
as he was in using his structure to show the equivalence of Judaism, Christianity, and Islam, an effort that failed, perhaps because the political institutions of those religions were in power struggles with each other and so were in fact hostile to reconciliation/unification.
Ramon Llull's work failed to find institutional acceptance in Judaism or Islam, and Christian Dominican Catholicism suppressed his work,
but his ideas were carried on in the underground world resulting in description of detailed substructures by Tarot



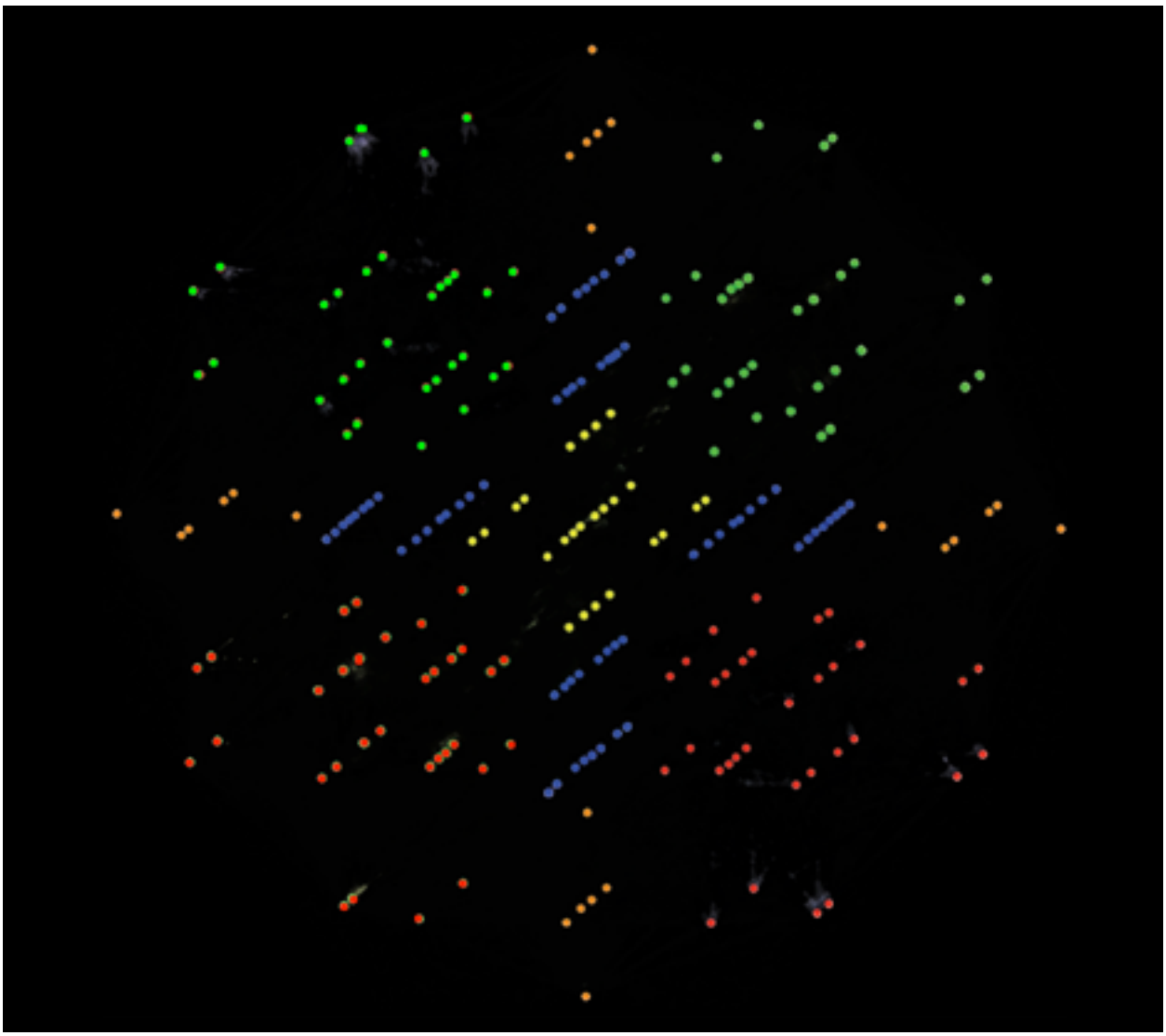
- The magenta 28 are the 28 Spin(8) adjoint bivectors of Cl(8).
- The 16 blue are the 8 vectors of Spin(8) and Cl(8) and their 8 dual/conjugates.
- The 32 red are the 16 spinors (8 +halfspinors and 8 -halfspinors) of Spin(8) and Cl(8) and their 16 dual/conjugates.
- The 2 black are diagonal degrees of freedom in 26-dim traceless J3(O)o part of J3(O) Jordan algebra.

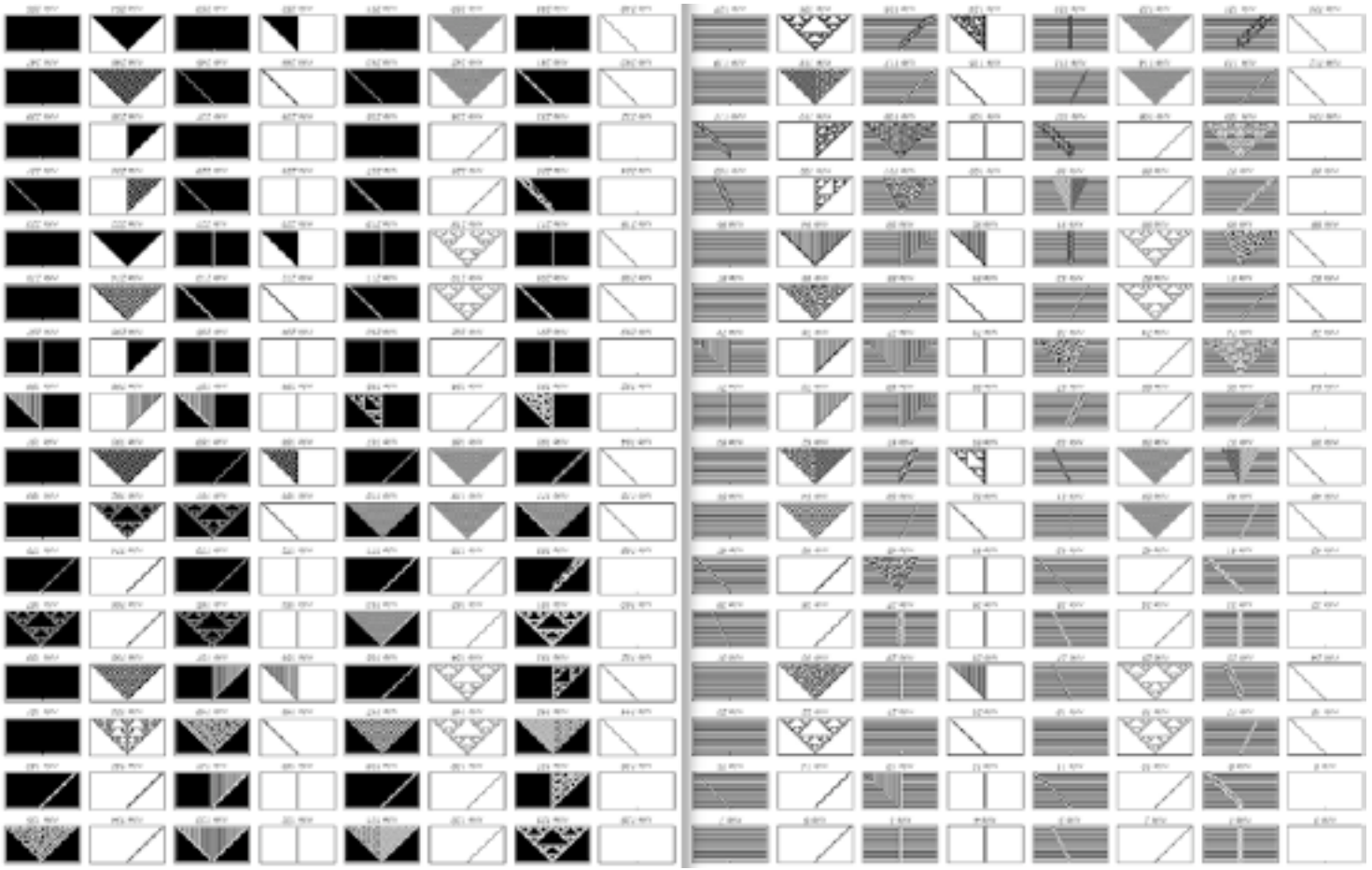
whose 78 cards represent the E6 subalgebra of the 248-dimensional Lie algebra E8 which is constructed from the Clifford algebra Cl(16) = Cl(8)xCl(8) where Cl(8) is the 16x16 = 256 dimensional algebra of IFA which is represented by the 256 vertices of a HyperCube in 8 dimensions, as shown on the cover and also (after Triality exchange of spinors and vectors/7-vectors) on the following page. If you omit the 8 white-dot vertices, you get the 248 elements of E8 which has 240 root vectors.

The 256 also represent the Elementary Cellular Automata which are shown on the third-following page.
The rest of this paper shows:
Physical Interpretation of Cellular Automata
Physical Interpretation of E8 lattices (shells 1 and 2)
Ron Eglash African Fractals
IFA, I Ching, Terence McKenna and Future History of the Global Financial System.



240 root vector vertices of E8





Raymond Aschheim (email May 2015) said:
"... An elementary CA is defined by the next value (either 0 or 1) for a cell, depending on its ... value, and the ... value of it[s] left and of it[s] right neighbor cell (it is one dimensional, and involve only the first neighbors, and the cell itself) ... So the next value depends [on] 3 bits ... eight possible combination of three bits, and for each ... combination... the next value is either zero or one. So the[re] are 256 ... CAs ...".

Since due to Real Clifford 8-periodicity any Real Clifford Algebra Cl(8N)) can be seen as tthe tensor product of N copies of Cl(8), any Real Clifford Algebra has fundamental structure of Cl(8) = Cl(1,7) = 16x16 real matrix algebra
so Cellular Automata correspondence with Cl(8) means
that any Real Clifford Algebra can be described by Cellular Automata.
Therefore Clifford Algebra E8 physics can also be seen in terms of Cellular Automata.

Each initial state for a CA rule for 1-dim nearest neighbor automata is a triple
* * * in which each of the 3 * (left, middle, right) can be either 0 or 1.
Each CA rule gives one of 2 outcomes 0 or 1 for each of the 8 states

1 1 1	0 1 1	0 0 1	0 0 0
	1 0 1	0 1 0	
	1 1 0	1 0 0	

so there are 2^8 = 256 possible CA rules.
The 8 states correspond to the 8 vectors of the Clifford Algebra Cl(8)

The CA rule that gives 0 for all 8 states corresponds to the 1 scalar 0-vector of Cl(8)

There are 8 CA rules that give 1 for one of the 8 states and 0 for the other 7
and they correspond to the 8 vectors of Cl(8)

There are 28 CA rules that give 1 for 2 of the 8 states and 0 for the other 6
and they correspond to the 28 bivectors of Cl(8)

There are 56 CA rules that give 1 for 3 of the 8 states and 0 for the other 5
and they correspond to the 56 3-vectors of Cl(8)

There are 70 CA rules that give 1 for 4 of the 8 states and 0 for the other 4
and they correspond to the 70 4-vectors of Cl(8)

There are 56 CA rules that give 1 for 5 of the 8 states and 0 for the other 3
and they correspond to the 56 5-vectors of Cl(8)

There are 28 CA rules that give 1 for 6 of the 8 states and 0 for the other 2
and they correspond to the 28 6-vectors of Cl(8)

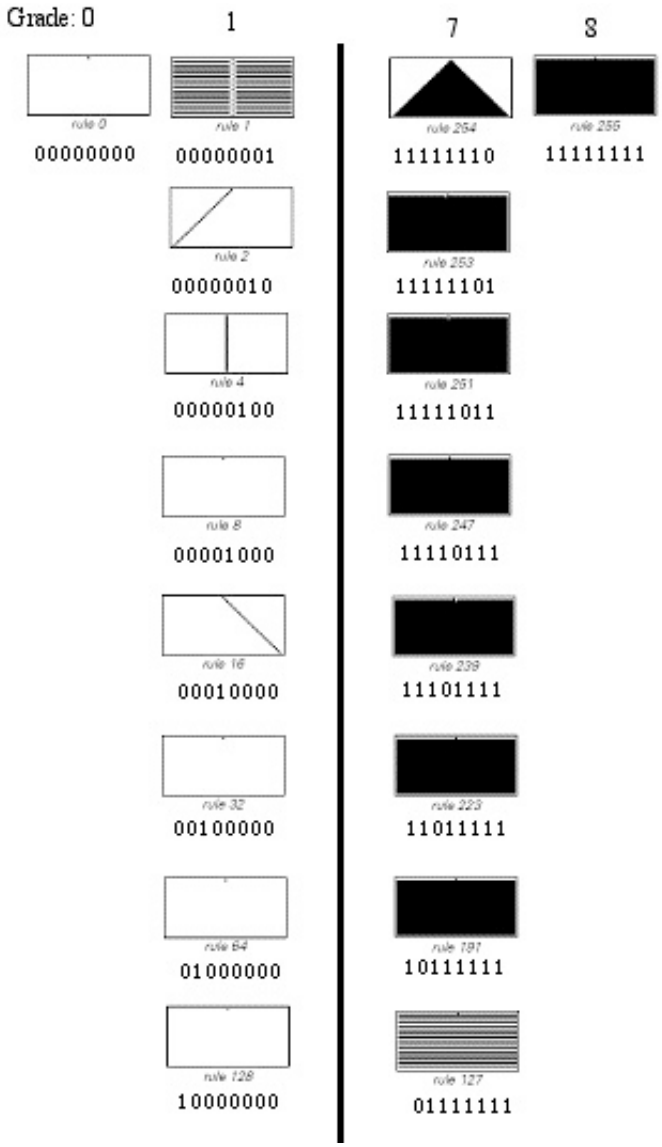
There are 8 CA rules that give 1 for 7 of the 8 states and 0 for the other 1
and they correspond to the 8 7-vectors of Cl(8)

There is 1 CA rule that gives 1 for all 8 states
and it corresponds to the 1 pseudo-scalar 8-vector of Cl(8)

256 Cellular Automata

1 8 28 56 70 56 28 8 1

(images from "A New Kind of Science" by Stephen Wolfram (Wolfram 2002))



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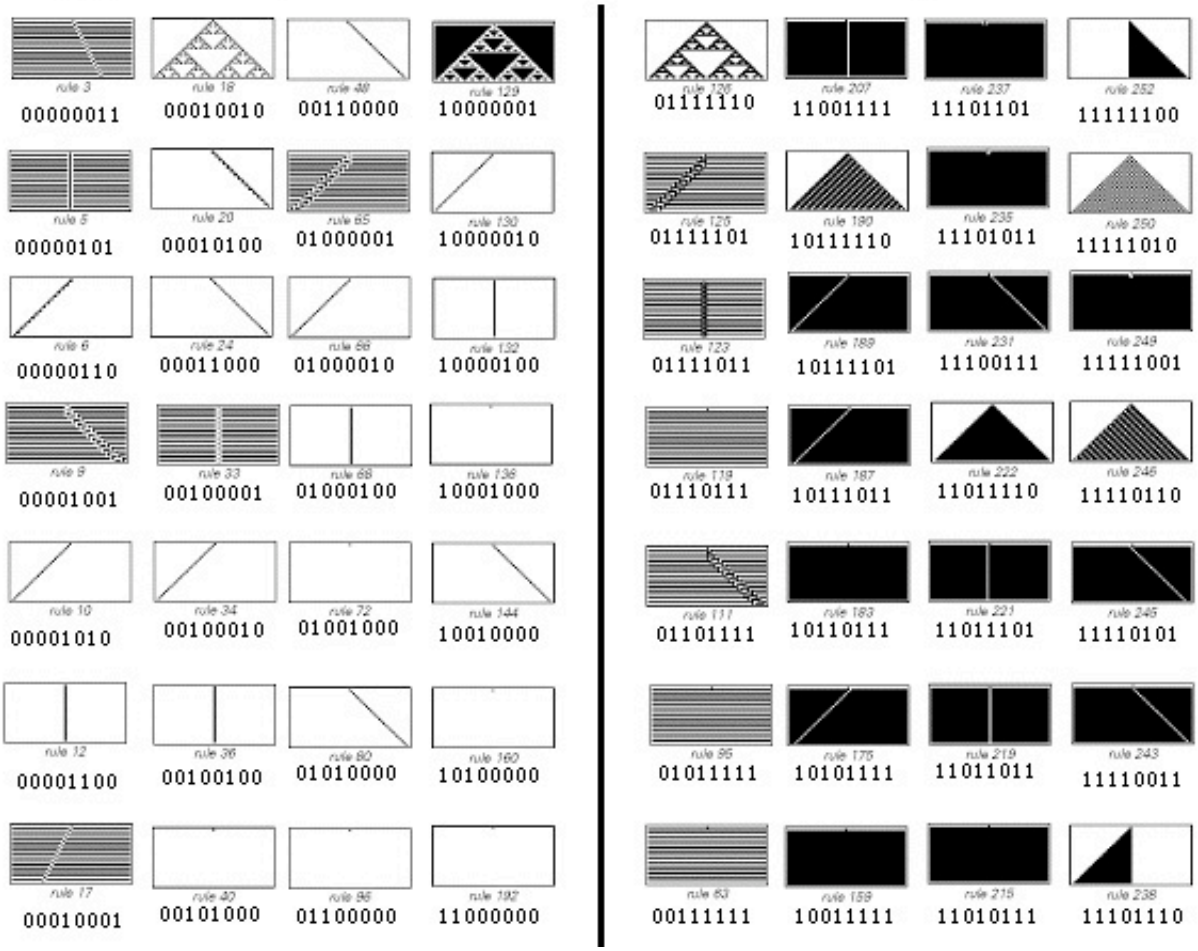
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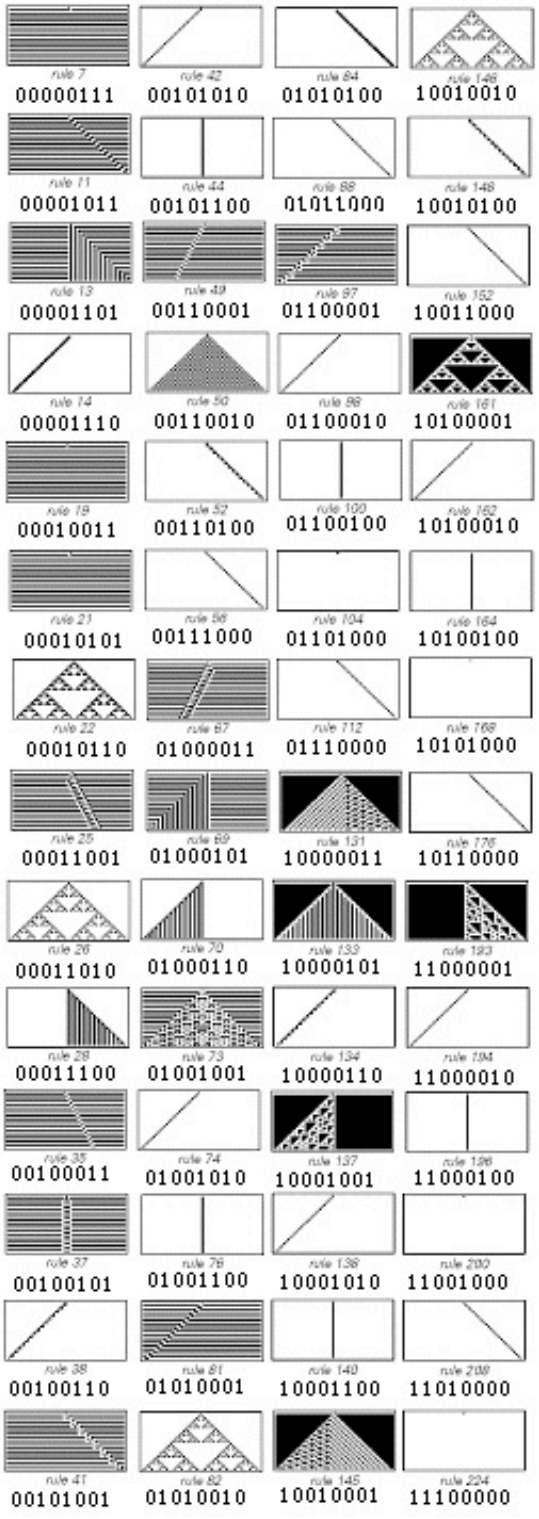
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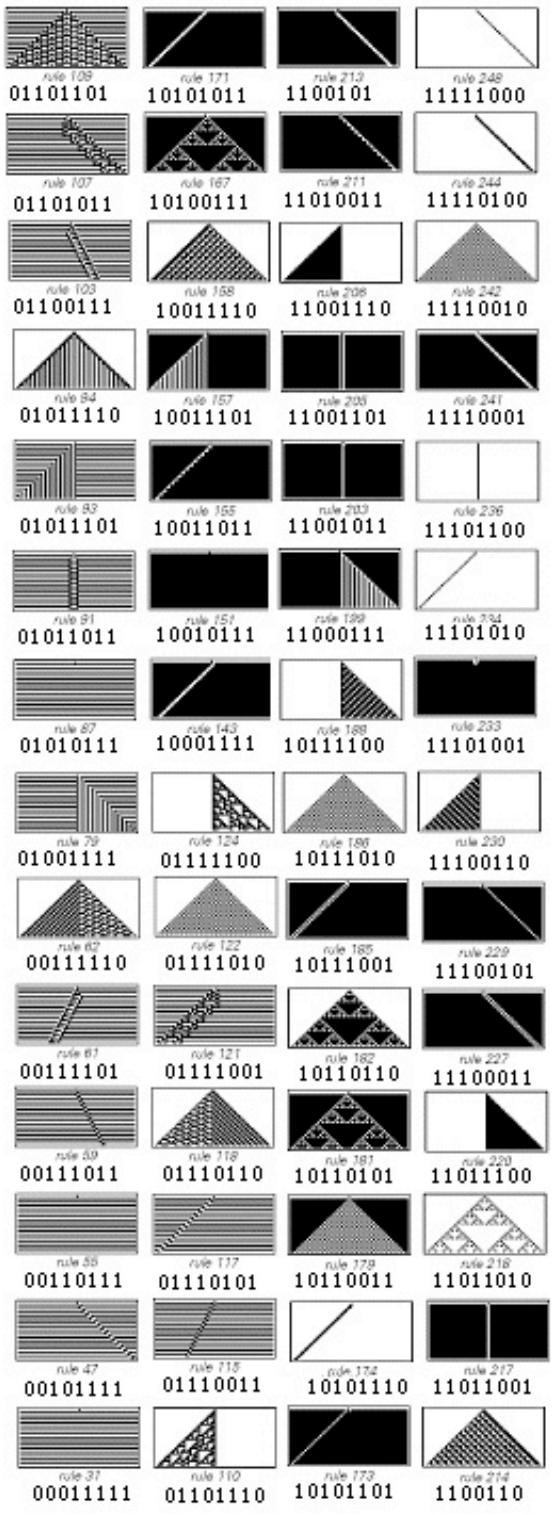
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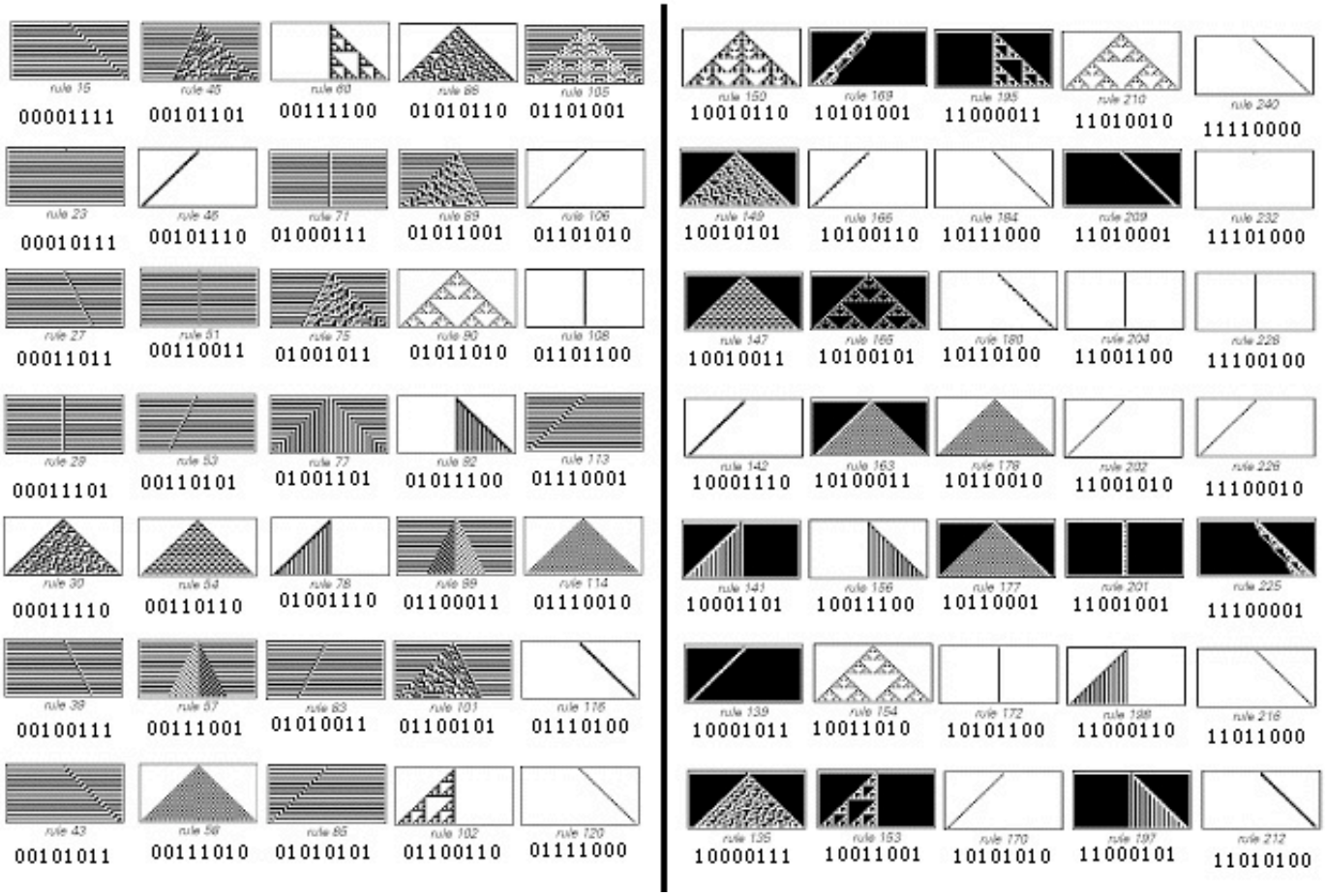
Grade: 4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rule 58
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rule 85
01010101
rule 102
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rule 120
01111000
rule 135
10000111
rule 153
10011001
rule 170
10101010
rule 197
11000101
rule 212
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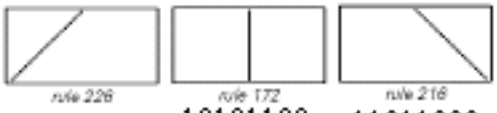
the 16 terms in the Cl(8) primitive idempotent

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

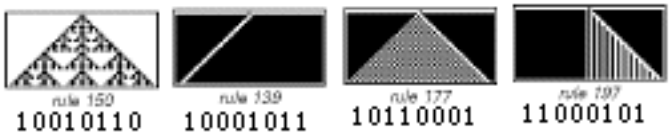
$$=(1/16)(1 + e_{1248} + e_{2358} + e_{3468} + e_{4578} + e_{5618} + e_{6728} + e_{7138} - e_{3567} - e_{4671} - e_{5712} - e_{6123} - e_{7234} - e_{1345} - e_{2456} + e_J)$$

correspond to 16 of the 256 Cellular Automata

- + e_12345678

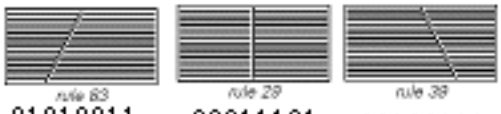


- + e_6728 + e_3468 + e_4578 to

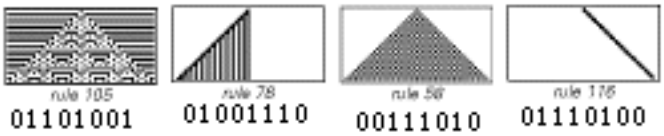


- + e_2358 + e_1248 + e_5618 + e_7138

- + 1 to



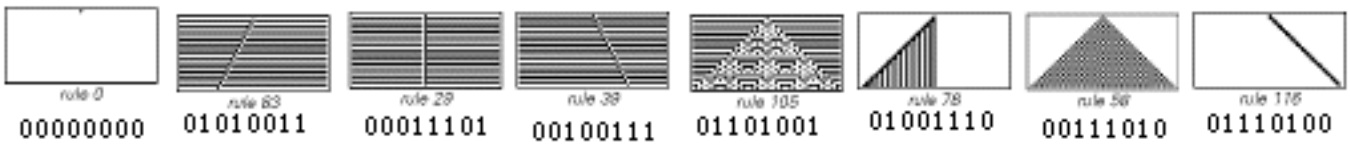
- - e_5712 - e_1345 - e_6123



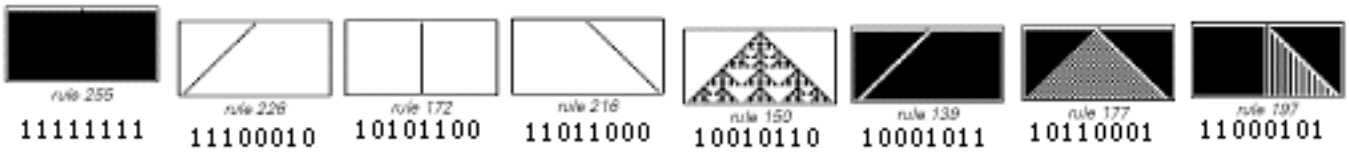
- - e_4671 - e_7234 - e_2456 - e_3567

Note the Cl(0,8) = Cl(1,7) triality correspondences among:

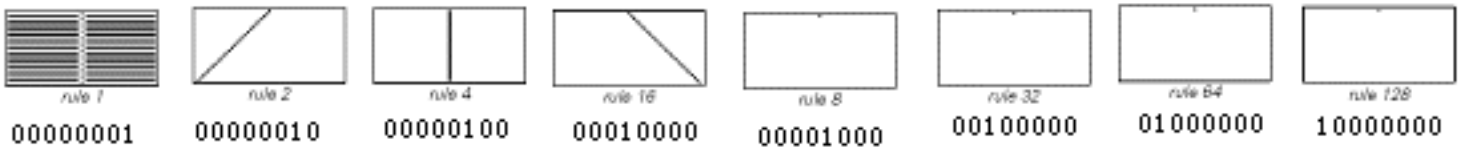
- the 8 +half-spinors



- the 8 -half-spinors

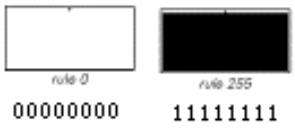


- the 8 vectors



Note that:

the grade-0 scalars



are related to the Spinors and Primitive Idempotents of Cl(0,8);

the grade-1 vectors 1, 2, 4, 16 (the subset sequence 2^0 = 1, 2^1 = 2, 2^2 = 4, 2^4 = 16 related to Fermat primes)

correspond to the 4 dimensions of physical spacetime;

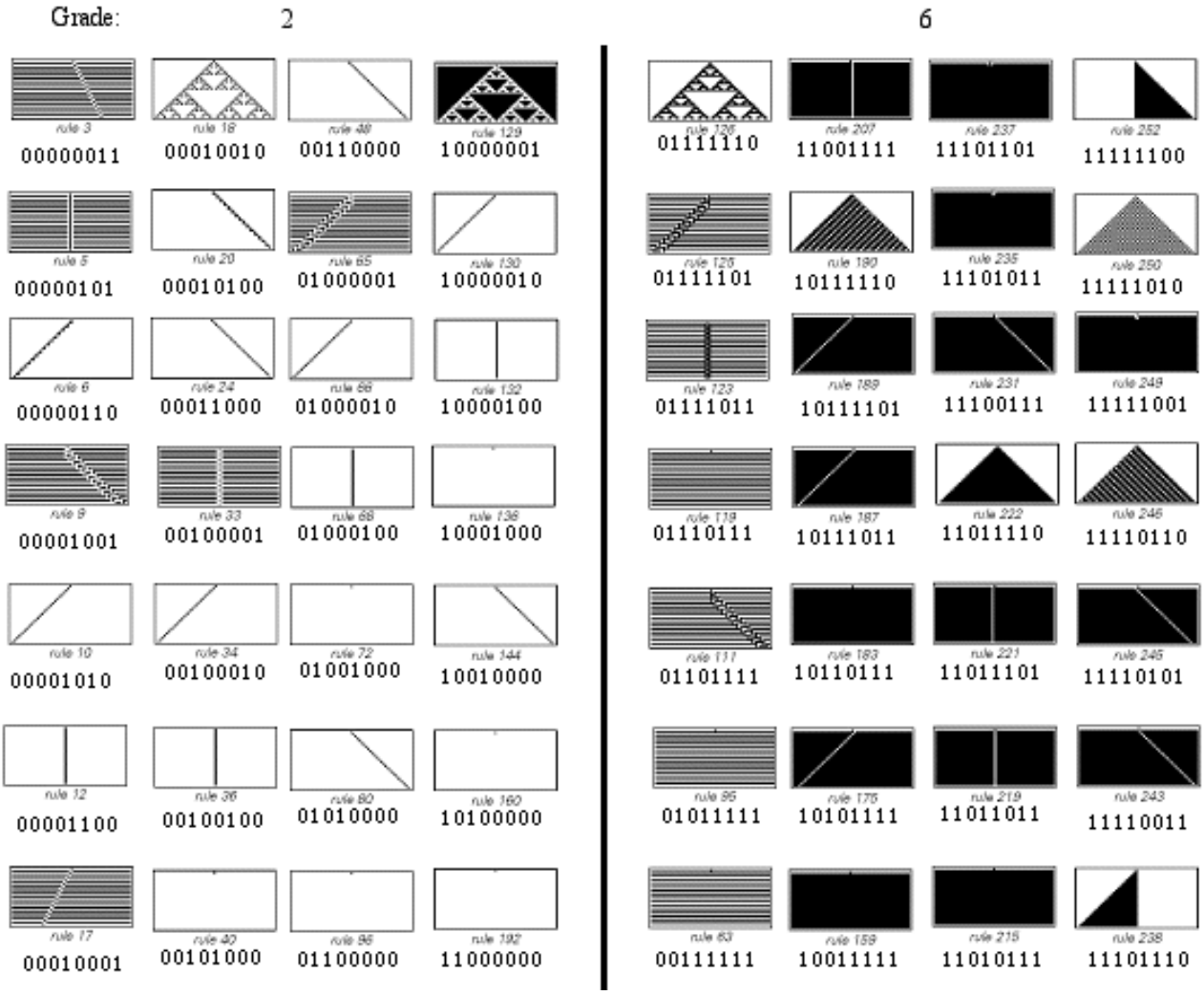
- 1 gives a succession of bands, the procession of time;
- 2 gives a slope to the left, one of three space dimensions;
- 4 gives a vertical slope, a second of three space dimensions;
- 16 gives a slope to the right, the third of three space dimensions;

the grade-1 vectors 8, 32, 64, 128 (all giving all white)

correspond to the 4 dimensions of internal symmetry space;

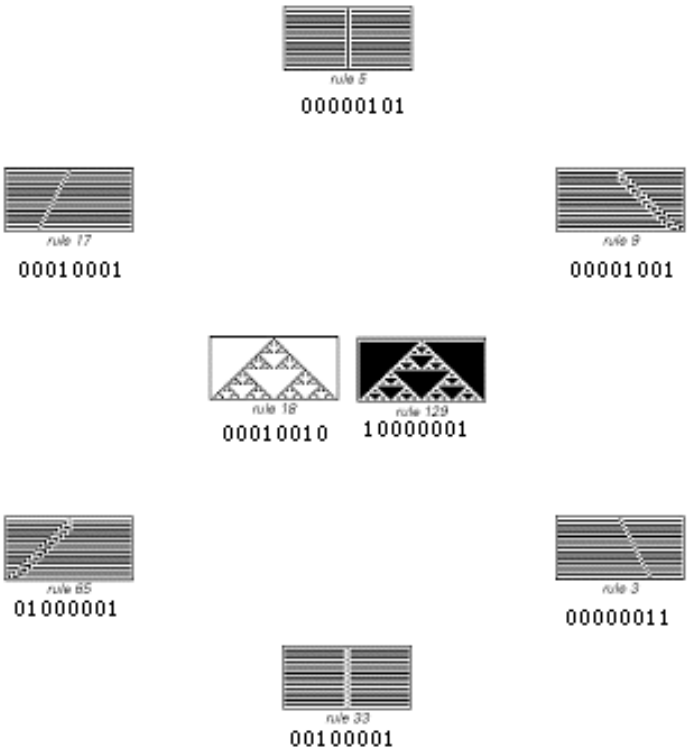
- rule 18 = 00010010 is the first rule to include both 16 = 00010000 with right slope and 2 = 00000010 with left slope and is the first rule with traingular self-similar fractal structure;
- rule 30 = 00011110 is the first rule to include 16, 8, 4, and 2 and is in the self-dual grade-4 and is the first rule with triangular chaotic behavior.

Here are all 28 rules for each of grades 2 and 6.



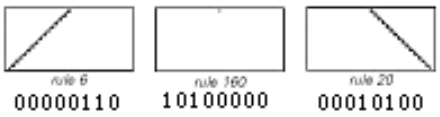
all 28 grade-2 bivectors correspond to the 28 generators of the Spin(8) Lie algebra;

8 of the grade-2 bivectors,



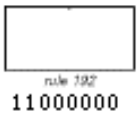
after dimensional reduction to 4-dimensional physical spacetime, correspond to the 8 generators of color force SU(3), whose root vector diagram is illustrated above;

3 of the grade-2 bivectors,



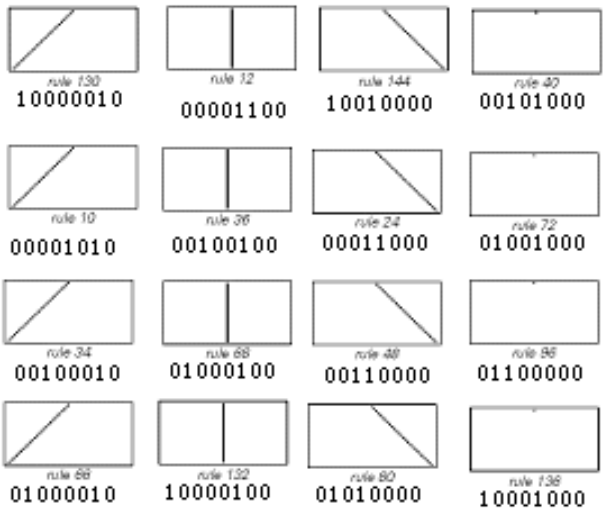
after dimensional reduction to 4-dimensional physical spacetime, correspond to the 3 generators of weak force SU(2);

1 of the grade-2 bivectors,

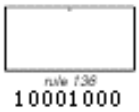


after dimensional reduction to 4-dimensional physical spacetime, correspond to the 1 generator of electromagnetic U(1);

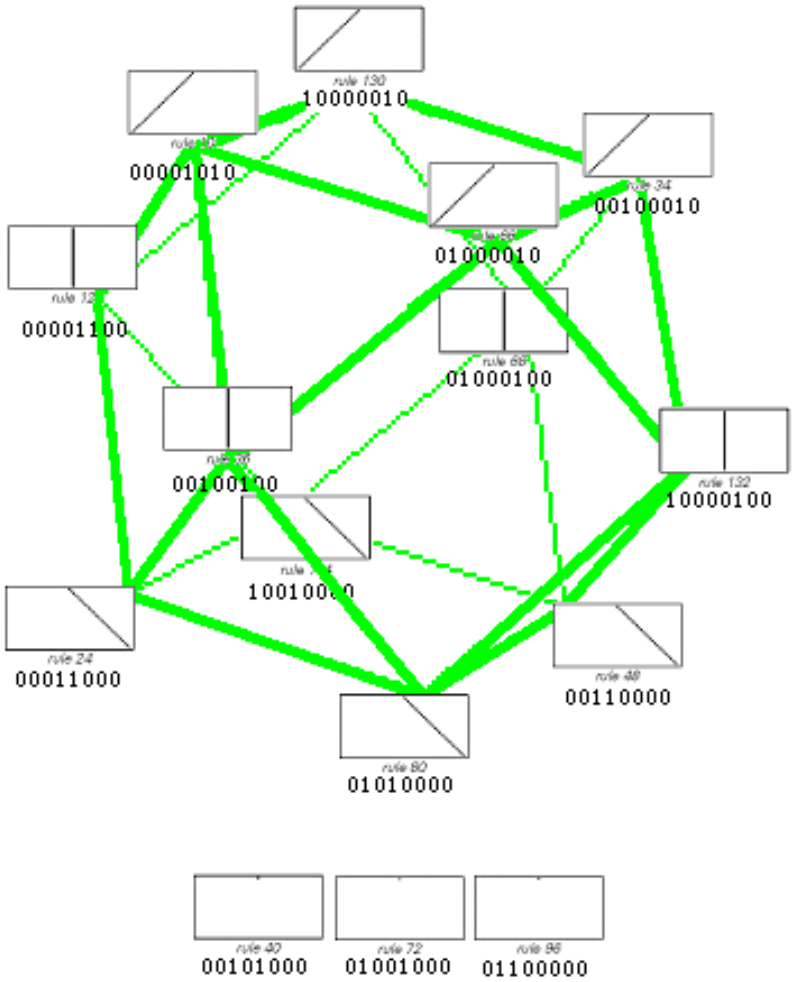
16 of the grade-2 bivectors,



after [dimensional reduction to 4-dimensional physical spacetime](), correspond to [the 16 generators of Gravity/Higgs/phase U(2,2)](). One of them

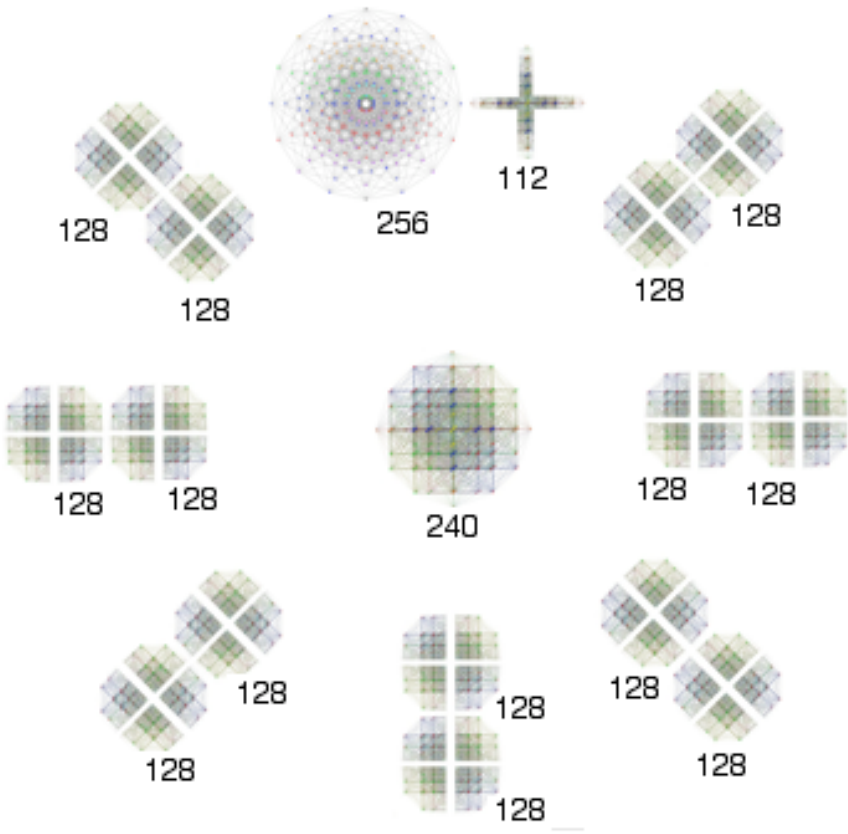


corresponds to the propagator phase U(1) while the other 15 correspond to the [Conformal]() Group SU(2,2) = Spin(2,4) [whose root vector diagram]()



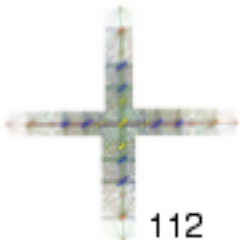
is a 12-vertex cuboctahedron (the other 3 bivectors corresponding to the 3 generators of the Cartan Subalgebra).

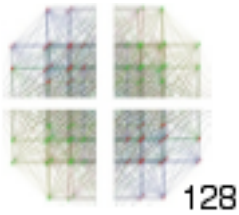
The 256 Cellular Automata, represented as the vertices of an 8-dim HyperCube, live among the 2160 vertices of the Second shell of an E8 lattice:



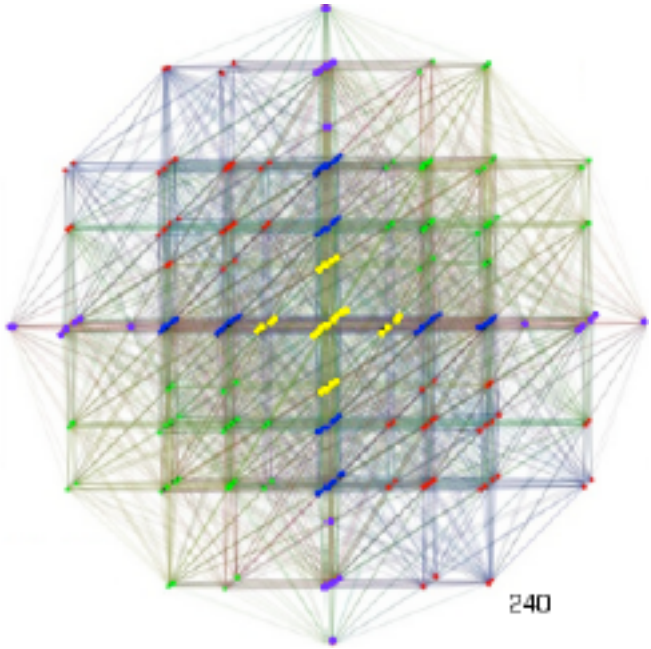
The First and Second shells of an E8 lattice have 240 and 2160 = 112 + 256 + 7(128+128) vertices.
The 256 is an 8-HyperCube with vertices
(+/-1, +/-1, +/-1, +/-1, +/-1, +/-1, +/-1, +/-1) of which
one checkerboard half represents the 128 +half-spinors of D8 and the
other mirror image checkerboard half represents the 128 -half-spinors of

D8.
The 112 represents the 112 root vectors of 120-dim D8.
Each of the 7 pairs of 128 are also representations of the 128 +half-spinors and 128 -half-spinors of D8.
The 112 can be combined with any of the 128





to form the 240 of the First Shell of an E8 latttice



that represents the 112 + 128 = 240 root vectors of E8.
There are 7 pairs of 128 in the Second Shell. Each choice of a pair from which to get a 128 to combine with the 112 produces one of the 7 independent E8 lattices.

You can also choose half of the 256 to combine with the 112 to form an 8^{th} E8 lattice. Although the 8^{th} E8 lattice is not independent of the 7, it is useful in constructing a physics model based on 8-Brane spacetime that in the continuum limit at low (compared to Planck) energies has M4 x CP2 Kaluza-Klein structure. Denote the 7 independent E8 lattices by 1E8, 2E8, 3E8, 4E8, 5E8, 6E8, and 7E8 and the 8^{th} E8 lattice by 8E8.

Note that each of the 8 E8 lattices uses only one of the 128 of a pair (or one half of the 256), and that it corresponds to one of the D8 half-spinor spaces. Physically, the chosen 128 represents Fermion Particles and AntiParticles of one generation, so the E8 contains one generation of Fermion Particles and AntiParticles (the second and third generations emerge at low energies). The 128 not chosen represents one antigeneration of Fermion Particles and AntiParticles, so the E8 does not contain a Fermion antigeneration. Therefore, the E8 model has realistic chirality properties. The 128 spinors can represent space spinors and be anticommuting with the E8 Lie algebra commutation relations still preserved, as Pierre Ramond pointed out in hep-th/0112261 (pages 13,14) with respect to F4 and Spin(9).

My goal in this paper is to explain how this E8 model is realistic and overcomes the acknowledged shortcomings of Garrett Lisi's E8 model of arXiv 0711.0770 which model was the motivation for me to work on this E8 model. I think that Garrett Lisi should get full credit for doing the basic ground-work for the E8 model.
I hope that this paper shows to its readers that the E8 model and its AQFT constitute a complete realistic theory that satisfies Einstein's criteria (quoted by Wilczek in the winter 2002 issue of Deadalus) :
"… a theorem which at present can not be based upon anything more than upon a faith in the simplicity, i.e., intelligibility, of nature: there are no arbitrary constants … that is to say,
nature is so constituted that it is possible logically to lay down such strongly determined laws that within these laws only rationally completely determined constants occcur …".

The remainder of this paper consists of the following sections:

10 spacetime Dimensions of 26-dim Bosonic Strings
16 Fermionic Dimensions of 26-dim Bosonic Strings
Closed Bosonic String World-Lines
Quaternionic M4 x CP2 Kaluza-Klein
Calculations of Masses, Force Strengths, etc
-for detailed results of the calculations etc, see web book at
http://www.tony5m17h.net/E8physicsbook.pdf and
www.valdostamuseum.org/hamsmith/E8physicsbook.pdf
AQFT
EPR Entanglement

10 spacetime Dimensions of 26-dim Bosonic Strings:

An 8-Brane is constructed as a superposition of all of the 8 E8 lattices. Each 8-Brane represents a local neighborhood of spacetime.
Global spacetime is a collection of 8-Branes parameterized by two real variables a , b that are analagous to the conformal dimensions (1,1) that extend (1,3) Minkowski physical spacetime of Spin(1,3) to the (2,4) Conformal spacetime of Spin(2,4) = SU(2,2).
Physical Gauge Bosons link an 8-Brane to a successor 8-Brane along the World Line of that Gauge Boson as follows:
A Gauge Boson emanating from only the 8E8 lattice in the 8-Brane is a U(1) Electromagnetic Photon;
A Gauge Boson emanating from only the 8E8 and the 4E8 lattice in the 8-Brane is a U(2) Weak Boson (note that their common 8E8 unifies the Electromagnetic Photon with the Weak Bosons);
A Gauge Boson emanating from only the 5E8, 6E8, and 7E8 lattices in the 8-Brane is a U(3) Gluon;
A Gauge Boson emanating from only only the 8E8 lattice and the 1E8, 2E8, and 3E8 lattices in the 8-Brane is a U(2,2) = U(1)xSU(2,2) = U(1)xSpin(2,4) Conformal Gauge Boson that gives Gravity by the MacDowell-Mansouri mechanism.

16 Fermionic Dimensions of 26-dim Bosonic Strings:

We now have constructed the 10 dimensions of the base manifold of 26-dim Closed Unoriented Bosonic String Theory, as well as the Gauge Bosons of the Standard Model plus Gravity, in which Strings are physically interpreted as World-Lines,
with relatively large Closed Strings corresponding to World-Lines of particles that locally appear to be free
and relatively small Closed Strings corresponding to paths of virtual particles in the Path Integral Sum-Over-Histories picture.

To describe the one fundamental generation of Fermion Particles and AntiParticles of the E8 model add, to the 10 dimensions we already have, a 16-dimensional space that is discretized by Orbifolding it with respect to the 16-element discrete Octonionic multiplicative group
{+/-1,+/-i,+/-j,+/-k,+/-E,+/-I,+/-J,+/-K}
to reduce the 16-dim Fermionic representation space to 16 points {-1,-i,-j,-k,-E,-I,-J,-K;+1,+i,+j,+k,+E,+I,+J,+K}
for which Fermion Particles (nu, ru, gu, bu, e, rd, gd, bu)
are represented by {-1,-i,-j,-k,-E,-I,-J,-K}
and the corresponding Fermion AntiParticles
are represented by {+1,+i,+j,+k,+E,+I,+J,+K}.

Now our E8 model has realistic first-generation Fermions as well as a base manifold with the Standard Model plus Gravity (M4 x CP2 Kaluza-Klein spacetime, with its 4-dim physical spacetime, and the second and third generations of Fermions, emerge at low temperatures when a preferred Quaternionic substructure freezes out from the high-temperature Octonionic structure).

Closed Bosonic String World-Lines:

Interaction of Closed Bosonic Strings as World-Lines looks like Andrew Gray's idea in quant-ph/9712037
"… probabilities are … assigned to entire fine-grained histories … this new formulation makes the same experimental predictions as quantum

field theory …"
so it seems that physical results of Bosonic String Theory can be interpreted as:

String Tachyons can be physically interpreted as describing the virtual particle-antiparticle clouds that dress the orbifold Fermion particles (As Lubos Motl said in his on 13 July 2005: "... closed string tachyons ... can be localized if they appear in a twisted sector of an orbifold ... tachyons condense near the tip which smears out the tip of the cone which makes the tip nice and round. ..." and as Bert Schroer said in hep-th/9908021: "... any compactly localized operator applied to the vacuum generates clouds of pairs of particle/antiparticles ...").

String spin-2 Gravitons can be physically interpreted as describing a Bohm-like Quantum Potential and what Penrose (in "Shadows of the Mind" (Oxford 1994) with respect to Quantum Consciousness) describes as "… the gravitational self-energy of that mass distribution which is the difference between the mass distributions of … states that are to be considered in quantum linear superposition …".

The 128 in the 240 of the E8 model breaks up into two 64-element things.
One 64 = 8x8 represents the 8 Dirac gamma covariant components (with respect to high-energy 8-dim spacetime) of each of the 8 fundamental first-generation Fermion Particles;
the other 64 = 8x8 represents the 8 Dirac gamma covariant components (with respect to high-energy 8-dim spacetime) of each of the 8 fundamental first-generation Fermion AntiParticles.

The 112 in the 240 of the E8 model breaks up into three parts: a 64 plus a 24 plus a dual 24.
The 64 = 8x8 in the 112 represents 8 Dirac gammas for the 8 dimensions of high-energy spacetime;
the 24 represents the 24 root vectors of a 28-dim D4 Lie algebra whose generators include those of the Standard Model Gauge Bosons;
the dual 24 represents the 24 root vectors of a second 28-dim D4 Lie algebra whose generators include those of the conformal U(2,2) that

produces Gravity.

Quaternionic M4 x CP2 Kaluza-Klein:

At this stage, the E8 model differs from conventional Gravity plus Standard Model in four respects:
1 - 8-dimensional spacetime
2 – two Spin(8) gauge groups from the two D4 in 112
3 - no Higgs
4 - 1 generation of fermions

These differences can be reconciled as follows:

Introduce (freezing out at lower-than-Planck energies) a preferred Quaternionic 4-dim subspace of the original (high-energy) 8-dim spacetime,
thus forming an 8-dim Kaluza-Klein spacetime M4xCP2
where M4 is 4-dim physical spacetime and CP2 is a 4-dim intrernal symmetry space.

Let the first Spin(8) gauge group act on the M4 physical spacetime through the SU(3) subgroup of its U(4) subgroup. As Meinhard E. 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 [= SU(3) / U(2)] 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. …".

So, freezing out of a Kaluza-Klein M4xCP2 spacetime plus internal symmetry space produces a classical Lagrangian for the SU(3)xU(2) = SU(3)xSU(2)xU(1) Standard Model including a BEHK Higgs mechanism.

Let the second Spin(8) gauge group act on the M4 physical spacetime through its Conformal Subgroup U(2,2) = Spin(2,4). As Rabindra Mohapatra said (section 14.6 of Unification and Supersymmetry, 2nd edition, Springer-Verlag 1992): "… gravitational theory can emerge from the gauging of conformal symmetry … we start with a Lagrangian invariant under full local conformal symmetry and fix conformal and scale gauge to obtain the usual action for gravity. …".
At this stage, we have reconciled the first 3 of the 4 differences between our E8 Physics Model and conventional Gravity plus the Standard Model.
As to the fourth, the existence of 3 generations of fermions, note that the 8 first generation fermion particles and the 8 first generation antiparticles can each be represented by the 8 basis elements of the Octonions O, and that the second and third generations can be represented by
Pairs of Octonions OxO and
Triples of Octonions OxOxO, respectively.
When the unitary Octonionic 8-dim spacetime is reduced to the Kaluza-Klein M4 x CP2, there are 3 possibilities for a fermion propagator from point A to point B:
1 – A and B are both in M4, so its path can be represented by the single O;
2 – Either A or B, but not both, is in CP2, so its path must be augmented by one projection from CP2 to M4, which projection can be represented by a second O, giving a second generation OxO;
3 – Both A and B are in CP2, so its path must be augmented by two projections from CP2 to M4, which projections can be represented by a second O and a third O, giving a third generation OxOxO.

Therefore, all four differences have been reconciled, and
our classical Lagrangian E8 Physics Model describes Gravity as well as the Standard Model with a BEHK Higgs mechanism.
Further,
the M4 physical spacetime inherits from the E8 lattices the structure of a 1+3 = 4-dimensional Feynman Checkerboard.

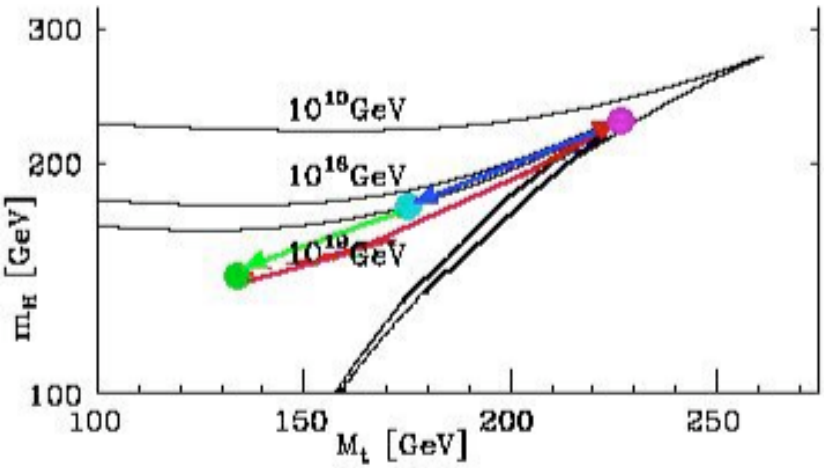
Calculations of Masses, Force Strengths, etc:

However, for our classical Lagrangian E8 Physics Model to be said to be complete and realistic, it must allow us to calculate such things as Force Strengths and Particle Masses that are consistent with experimental and observational results. To do that, we use the results of Hua in his book "Harmonic Analysis of Functions of Several Complex Variables in the Classical Domains". (Similar use of the work of Hua was made years ago by Armand Wyler, and recently by a few others, such as Carlos Castro.)

Hua's calculated volumes related to kernels and Shilov boundaries are the key to calculation of Force Strengths and Particle Masses. For example, the Lagrangian term for each of the Forces is integrated over the M4 physical spacetime base manifold, but each of the Four Forces sees M4 in terms of its own symmetry, consequently with its own measure which measure is proportional to Hua-calculated volumes. Since M4 was formed by a freezing out of a Quaternionic structure, M4 is a 4-dimensional manifold with Quaternionic structure and therefore can be seen as one of Joseph Wolf's 4 equivalence classes:
for Electromagnetism: T4 = U(1)^4
for Weak Force: S2 x S2 = SU(2) / U(1) x SU(2) / U(1)
for Color Force: CP2 = SU(3) / U(2)
for Gravity: S4 = Spin(5) / Spin(4) = Sp(2) / Sp(1)xSp(1)
When we also take into account the relevant volumes related to the curvature term in the Lagrangian for each force,
and the masses involved for forces with gauge bosons related to mass,
the calculations produce results that are reasonably close to experimental observation:

Force Strengths:
Gravity = 5 x 10^-39
Electromagnetic = 1 / 137.03608
Weak = 1.05 x 10^-5
Color at 245 MeV = 0.6286
Renormalization gives Color at 91 GeV = 0.106
and including other effects gives Color at 91 Gev = 0.125

Tree-level fermion masses (Quark masses are constituent masses due to a Bohmian version of Many-Worlds Quantum Theory applied to a confined fermion, in which the fermion is at rest because its kinetic energy is transformed into Bohmian PSI-field potential energy.):
Neutrinos: Me-neutrino = Mmu-neutrino = Mtau-neutrino = 0 at tree-level (first order corrected masses are given below)
Electron/Positron Me = 0.5110 MeV
Up and Down Quarks Md = Mu = 312.8 MeV
Muon Mmu = 104.8 MeV
Strange Quark Ms = 625 MeV
Charm Quark Mc = 2.09 GeV
Tauon Mtau = 1.88 GeV
Beauty Quark Mb = 5.63 GeV
Truth Quark Mt = 130 GeV ground state - 8-dimensional Kaluza-Klein spacetime with Truth-Quark condensate Higgs gives a 3-state system with a renormalization line connecting the 3 states:



(see hep-ph/0307138 for background for chart immediately above)
Low ground state:
Higgs = 146 GeV and T-quark = 130 GeV
Medium Triviality Bound state:
Higgs = 176-188 GeV and T-quark = 172- 175 GeV
High Critical Point state:
Higgs = 239 +/- 3 GeV and T-quark = 218 +/- 3 GeV

Weak Boson Masses (based on a ground state Higgs mass of 146 GeV):
M_W+ = M_W- = 80.326 GeV;
M_Z0 = 80.326 + 11.536 = 91.862 GeV

Kobayashi-Maskawa parameter calculations use phase angle d13 =
= 1 radian (unit length on a phase circumference) to get the K-M matrix:

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

Corrections to the tree-level neutrino calculations give neutrino masses
nu_1 = 0
nu_2 = 9 x 10^(-3)eV
nu_3 = 5.4 x 10^(-2) eV
and
the neutrino mixing matrix:

	nu_1	nu_2	nu_3
nu_e	0.87	0.50	0
nu_m	-0.35	0.61	0.71
nu_t	0.35	-0.61	0.71

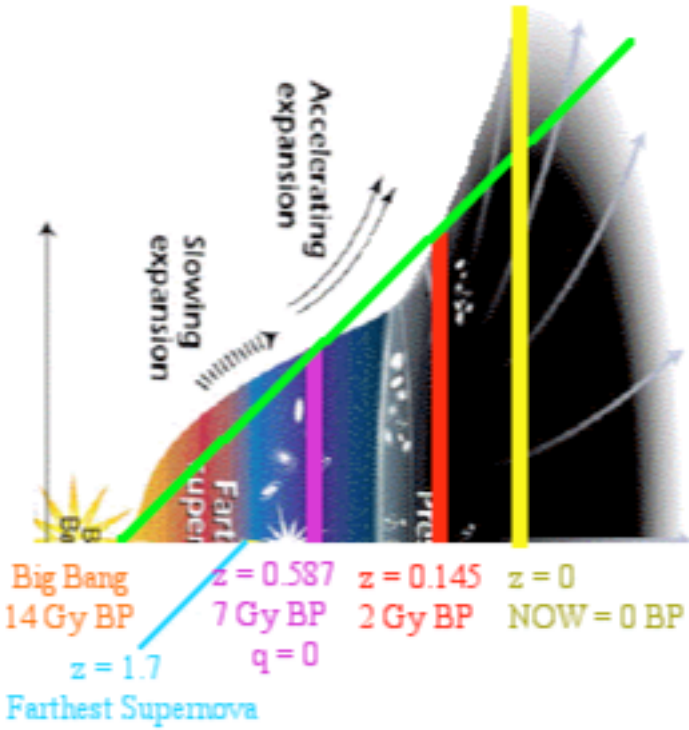
The mass of the charged pion is calculated to be 139 MeV
based on a Kerr-Newman Black Hole model of the pion and its constituent quark-antiquark pair. The pair of Black Holes form a Toroidal Black Hole for which the Torus is an Event Horizon that is (1+1)-dimensional with a timelike dimension which carries a Sine-Gordon Breather whose soliton and antisoliton are the quark and antiquark. The physically relevant Sine-Gordon solution for which the first-order weak coupling expansion is exact gives the ratio of quark constituent mass to the pion mass.

The Neutron-Proton mass difference is calculated to be 1.1 Mev
based on the down quark having virtual states related to the strange quark and the up quark having virtual states related to the charm quark, and the higher probability of strange quark states emerging from the nucleon sea.

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

based on the Conformal Gravity model of Irving Ezra Segal
and the 15 generators of the Conformal Group Spin(2,4) = SU(2,2)
10 = 6 Lorentz plus 4 Special Conformal = Dark Energy
4 Translations = Dark Matter Primordial Black Holes
1 Dilation = Ordinary Matter mass from Higgs
and the evolution of that basic ratio 10 : 4 : 1 = 0.67 : 0.27 : 0.06
as our universe has expanded



Details of calculations and discussion of some things that here are oversimplified can be found in my free pdf book "E8 and Cl(16) = Cl(8) x Cl(8)" which is available at
http://www.tony5m17h.net/E8physicsbook.pdf and
http://www.valdostamuseum.org/hamsmith/E8physicsbook.pdf

AQFT:

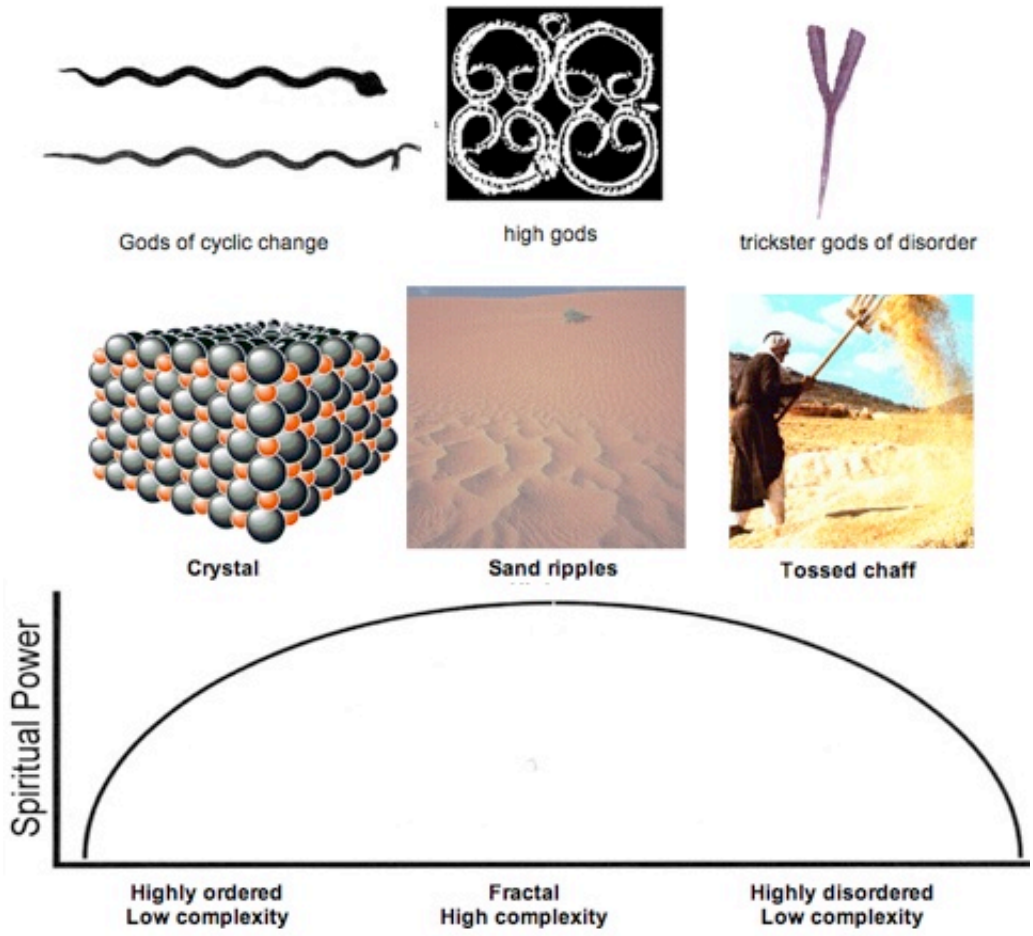
Since the E8 classical Lagrangian is Local, it is necessary to patch together Local Lagrangian Regions to form a Global Structure describing a Global E8 Algebraic Quantum Field Theory (AQFT).
Mathematically, this is done by using Clifford Algebras (others now using Clifford algebras in related ways include Carlos Castro and David Finkelstein) to embed E8 into Cl(16) and using a copy of Cl(16) to represent each Local Lagrangian Region. A Global Structure is then formed by taking the tensor products of the copies of Cl(16). Due to Real Clifford Algebra 8-periodicity, Cl(16) = Cl(8)xCl(8) and any Real Clifford Algebra, no matter how large, can be embedded in a tensor product of factors of Cl(8), and therefore of Cl(8)xCl(8) = Cl(16). Just as the completion of the union of all tensor products of 2x2 complex Clifford algebra matrices produces the usual Hyperfinite II1 von Neumann factor that describes creation and annihilation operators on the fermionic Fock space over C^(2n) (see John Baez's Week 175), we can take the completion of the union of all tensor products of Cl(16) = Cl(8)xCl(8) to produce a generalized Hyperfinite II1 von Neumann factor that gives a natural Algebraic Quantum Field Theory structure to the E8 model.

EPR Entanglement:

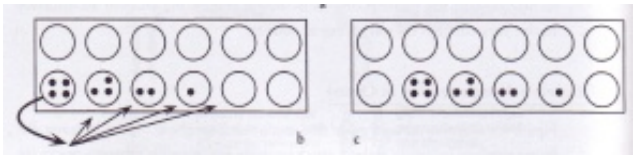
For the E8 model AQFT to be realistic, it must be consistent with EPR entanglement relations. Joy Christian in arXiv 0904.4259 "Disproofs of Bell, GHZ, and Hardy Type Theorems and the Illusion of Entanglement" said: "… a [geometrically] correct local-realistic framework … provides exact, deterministic, and local underpinnings for at least the Bell, GHZ-3, GHZ-4, and Hardy states. … The alleged non-localities of these states … result from misidentified [geometries] of the EPR elements of reality. … The correlations are … the classical correlations among the points of a 3 or 7-sphere … S3 and S7 … are … parallelizable …
The correlations … can be seen most transparently in the elegant language of Clifford algebra …". The E8 model AQFT is based on the parallelizable Lie group E8 and related Clifford algebras,
so the E8 model seems consistent with EPR.

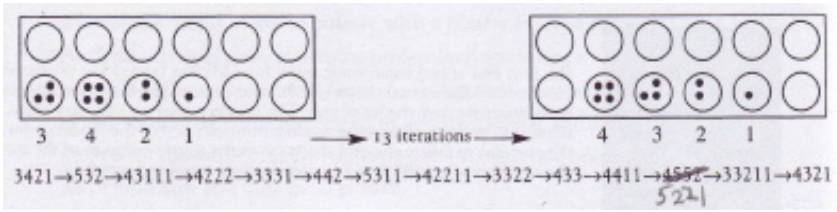
Ron Eglash (in his book "African Fractals" (Rutgers 1999) and on his web site at www.csdt.rpi.edu) says:

"...



... the owari marching-group system can be used as a one-diemnsional cellular automaton ...





... transients of many different lengths can be produced. ... the constant pattern is called a "point attractor", and the transients would be said to lie in the "basin of attraction".

The marching group rule can also produce periodic behavior (a "limit cycle" or "periodic attractor" ...). Here is a period-3 system using only four conters:

211 -> 22 -> 31 -> 211

Total number of counters	Behavior (after transients)
1	Marching
2	Period 2
3	Marching
4	Period 3
5	Period 3
6	Marching
7	Period 4
8	Period 4
9	Period 4
10	Marching
11	Period 5
12	Period 5
13	Period 5
14	Period 5
15	Marching

... The numbers which lead to marching groups - 1 , 3 , 6 , 10 , 15 ... - ...[are]... the triangular numbers ...

[the triangular numbers correspond to the dimension of the grade-2 bivectors in Clifford Algebras - - for the case of the 2^8 = 256 Elementary CA Rules, there are 28 grade-2 CA Rules]

... One-dimensional versions can ... be used as a kind of parallel computer. Consider, for example, a rule that in each iteration the number of counters in a cup is replaced by the sum of itself and its left neighbor. Starting with one:

0100000 -> 0110000 -> 0121000 -> 0133100 -> 0146410

This fourth iteration gives the us the binomial coefficients for expansion of (a+b)^4 ,
which equals to a^4 + 4 a^3 b + 6 a^2 b^2 + 4 a b^3 + b^4 .

[Such a rule reproduces at each step succeeding rows of the Yang Hui triangle.]

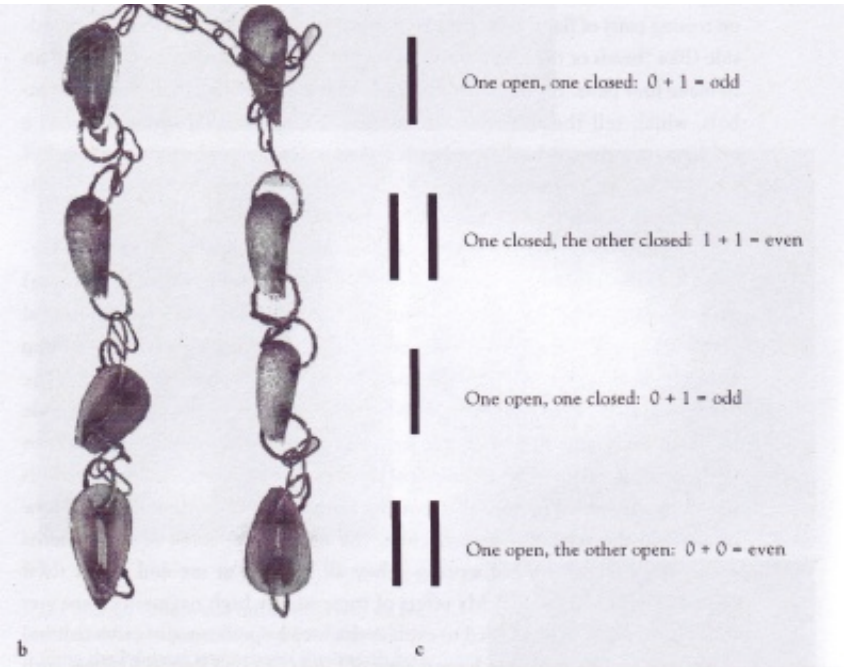


FIGURE 7.6

Binary codes in divination

(a) This Nigerian priest is telling the future by Ifa divination, in which pairs of flat shells or seeds split in two are tossed with each landing open-side or closed-side. They are connected by a doubled chain to make four pairs, giving a total of 16 divination symbols. In this version of Ifa (used in the Abigba region of Nigeria) they use two doubled chains and consider the cast more accurate if there is a correlation between the two sets. **(b)** Here we see a chain using split seeds. Each half lands either "closed" (meaning we see the rounded outside) or "open" (meaning we see the interior). By using open to represent 0 (double lines), and closed to represent 1 (single line), we can see how the divination symbol is obtained. **(c)** The divination chain is interpreted as pairs summing to odd (one stroke) or even (two strokes).

(**a**, *photo by E. M. McClelland, courtesy Royal Anthropological Institute.*)

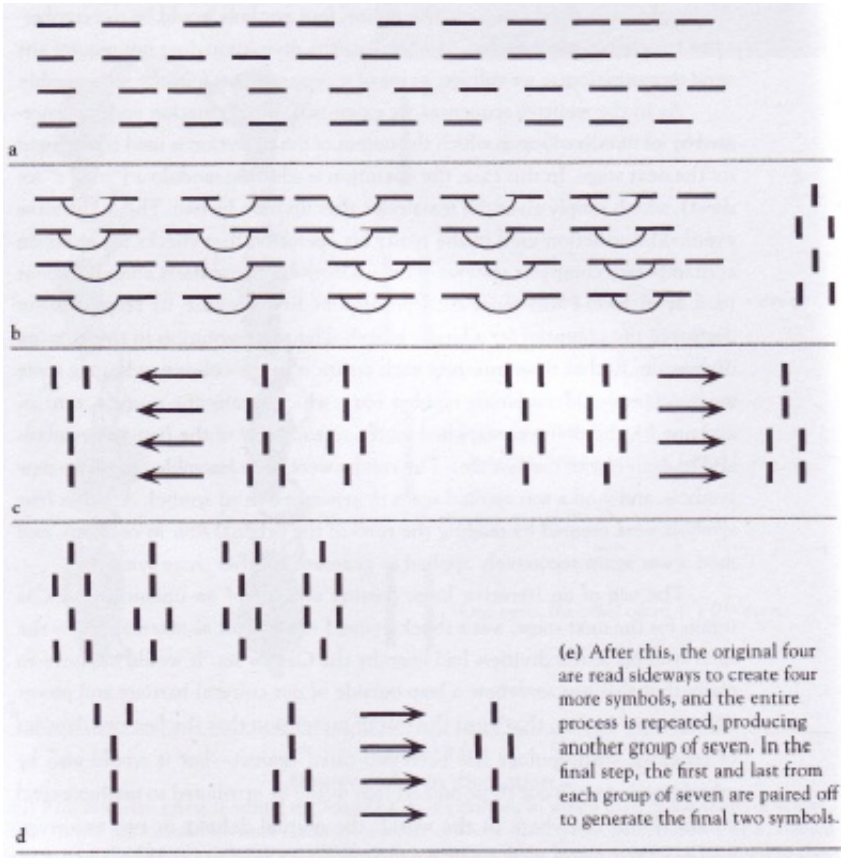


FIGURE 7-7

Bamana sand divination

(a) Four sets of random dashes are drawn. (b) Each of the dashes is paired, and the odd/even results are recorded. (c) The process is repeated four times, resulting in four symbols. Each row of the first two symbols and the last two symbols are paired off to generate two new symbols. (d) The two newly generated symbols, now placed below the original four, are again paired off to generate a seventh symbol.

... If we think of the two-strokes as zero and single stroke as one, the Bamana divination system is almost identical to the process of pseudorandom number generation used by digital circuits called "shift registers". Here the circuit takes mod 2 of the last two bits in the register and places the result in the first position. The other bits are shifted to the right, with the last discarded. ...

```
1111
0111
0011
0001
1000
0100
0010
1001
1100
0110
1011
0101
1010
1101
1110
```

... This four-bit register will only produce 15 binary words before the cycle starts over, but the period of the

cycle increases with more bits ... For the entire 16 bits ... that begin the Bamana divination, 65,535 binary words can be produced before repeating the cycle. ...

Skinner ... "Terrestrial Astrology: Divination by Geomancy". London: Routledge and Kegan Paul, 1980 ... provides a well-documented history of the diffusion evidence ... for ... Arabic, European, West African, and East African ... "geomancy" ...divination technique. ...

[Such diffusion seems also to have extended

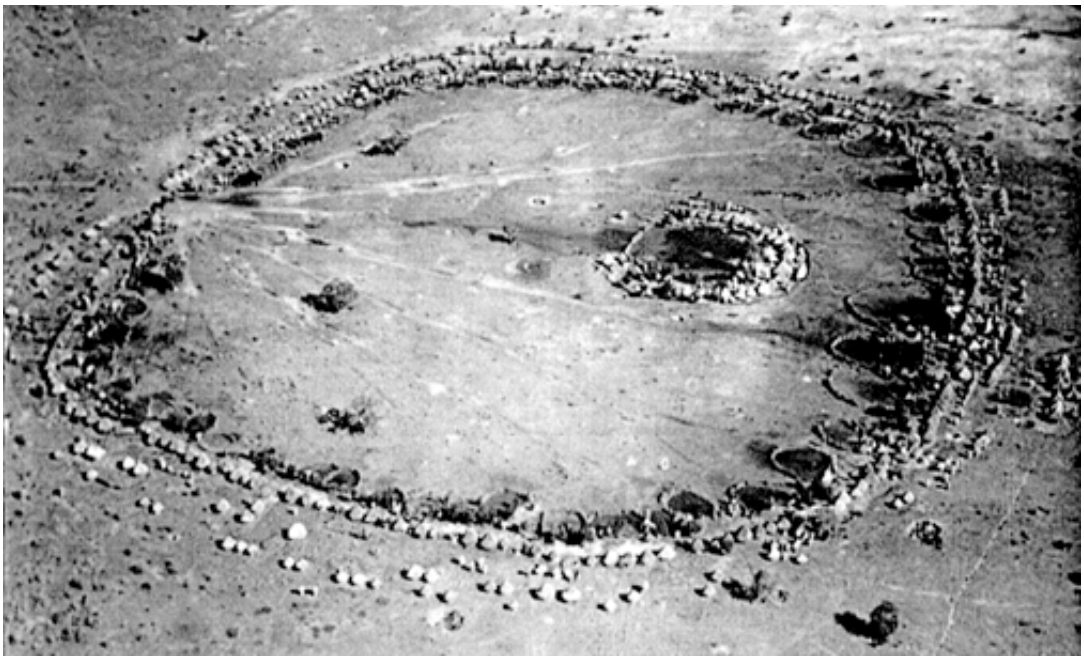
from Africa to India, China, and Japan.]

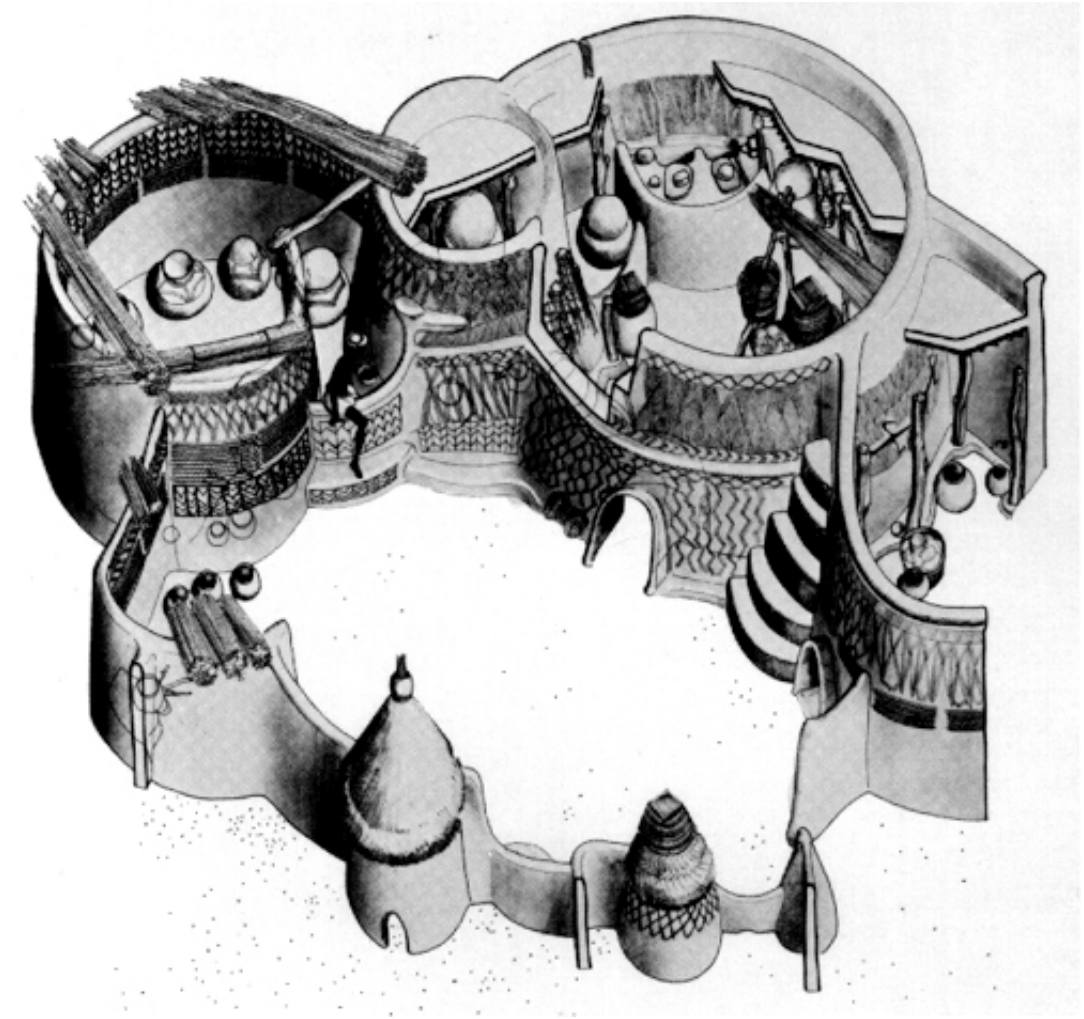
... The implications of this trajectory - from sub-Saharan Africa to North Africa to Europe - are quite significant for the history of mathematics.

... a historical path for base-2 calculation ... begins with African divination, runs through the geomancy of European alchemists, and is finally transformed into binary calculation, where it is now applied in every digital circuit ...

... Following the introduction of geomancy to Europe by Hugo of Santalla in twelfth-century Spain ... European geomancers ... Ramon Lull ... and others ... persistently replaced the deterministic aspects of the system with chance. By mounting the 16 figures on a wheel and spinning it, they maintained their society's exclusion of any connections between determinism and unpredictability. The Africans, on the other hand, seem to have emphasized such connections ...[with]]... a "trickster" god, one who is both deterministic and unpredictable. ...

The fractal settlement patterns





of Africa stand in sharp contrast to the Cartesian grids of Euro-American settlements. ... Euro-American cultures are organized by ... "top-down" organization. Precolonial African cultures included ... societies that

are organized "bottom-up" rather than "top-down". ...

African architecture tends to be fractal because that is a prominent design theme in African culture ...

most of the indigenous African societies were neither utterly anarchic, nor frozen in static order;

rather they utilized an adaptive flexibility ...

African traditions of decentralized decision making could ... be combined

with new information technologies,

creating new forms that combine democratic rule with collective informaiton sharing ...

what is needed is not ... "small is beautiful",

but rather a self-organized approach

to changes in the relations between scale and the socioenvironmental systems -

not just appropriate technology, but appropriate scaling. ...

we are trapped between the periodic stasis of the preservationists' limit cycle,

and the white noise of the profiteering positive feedback loop. ...

both are lacking in flexible interactions with memory;

the ... preservationists' ... limit cycle being too tied to it,

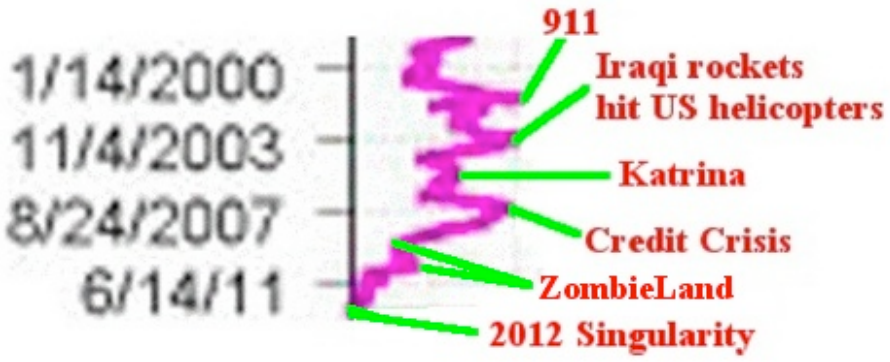
and

the ... profiteering ... white noise being too free from it. ...".

Can the African IFA tell us about Past and Future History ?

A few thousand years ago in Shang China, King Wen took the 64-element I Ching subset of IFA and modified its binary number Earlier Heaven sequence to describe the History of that Time and Place. In the 20th century, Terence McKenna used a similar technique to describe History of the Earth through 2012.
His Predictions for 2000 to 2012 seem to be quite relevant to the State of Our Earth as of now (2009):

Terence McKenna died in April 2000, but the Predictions of his



I Ching Resonance TimeWave of History live on to 2012.

Now (April 2009) we know that his 2000 to 2009 TimeWave History peaks:

- 9/11
- Iraqi War escalation (Rocket Attacks on USA helicopters)
- Hurricane Katrina
- the Credit Crisis of the USA/UK Global Financial System

all did happen coincident with TimeWave Peaks.

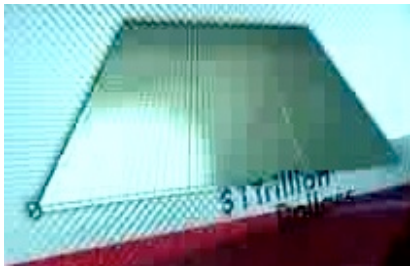
What does the TimeWave tell us about next 3 years, 2009 to 2012 ?

From now (April 2009) into 2010 is a nearly flat (or seemingly slightly rising) plateau that I call **ZombieLand**. In ZombieLand, Trillions of USA Dollars are fed to keep insolvent (but politically influential) financial institutions in an undead state - that is, not a living useful part of the Global Economy, but not officially recognized as being dead. To understand ZombieLand, you need to understand what is a **Trillion USA Dollars**. Glenn Beck (on his TV show) made a very good effort to show what is a Trillion USA Dollars. He said (I am paraphrasing): :

"... Here are $100 USA Dollars and $1 Million USA Dollars (It would fit in a suitcase):

Here are $1 Billion USA Dollars (It is about the size of a car) and **$1 Trillion USA Dollars (It is about the**

size of a Thousand Cars in a big parking lot.)



...".

Another way to visualize the size of $1 Trillion USA Dollars is to realize that the population of the USA (around 300 Million people) is about 100 Million Families.

$1 Billion is about $10 for every Family in the USA.

$1 Trillion is about $10,000 for every Family in the USA.

Another thing to keep in mind is that the amount of Bailouts so far is on the order of a few Trilllion USA Dollars, but **the total amount of possibly-worthless derivatives is on the order of $500 Trillion USA Dollars**. **That would be 500 x 10,000 = $5 Million for every Family in the USA**.

Since the population of the Earth is around 6 Billion, that would be almost $100,000 for every Person on Earth.

According to a 15 March 2009 huffingtonpost.com article by Arianna Huffington:

> "... The battle lines over **how to deal with the banking crisis** have been drawn. **On the one side are those who know what needs to be done. On the other are those who know what needs to be done -- but won't admit it**. Because it is against their self-interest. Unlike the conflict over the stimulus package, this is not an ideological fight. **This is a battle between the status quo and the future, between the interests of the financial/lobbying establishment and the public interest**. **What needs to be done is hard but straightforward**. As Martin Wolf of the Financial Times sums it up: "**Admit reality, restructure banks and, above all, slay zombie institutions at once.**" This tough love for bankers is being promoted by everyone from Nouriel Roubini, Paul Krugman, and Ann Pettifor to Niall Ferguson, the Wall Street Journal, and Milton Friedman's old partner, Anna Schwartz ... "They should not be recapitalizing firms that should be shut down," says Schwartz. "Firms that made wrong decisions should fail."... **Tim Geithner ... is on the wrong side of the issue, more worried about the banking industry than the American people**. Like Hank Paulson before him, Geithner appears more concerned about saving particular banks than saving the banking system. ... As Ann Pettifor puts it on HuffPost: "Much of Wall Street is effectively insolvent. **It's not that these banks lack cash or capital -- it's just that they're never going to meet all their financial liabilities -- i.e. repay their debts. Ever**." ...".

According to a 23 March 2009 democracynow.org interview of Paul Krugman:

> "... **"The Zombie Ideas Have Won" - Paul Krugman on $1 Trillion Geithner Plan to Buy Toxic Bank Assets** ... **Treasury Secretary Timothy Geithner** is preparing to unveil a plan ... to **purchase as much as $1 trillion in troubled mortgages and other assets from banks**. ... **The Obama administration has described the plan as a public-private partnership, but most of the actual money will be put up by the government**. ... Paul Krugman: A zombie

> idea is ... a bad idea, but it just keeps on coming back. ... to ... have taxpayers go in and buy ... these toxic assets ... 85 percent of the money is going to be a loan from the government, which is a non-recourse loan ... this is not Geithner. Ultimately, **the buck stops in the Oval Office.** The question is, why is President Obama going with the soft side, the hope over analysis, on this stuff? ... **the view still, apparently, dominant ... in this administration is that there's nothing really fundamentally wrong with the system. ... those people who we thought were so smart ... really are smart, and we want to keep them on the job**. ... the Obama administration is still partying like it's 2006. ...".

According to a 22 April 2009 economictimes.indiatimes.com article by Swaminathan S. Anklesaria Alyar:

> "... **the Obama administration is prolonging the recession by avoiding surgery to remove dead wood from its financial sector**. Some call this cowardice. Others, such as former IMF chief economist Simon Johnson, writing in The Atlantic, say **Wall Street has captured the White House**. ... Johnson says **the US now resembles Russia, where business oligarchs and government officials protect each others' financial interests, at the expense of the economy**. ... This ... highlights the priority given by the Obama administration to save the titans of Wall Street rather than end the recession quickly. ... **Technically, the financial sector is comprehensively bust**. It needs to recognise the losses, writing off trillions. ... **The market solution would be to force insolvent banks into bankruptcy, with shareholders and creditors taking a huge hit** ... Many titans of Wall Street will disappear ... **the Obama administration refuses to contemplate this obvious solution**. ... **Wall Street has captured the White House, so nothing will be done to imperil the politico-financial network that rules the US**. Robert Rubin and Hank Paulson, treasury secretaries of Clinton and Bush, were both from Goldman Sachs. Larry Summers, the current treasury secretary, earned millions as a hedge fund consultant. **In a market economy, well-managed companies should be rewarded with profits, while mismanaged companies should go bust. This basic rule has been suspended almost entirely for the titans of Wall Street. ... Accounting norms have been tweaked to permit zombie banks to pretend they are alive and solvent.**...".

If Terence McKenna's TimeWave is accurate, then for the next year or so we will live in a ZombieLand of accounting fiction and Empty Words of Hope,

only to see a sharp collapse of the USA/UK Global Financial System during 2010.

What will the 2012 Singularity Be Like ?

On the bad side, maybe the USA/UK leaders will be so unhappy at the prospect of losing their Global Hegemony that they might have a Temper Tantrum and Kick Over the Table of the Game of Life and have a Big War.

A more optimistic possibility is that a new Global Hegemony might form consistent with a Confucian Mandate of Heaven.

The Confucian I Ching (used by Terence McKenna in constructing the TimeWave) seems to be derived from Ancient African Mathematical Divination. Ron Eglash, in his book "African Fractals" (Rutgers 1999), said: "... fractal settlement patterns of Africa stand in sharp contrast to the Cartesian grids of Euro-American settlements. ... Euro-American cultures are organized by ... "top-down" organization. Precolonial African cultures included ... societies that are organized "bottom-up" rather than "top-down". ... most of the indigenous African societies were neither utterly anarchic, nor frozen in static order; rather they utilized an

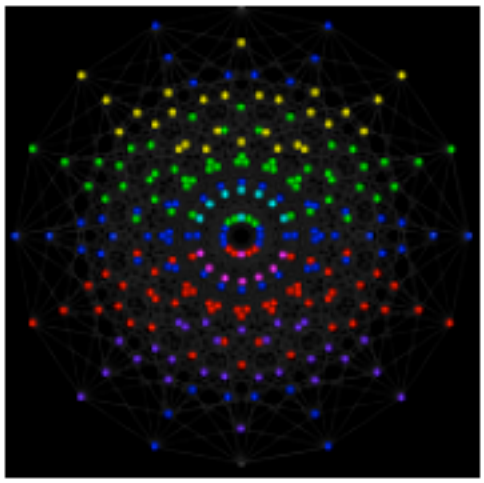
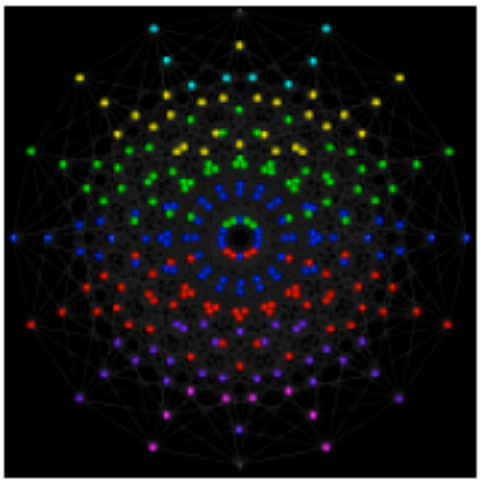
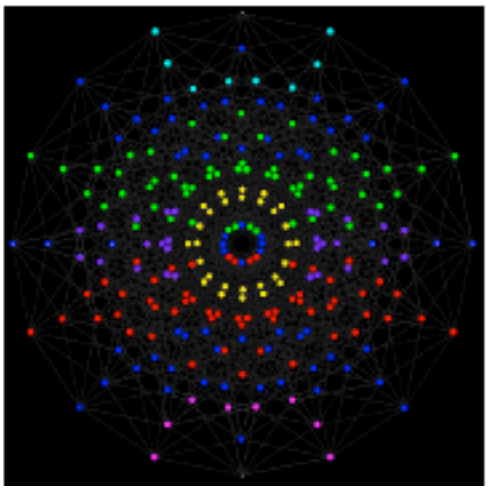
adaptive flexibility ... African traditions of decentralized decision making could ... be combined with new information technologies, creating new forms that combine democratic rule with collective information sharing ...".

How does such a New Collective Democracy fit with the most likely successor entity to the USA/UK Global Hegemon - China ?

Although some regard China as a top-down dictatorship, the true situation is quite different, as is exemplified by the Chinese Computer Hacker Community. According to a 23 April 2009 popsci.com article by Mara Hvistendahl: "... In the past two years, Chinese hackers have intercepted critical NASA files, breached the computer system in a sensitive Commerce Department bureau, and launched assaults on the Save Darfur Coalition, pro-Tibet groups and CNN. And those are just the attacks that have been publicly acknowledged. Were these initiated by the Chinese government? Who is doing this? ... **It's hundreds of thousands of everyday civilians**. ... This ... Hacker ... culture thrives on a viral, Internet-driven nationalism. ... **China's Internet patriots, who call themselves "red hackers," may not be acting on direct behalf of their government, but the effect is much the same**. ... The Red Hacker Alliance, often described in the Western press as a monolithic group, is in fact a loose association allowing disparate cells to coordinate their efforts. ... **the largest unifying characteristic is nationalism**. In a 2005 Hong Kong Sunday Morning Post article, a man identified as "the Godfather of hackers" explains, "Unlike our Western [hacker] counterparts, most of whom are individualists or anarchists, Chinese hackers tend to get more involved with politics because most of them are young, passionate, and patriotic." Nationalism is hip, and hackers -- who spearhead nationalist campaigns with just a laptop and an Internet connection -- are figures to revere. Henderson ... emphasizes that **the relationship between citizen and state is fluid in China**, and that the Chinese government tends not to prosecute hackers unless they attack within China. To Henderson, that lack of supervision is tacit approval, and it constitutes a de facto partnership between civilian hackers and the Chinese government. Jack Linchuan Qiu, a communications professor at the Chinese University of Hong Kong ... agrees. "**Chinese hackerism** is not the American 'hacktivism' that wants social change," he says. "**It's actually very close to the state. The Chinese distinction between the private and public domains is very small**." ...".

Perhaps the Chinese Government/People System, is in fact in accord with "African traditions of decentralized decision making",

and so might give us a Better World than the USA/UK system that is now collapsing under the weight of its own greedy profiteering.

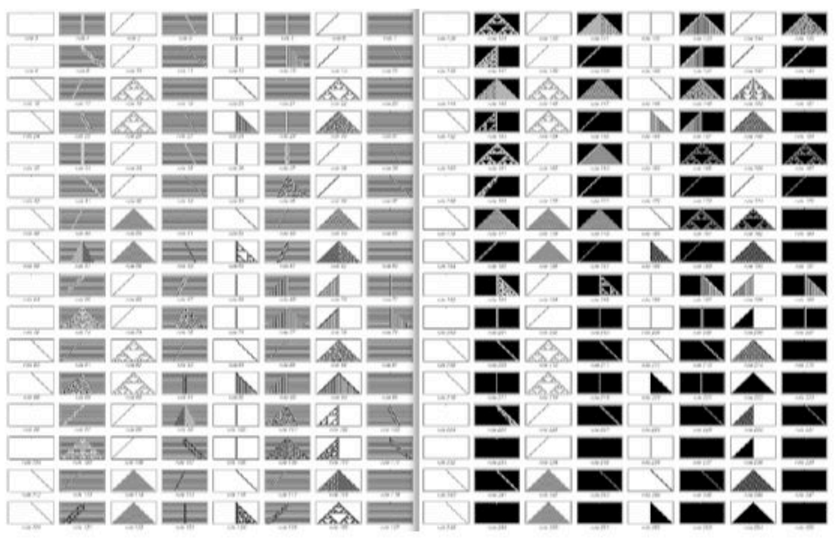
African Origins

Africans developed IFA Oracle divination based on the square of 16 = 16x16 = 256 = 2^8 corresponding to the vertices of an 8-dimensional hypercube and to the binary 2-choice Clifford algebra Cl(8) and so to related ones such as Cl(8)xCl(8) = Cl(16).

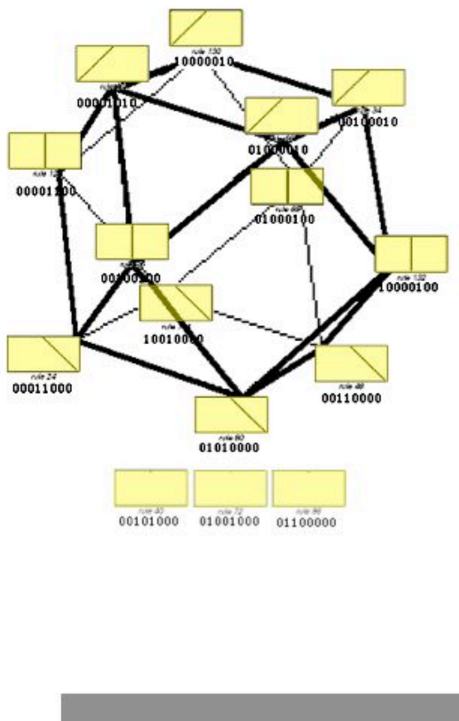
Since the number of sub-hypercubes in an 8-dimensional hypercube is 6,561 = 81x81 = 3^8, the IFA Oracle has N=8 ternary 3-structure as well as binary 2-structure:

N	2^N	3^N
0	1	
1	2 3	
2	4 =2x2	9 = 3x3
3	8	27
4	16 = 4x4	81 = 9x9
5	32	243
6	64 = 8x8	729 = 27x27
7	128	2187
8	256 = 16x16	6561 = 81x81

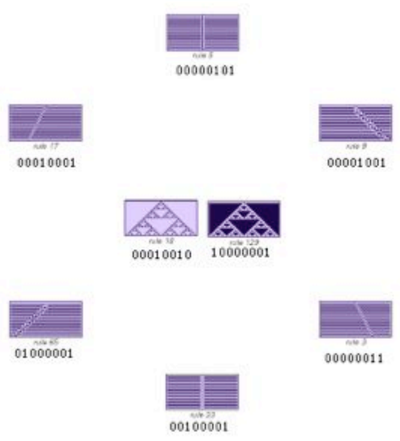
As ancient African games such as Owari show, binary 2-structure corresponds to static states and ternary 3-structure corresponds to dynamic states. Mathematically, using binary 2-choice static states to define dynamics on 3 ternary neighbor states produces the 256 Elementary Cellular Automata:



15 of the elements represent Conformal Spin(2,4) of Gravity:

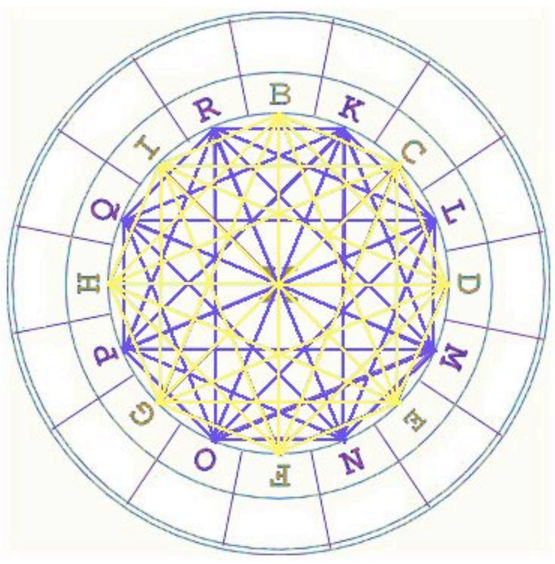


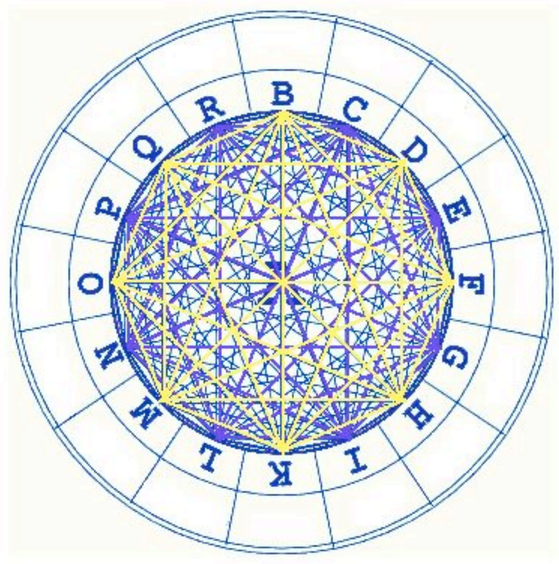
8 of the elements represent the SU(3) Color Force:



Hispanic Development

Ramon Llull (1232-1316) of Mallorca studied the 16 possibilities of the Ilm al Raml, which are derived from 16 of the 16x16 = 256-element African IFA divination system, and found a structure that he summarized in Wheel Diagrams with 16 vertices connected to each other by lines and in Cubic 4x4x4 = square 8x8 = 64-element Elemental Figures (images adapted from lullianarts.net web site):





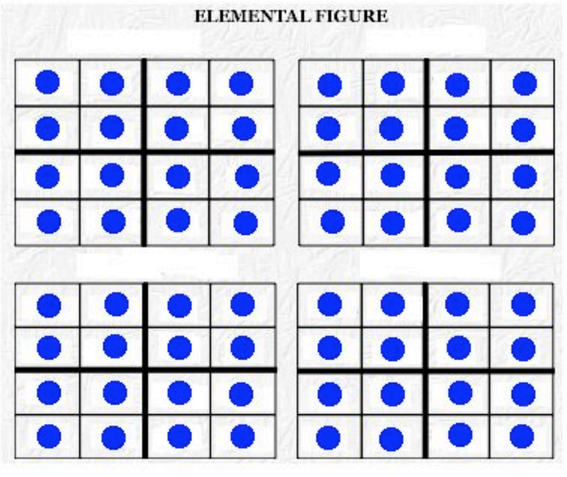
The 28 gold lines (gold 8-HyperCube points) represent Gravity and the 28 purple lines (purple 8-HyperCube points) represent the Standard Model.

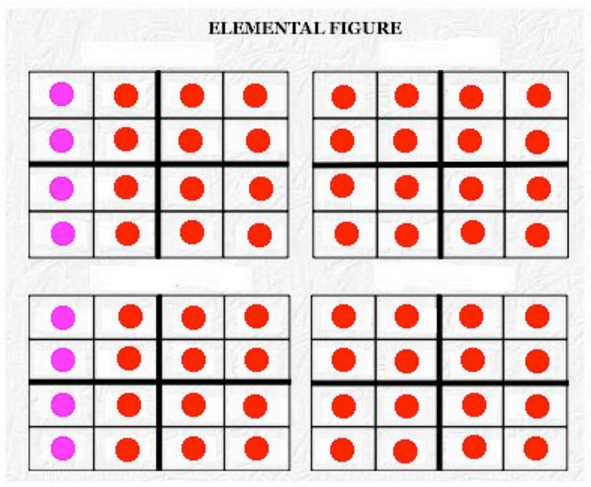
Adding in 64 blue lines (blue 8-HyperCube points without white dots) gives 120 lines that represent the Spin(16) BiVector Lie Algebra of the Clifford Algebra Cl(16) = Cl(8) x Cl(8):

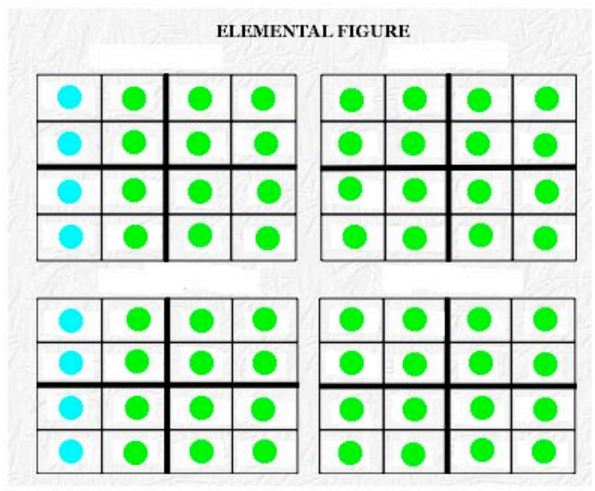
The 64 blue lines, and the 64 pure blue 8-HyperCube points, represent 8-dimensional Kaluza-Klein Vector SpaceTime and can be shown as a 64-element Elemental Figure.

By Triality Automorphisms, the 8+56 = 64-element magenta and red 8-HyperCube points that represent 8 Fermion Particles can also be shown as a 64-element Elemental Figure and the 8+56 = 64-element cyan and green 8-HyperCube points that represent 8 Fermion AntiParticles can also be shown as a 64-element Elemental Figure.

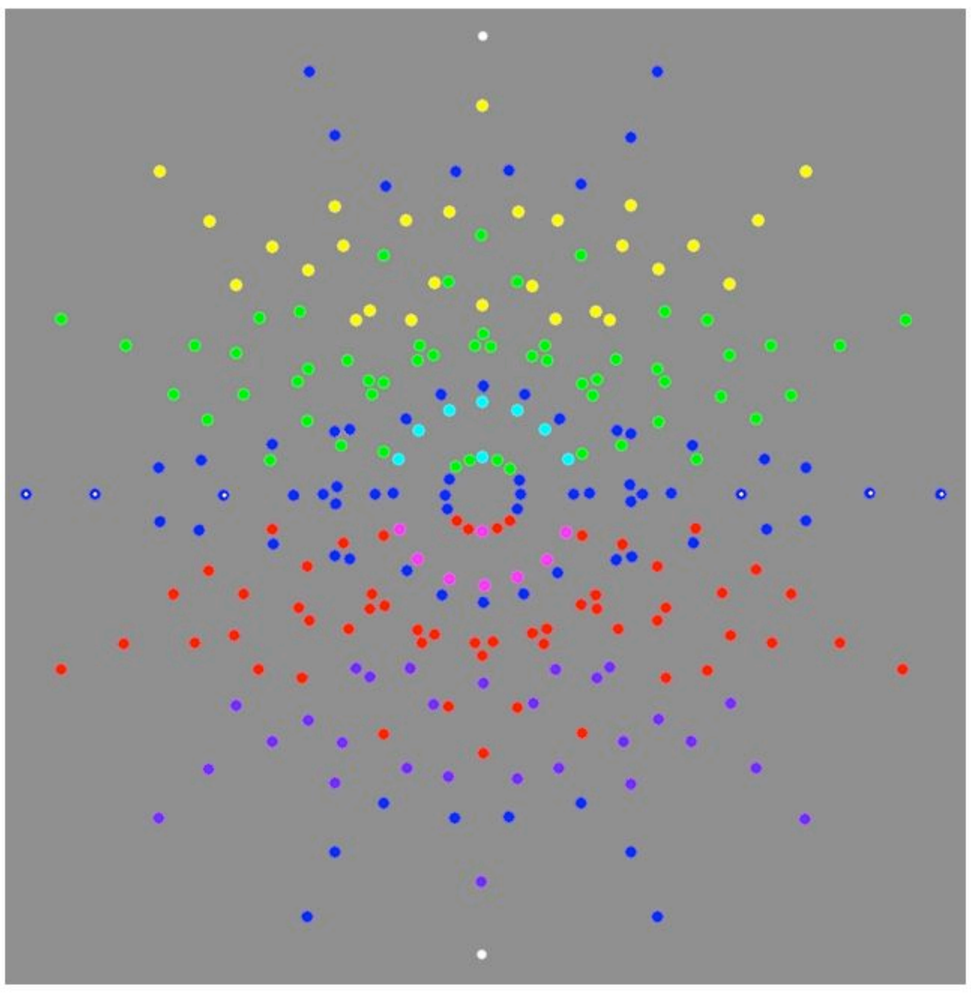
The 64 red-magenta Fermion Particle elements plus the 64 green-cyan Fermion AntiParticle elements form the 128 elements of one Half-Spinor representation of Spin(16).



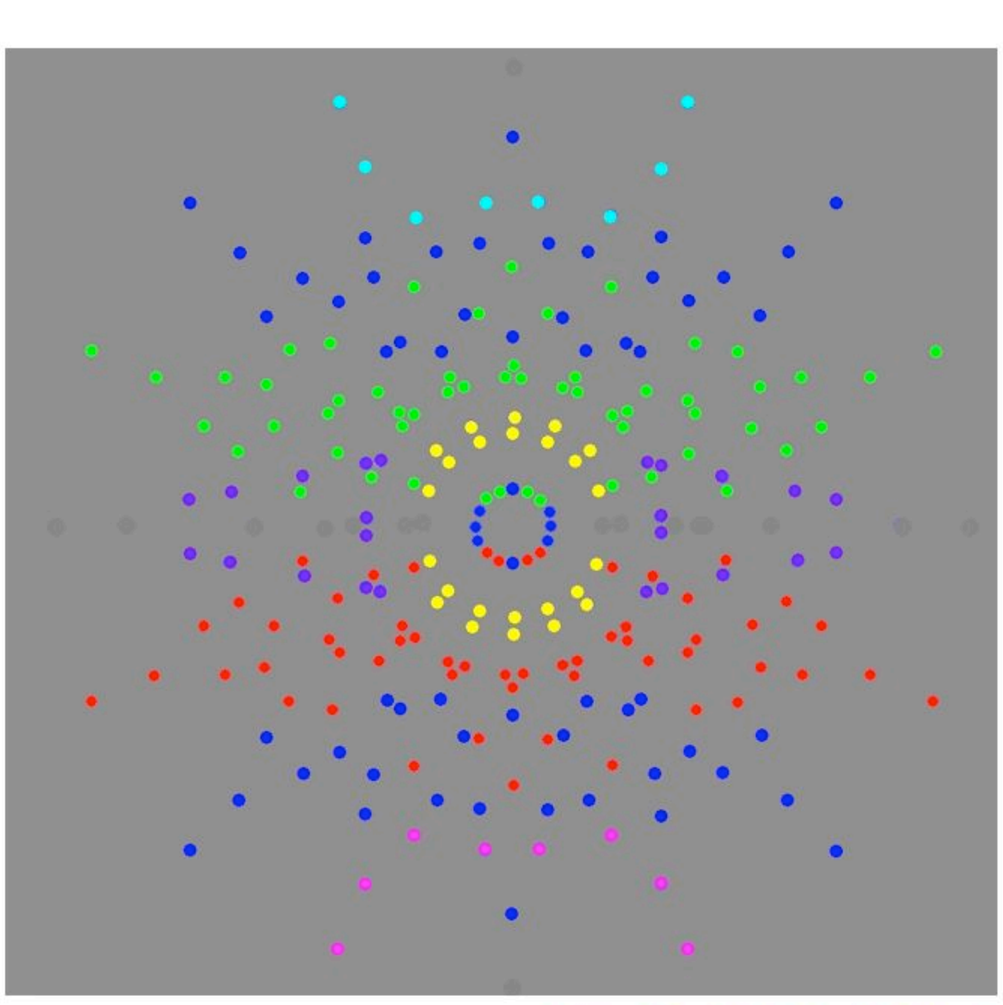




The 120 elements of the Spin(16) BiVector Lie Algebra plus the 128 elements of a Half-Spinor representation of Spin(16), both of which live in the Clifford Algebra Cl(16) = Cl(8) x Cl(8), combine to form the 120+128 = 248-dimensional E8 Lie Algebra:



8-HyperCube = 256 vertices = 1 + 8 + 28 + 56 + (8+48+8+(3+3)) + 56 + 28 + 8 + 1



E8 Lie Algebra = 120+128 = 248 vertices = 8 + 28 + 56 + (28+8+28) + 56 + 28 + 8

E8 Physics

The resulting E8 Physics Model has:

EPR structure similar to that of Joy Christian;

E8 structure modified from that of Garrett Lisi;

Cl(16) = Cl(8)xCl(8) Clifford Algebra structure anticipated by Ramon Llull;

Higgs mechanism produced by formation of M4 x CP2 spacetime as shown by work of Meinhard Mayer;

Standard Model Gauge Groups produced therein as shown by work of N. A. Batakis;

Conformal Gravity produced as in the MacDowell-Mansouri mechanism;

Dark Energy : Dark Matter : Ordinary Matter ratio 75 : 21 : 4 produced by conformal structures similar to those of Irving Ezra Segal;

Force Strength and Particle Mass calculations done using the Work of Hua Luogeng, particularly work on the Geometry of Complex Domains;

T-quark composite Higgs model based on the work of Yamawaki et al, resulting in a 3-state T-quark - Higgs system;

and Algebraic Quantum Field Theory (AQFT) constructed from a Clifford Real-Periodicity-8 hyperfinite II1 von Neumann algebra factor.

E8 Root Vectors = 112+128 = 240 = 8 + 28 + 56 + (24+8+24) + 56 + 28 + 8