QUASICRYSTALS, & A UNIFIED FIELD THEORY

Christopher C. O'Neill
email: chris.ozneill@gmail.com
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Abstract

In this paper, we look for more similarities between the 5-dimensional model of the graviton, presented to us in the Dimensional Gate Operators (DGO) Standard Model, and other mathematical entities like the Golden Ratio and Quasicrystals. We square off the 5D graviton theory with other 5D gravity theories, which leads us to conclude that few of them are actually 5-dimensional, from a strictly DGO perspective. Instead, we investigate the 5D characteristics of the Golden Mean, which bears fruit in the hyper-dimensional projections of 5-fold quasicrystals. Quasicrystals (QC) are candidates for the Fundamental Polytope of quantum gravity and also possess the geometry seen in the DGO representation of the weak bosons, and gluons. In light of this, we posit a superposition of the Higgs and Graviton that is represented by a vertex-first projection of a 6-cube to a rhombic triacontahedron. The relationship between the QC lattices and the DGO suggests a superficial geometric unity of the strong, weak force and gravity.

Golden Apples

Adam and Eve gained awareness of good and evil and the Universe by eating an apple from the Tree of Knowledge. [1] A less believable tale is that Isaac Newton arrived at his theory of gravity, when an apple fell from a tree and struck him on his head. [2] There are obvious symmetries in these two stories. It is perhaps fitting therefore that in my previous paper 'The Golden Ratio, The Graviton & The Tree Of Life' that the graviton itself should lead the way to an understanding of how all particles can be placed on the Kabbalistic Tree of Life. [3]

But this still leaves us with an important question; Where is that blasted snake?

No worries, I'm sure he's lurking around here somewhere…

In the meantime, let us examine the 22 pathways that the snake twists around, at least in the Christian Cabalistic version of the Tree of Life. [4] These are 22 paths on the Tree of Life, which corresponds to the 22 dimensions of the DGO Standard Model (Dimensional Gate Operators). These 22 dimensions arise from the sum of the Fibonacci series: 2, 4, 6, 10, which represents the dimensional increase for all particles in the Standard Model (SM). The 10 Sephiroth of the Tree of Life were linked to the SM-10 — a set of the Standard Model that contains 10 elements. [5]

The vertex-first projection of a 5-cube results in a rhombic icosahedron envelope with 22 vertices (See Fig 1). The internal vertices of this object number 10 and make up a pentagonal antiprism. [6] Once again, we see this 22-10 relationship. Does this mean that the ancient symbol of the Tree of Life is actually 5-dimensional in character? Perhaps, but the flow of information here is headed 'in the wrong direction'. We are not currently interested in gleaming new knowledge about the Tree of Life. We are interested in what it can tell us about the particles and forces inherent in the SM. We therefore only accept new knowledge about the Universe from the Tree of Life, provided they make good mathematical and logical sense, and not the other way round.

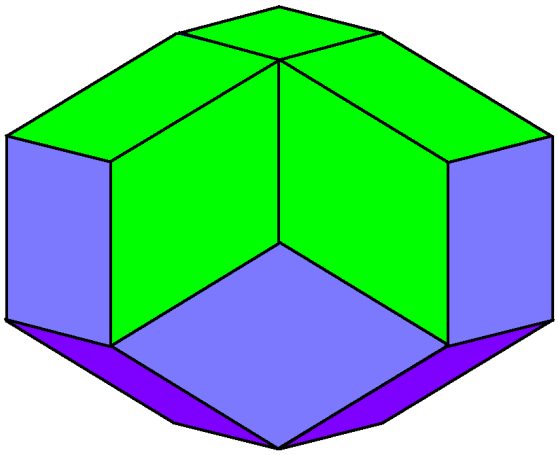

Fig 1: Image of the Rhombic icosahedron

We discovered this 5-dimensional property of the Tree of Life, because we already know about the graviton and its 5-dimensional character. From where did we draw this inference? From the precepts of the DGO Standard Model. [7] If our investigation into DGO leads us both to the Golden Ratio and the conclusion that the Graviton (and the Higgs) are 5-dimensional particles, does this mean that the Golden Ratio (1.618033988…) plays a part in the formation of gravity?

The Golden Ratio appears everywhere in nature, from mathematics to physics, and chemistry to biology. To some it is seen as a mystical indicator, to others it is merely the drab consequence of 'things being packed closely together'. [8]

Whatever the truth (I have my own view on this, but they are incidental at the present time), it is clear that the fingerprints of the Golden Mean are seen scattered all about the Universe.

We see it in the shape of a fern leaf and in the curves of the spiral arms of galaxies. This last one is interesting. True that it is just another archetype of the packing analogy, but it does leave us with that mystical aftertaste. Is gravity really dependent on the Golden Mean?

A quick look at the literature and it is hard to argue against it.

The writer and physicist Paul Davie used a non-quantum gravity equation to show that "the golden ratio is the precise point where a black hole's modified specific heat changes from positive to negative" [28]. Although, as John Baez points out, this is in a very specific case, and one which might not even encompass a physical reality, in which case the result is clearly meaningless.[29]

$$\frac{M^4}{J^2} = \Phi$$

However, elsewhere, Carlo Rovelli is said to have formulated an equation "for the lower bound on black hole entropy" [30]:

$$e\frac{8\pi S l_p^2}{kA} \geq \Phi$$

And from Quantum Gravity Research (QGR), "Amaral Marcello has shown that the golden ratio modifies the loop quantum gravity parameter to blackhole entropy" :

$$2^{\pi\gamma} = \Phi$$

All three of these examples came from a video presentation by Klee Irwin entitled, 'Quantum Gravity Research Overview' and reveals—in some cases—the remarkable importance of the Golden Ratio to gravity and in particular, as it pertains to blackholes and blackhole entropy. [9]

So, it would appear that the Golden Mean has a lot to do with gravity and gravity on a quantum scale. But none of this is of much value to us, if we are unable to link it all back to a 5th spatial dimension. There are many theories and avenues of research that can potentially provide us the means of doing this. But, as we shall see, not all of them are fit for purpose.

For instance, there is the Gravitational Exciton Theory (GET), which requires a 5th dimension of space coiled up very small in a geometric form referred to as the 'Fundamental Polytope' (FP). The exact geometry of the FP is not known. Various candidates have been floated, including the Calabi-Yau manifold. [10, 11] But the process of selection is hampered, as there are infinitely such polytopes to choose from. Luckily, the DGO is very clear on this, as it only gives you one option. The 5-dimensional Chamfered Cube.

We have already examined in detail much of the importance and characteristics of the Chamfered 5-cube in relation to the graviton, in a previous preprint. [12]

At the opposite end of the scale to the GET, we have the Space-Time-Matter Theory (STM). This requires a large 5th spatial dimension. Both the GET and STM are based on the Kaluza-Klein Theory (KKT). The KKT was meant to unify the theory of Quantum Electro Dynamics (QED) with the Theory of General Relativity, and as such it is built on the foundations of both theories.

General Relativity is a theory of 3 spatial dimensions and one of time, for a total of 4 dimensions. So, is it really correct to call the KKT a 5-dimensional theory?

No, I would argue it isn't. Since it only has 4 spatial dimensions and one time dimension, this is not a valid 5-spatial dimensional theory. And therefore, neither is GET or STM. This is a little

disappointing, as it would be nice to find agreement with these theories. On the other hand, there are lots of other theories, like String Theory and Representation Theory, which posit dimensions of 6, 8, 10 or even 26 or more dimensions.

The Golden Serpent

We won't follow them any further down that dimensional rabbit hole. Instead, we will return and look at the relationship between gravity and the Golden Ratio (1.618033988…). If gravity is 5-dimensional and is so influenced by the Golden Ratio, then does it follow that the Golden Ratio is at least partially 5-dimensional in aspect?

I would argue tentatively in favour of this assertion and would offer the formula of the Golden Ratio itself, as my first piece of evidence:

$$\frac{\sqrt{5}+1}{2} = \Phi$$

It is my belief that the 5th-dimension expresses itself in the embedded 5-fold symmetries of ordinary space. The fact that the number 5 appears in the equation for the Golden Ratio is therefore an indication that the Golden Ratio is 5-dimensional. There is also the relationship between the Golden Ratio and the 5-sided pentagram. [24] The 5-fold symmetries with respect to the Golden Ratio does not end there, in fact they go on and on.

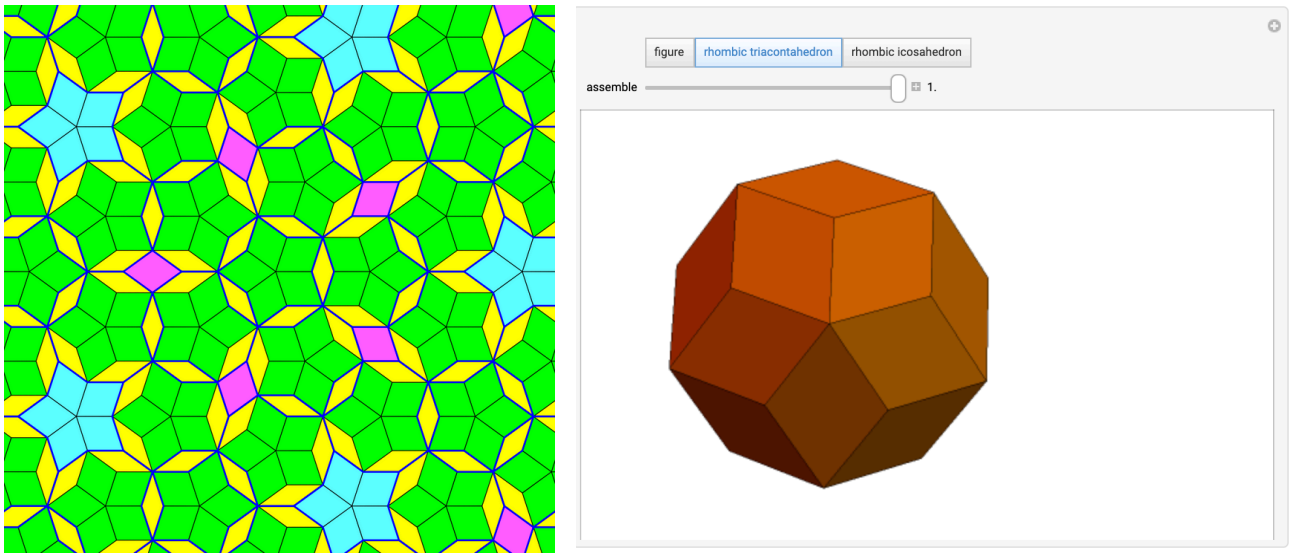

Fig 2: Quasicrystal lattice (left).[23] Rhombic Triacontahedron exhibits the same seed symmetry (right)[22]

The 5-fold lattice of quasicrystals is one place where the Golden Ratio finds application and is particularly interesting in terms of potentially higher-dimensional lattice objects existing in 3-

dimensions. It is of little surprise therefore that the quasicrystal should be touted as one of the more likely candidates for the Fundamental Polytope of Quantum Gravity and why it is the primary focus of Quantum Gravity Research. [9, 13, 14]

The vertex-first projection of the 5-cube produces a rhombic icosahedron, which from a particular angle is structured entirely from the rhombohedrons of the quasicrystal lattice (See Fig. 3). It is my belief that the gravitational field of a body like that of the Earth possesses the characteristics of a rhombic hexecontahedron surrounded by 12 rhombic triacontahedra — something which I will attempt to demonstrate further in subsequent papers.

But recall that the graviton is not a 5-cube, but rather a Chamfered 5-cube. In some ways this does not pose too much of a problem, as the labyrinthine passageways of the graviton is itself the grid of a 5-cube. More accurately, however, it is the XNORed Higgs which displays the geometry most closely associated with that of the 5-cube and therefore, the rhombic icosahedron (RI).

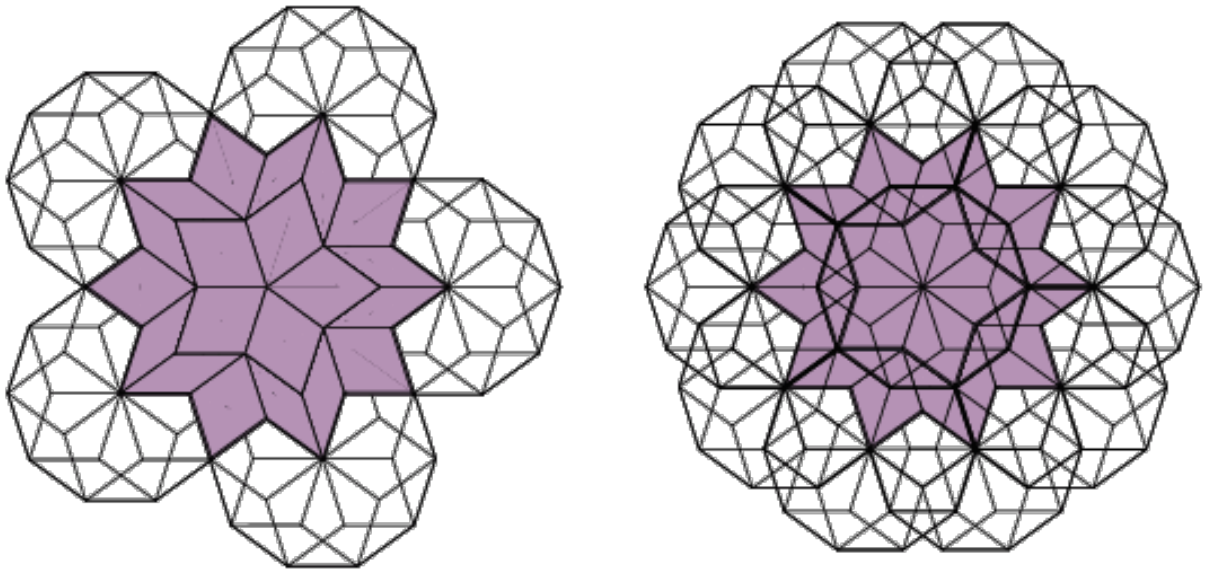

Fig 3: 12 rhombic triacontahedra can be fit around a rhombic hexecontahedron (purple). [19]

We already know that the gluon and the W and Z bosons take the shape of the rhombic dodecahedron, in their 4th dimensional incarnation, at least. This is actually rather beneficial, as the rhombic dodecahedron is the vertex-first projection of the tesseract and so it is a 4th dimensional object that lives and breaths in 3-dimensional space. [15]

Just as the rhombic dodecahedron can be formed from 8 rhombohedrons arranged in 4-dimensional space, a rhombic icosahedron can be formed from 10 rhombic dodecahedra in 5-dimensional space. [16] Therefore, the Higgs, or the Graviton — whichever you prefer — is made up of the geometric equivalent of 10 overlapping W/Z/gluon particles, in 5-dimensions.

We can see this easily when we look at the quasicrystal lattice, with the rhombic dodecahedrons (RD) poking out all over the place. But notice that in this flat projection, they do not appear as ordinary RD polytopes. Instead they are Bilinski dodecahedra. Bilinski dodecahedrons have obtuse angles of √phi, which indicates their significance. [17]

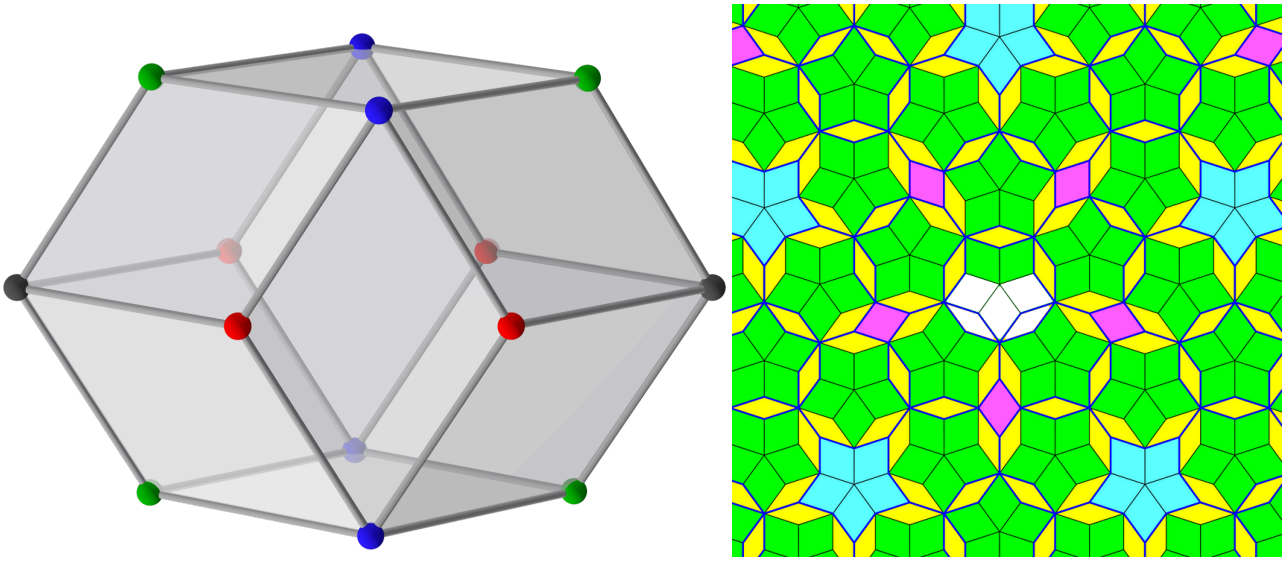

Fig 3: The Bilinski dodecahedron (left) and the a Penrose Tiling (or quasicrystal) with the same shape highlighted in white (right).

Before Billinski discovered this semi-regular solid, he found the Billinski rhombic icosahedron and even the rhombic triacontahedron. The rhombic triacontahedron has 32 vertices, which once again correspond to the 32 known particles of the Standard Model. [19] Technically, the DGO Standard Model includes One W and One Z bosons, but these may as well just be more energetic versions of the ordinary W and Z bosons. [18] The 33rd particle, therefore, is the graviton itself, which sits at the centre of the rhombic triacontahedron (RT).

But, the RT is not the projection of the 5-cube, instead it is the vertex-first projection of the 6-cube. So, it would appear we have shot ourselves in the foot.

We wanted a 5-dimensional theory of gravity that includes the Golden Ratio, as an extra and instead we have arrived at a 6-dimensional model.

To understand this we have to go back to the research we did in [5], where we noted that dimensionality expands proportionately to the Fibonacci sequence. As such, there is no 5D space sitting all by itself. It is always accompanied by the 6th dimension. We see this in the Pentonion matrix, as well, where a sixth dimension is thrown in *gratis* (or *saor in aisce*).

This actually comports well with what we learnt from the Maximal Independent Sets analysis of the Claw Graph version of the Tree of Life. [3] In that research, we noted that the graviton and the Higgs were basically interchangeable in the graph system and may even represent a kind of superposition, where they are in both positions of the graph simultaneously. Indeed, this is not too unexpected, when we recall that the graviton contains aspects of the Higgs and vice versa.

[7] This superposition, however, could be thought of as creating a new type of particle that is at once Higgs Boson and graviton and neither at the same time. Such a particle would need a new strata to occupy in the DGO Standard Model and this strata, naturally enough, would have to be 6-dimensional, which as we have already pointed out is a given within the model.

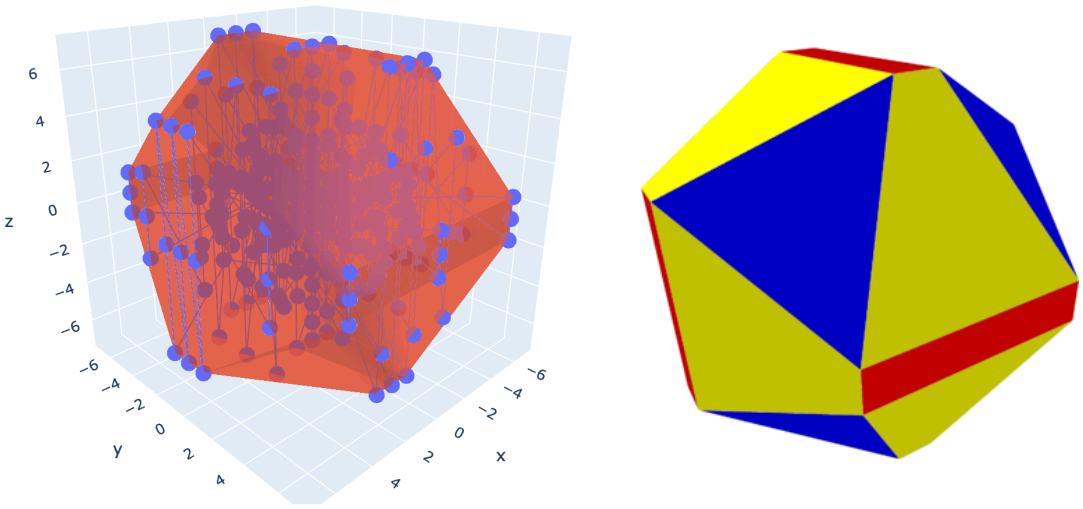

Fig 4: Truncated icosahedron made from the bosonic excitation of an electron in 3D (Left). More accurately, a non-uniform pyritohedral symmetry of the rhombicuboctahedron, which in the limit goes to an icosahedron. (Right) [27]

Then again, we could just stick more RDs together to achieve the same result, or 12 RIs should do it. Then again, then again, we might be able to simply synthesise the RT out of the multiplicative addition of the graviton and the Higgs. It is, after all, possible to create a truncated icosahedron from the Trionion addition of a 1st generation 3-dimensional W/Z boson with an electron, so it might be possible to create an RI or RT by the same token (See Fig 4).

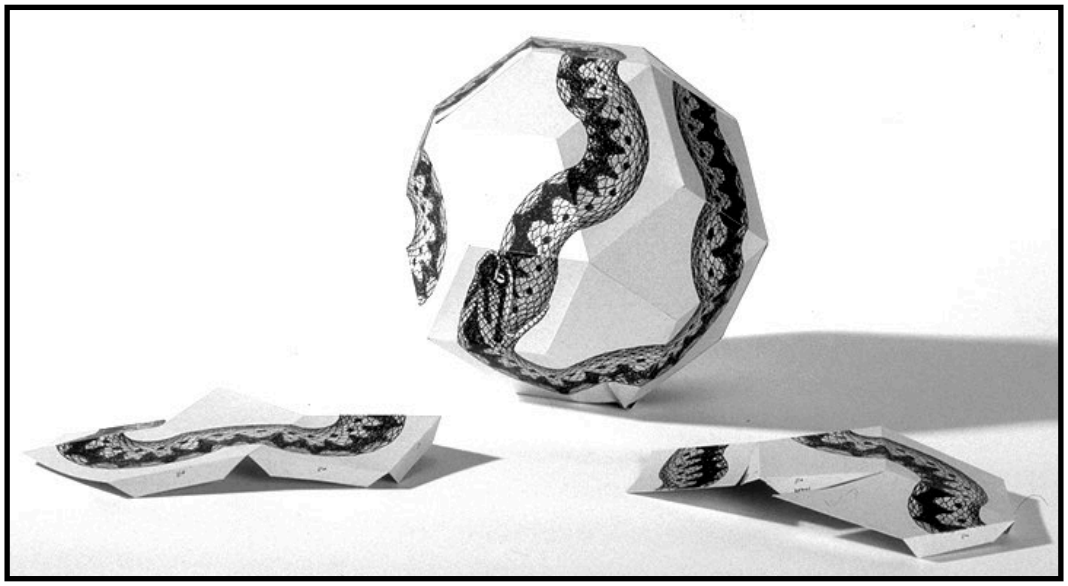

Fig 5: Ouroboros snake path on Triacontahedron [21]

The prospect of a 6-dimensional polytope at the top most position is a satisfying one, as it seems to confirm and reaffirm the importance of the E6 Lie Group in terms of particle physics and Representation Theory. Indeed, we would probably do well to remember that the 600-cell, which nearly all of the QGR group's research is based on, was proven to be a cut and project of the E8 lattice. We haven't quite reached the heights of E8, in our current incarnation, unless you include the expansion into the octonions and sedenions obtained in [18].

The last place where we find the number 5 in relation to gravity, and the Golden Ratio is in the cross section of the apple itself. [25] And, this leads us back (*by a commodious vicus of recirculation*) to our original question. [26] Where is the snake? We have already seen the snake winding its way around the Cabalistic Tree of Life. But where is it in the rest of the DGO Schema?

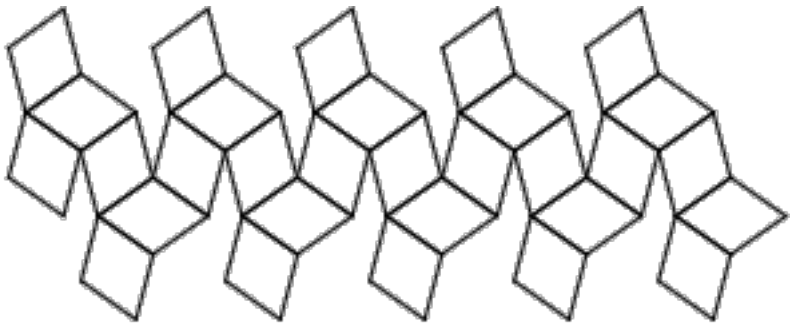

Fig 6: Net of the Triacontahedron [19]

The answer is to be found in the rhombic triacontahedron. In Fig. 5, we see one possible winding pattern around the triacontahedron lattice. [21] The serpent is merely an analogy for some kind of energy waveform, like the phason shifts of Ribbon Dynamics, [20]. There are, of course, many ways in which this energy can wind around the RT, as the net of the object will attest to (See Fig. 6). Perhaps these windings will be useful in some kind of gravity research in the future.

Conclusion

We examined a number of places where the Golden Ratio intersects with our current models of gravity and asked if this relationship is somehow fundamental. While we were unable to establish a relationship via conventional theories like SMT and GET, we were able to extend our understanding of the Golden Ratio into 5-dimensions and thereby have it link with quantum gravity research that includes quasicrystals. This linkage takes place both in the vertex-first projection of the 5-cube and of the 6-cube, suggesting that the Higgs and graviton exist, as one kind of super-particle on a 6-dimensional footing. But perhaps the greatest success of this paper was in being able to place the geometry of the gluon and the Weak bosons into the hypothetical quantum gravity

framework of the Graviton and Higgs boson and thereby offer, at the very least, a weak geometric unification between the Gravity field and that of strong and weak forces.

References & Endnotes

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[8] https://www.lockhaven.edu/~dsimanek/pseudo/fibonacc.htm

[9] https://quantumgravityresearch.org/emergence-theory-overview

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