Quantisation via Photonic Excitation of Leptons Confirms Chirality

Christopher C. O'Neill
14 February 2021
email: chris.ozneill@gmail.com
Cataphysics: http://www.cataphysics.c1.biz/

Abstract

Quantisation via photonic excitation of electrons and neutrinos Dimensional Gate Operator Standard Model leads to chiral geometries.

---

1. Introduction

So far Dimensional Gate Operators (DGO) has been fairly successful at providing confirmation of various aspects of the Standard Model, as well as offering explanations to some of the Standard Model's most intractable problems. These include:

- Why there are 3 Flavours of Matter. [1, 2]
- Why there is more matter than anti-matter. [3]
- How the mass of the Higgs is protected [3]
- The reason for the mass of the Higgs [3]
- The reason for the strength of the Higgs Field [2, 8]
- The reason behind the mass of the W-boson [3, 5]
- The important role the W-boson plays in the 3 generations of matter [2]
- Confirmation of the graviton as an exciton [4]
- The Higgs particle as quasiparticle [5]
- The Higgs and Graviton forming a composite particle [6]
- Confirmation of extra 'Dark Matter' particles needed for Standard Model [3 7]
- Solution to the Hierarchy Problem [8]
- The Graviton as exciton and therefore Gravity being emergent [5]

As we can see, most of these have something to do with mass, in one way or another.

When we consider that the geometry of the DGO particles was, from the outset, linked to mass more than to any other property, this is not unexpected. [9] There was some effort made early on linking angles of the polytopes to electric charges, and this has provided some small measure of success. [9, 10] But several properties, including; spin, chirality and helicity, remain conspicuous by their absence.

Since chirality, helicity and spin are all somewhat related properties, it is expected that if one should be absent, all should be. Spin and its corollaries are products of the imaginary numbers, and since we have done away with imaginary numbers in the DGO, it is inconceivable that any of these properties should make it into the model. But perhaps, as we shall see, they are not entirely absent.

---

2. Electron Excitations

In previous preprints, we were concerned with how to add or subtract one boson with itself in order to generate different flavours of chiral (or asymmetric) particles like leptons and quarks. [9, 10] We also looked at how to add and subtract these chiral particles from one another to generate bosons of different energy levels.

Up until now, this process has been very methodical. This was necessary in order to map out all of the particles needed for the Standard Model, which will be used — in time — to create the DGO quantum particle simulator. [5] But for now, we can ask; what happens if we were to add and subtract particles in other ways? What, for example, is the result of adding a boson (like a photon) to a charged lepton? Or what happens when we minus a higher energy W-boson from an electron? And so forth. These are the sorts of questions, we will ask and answer in this preprint.

If we continuously add photons to an electron, it causes the electron to become more energetic. Particle physicists refer to this increase in energy, as an ‘excitation’. Excitations of this kind are most commonly seen in regards to atomic orbitals, where electrons jump from one shell to another. While these kinds of excitations are common, we will see that in this paper, they will lead to highly unexpected results, which include an unusual connection to quantisation of particles and a weird connection to chirality.

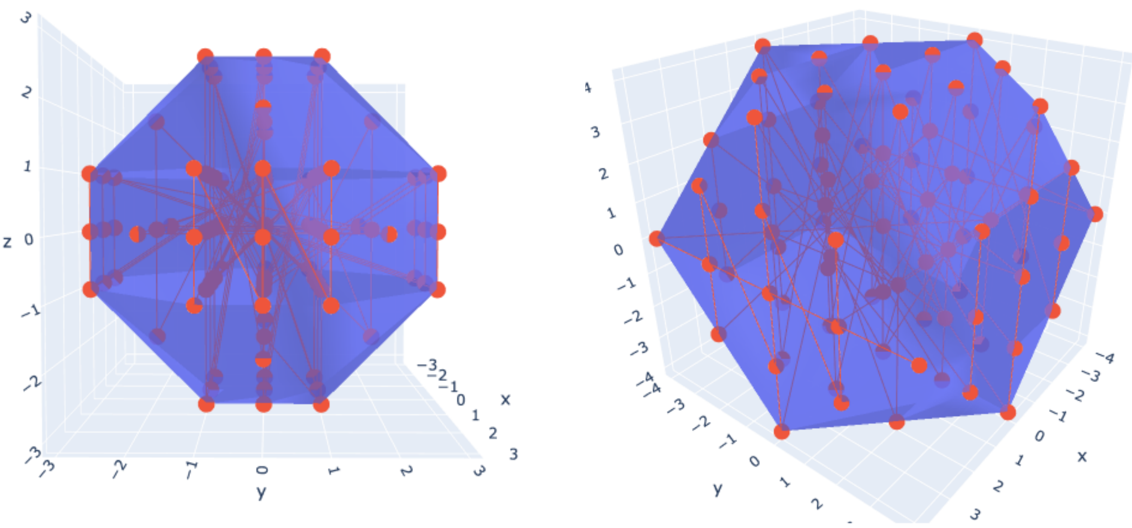

Fig 1: The Photon (LEFT). The Electron (RIGHT)

Without any additional photons, the geometry of the electron is that of a cuboctahedron (CO) [See Fig. 1 RIGHT]. The geometry of the photon is that of a rhombicuboctahedron (RCO), as can plainly be seen in Fig. 1 LEFT. As we add photons, an instant change occurs. With one electron, the geometry shifts into that of a pyritohedral icosahedron with non-uniform geometry. (See Fig. 2; top left). And with each subsequent additional photon, this change becomes more pronounced.

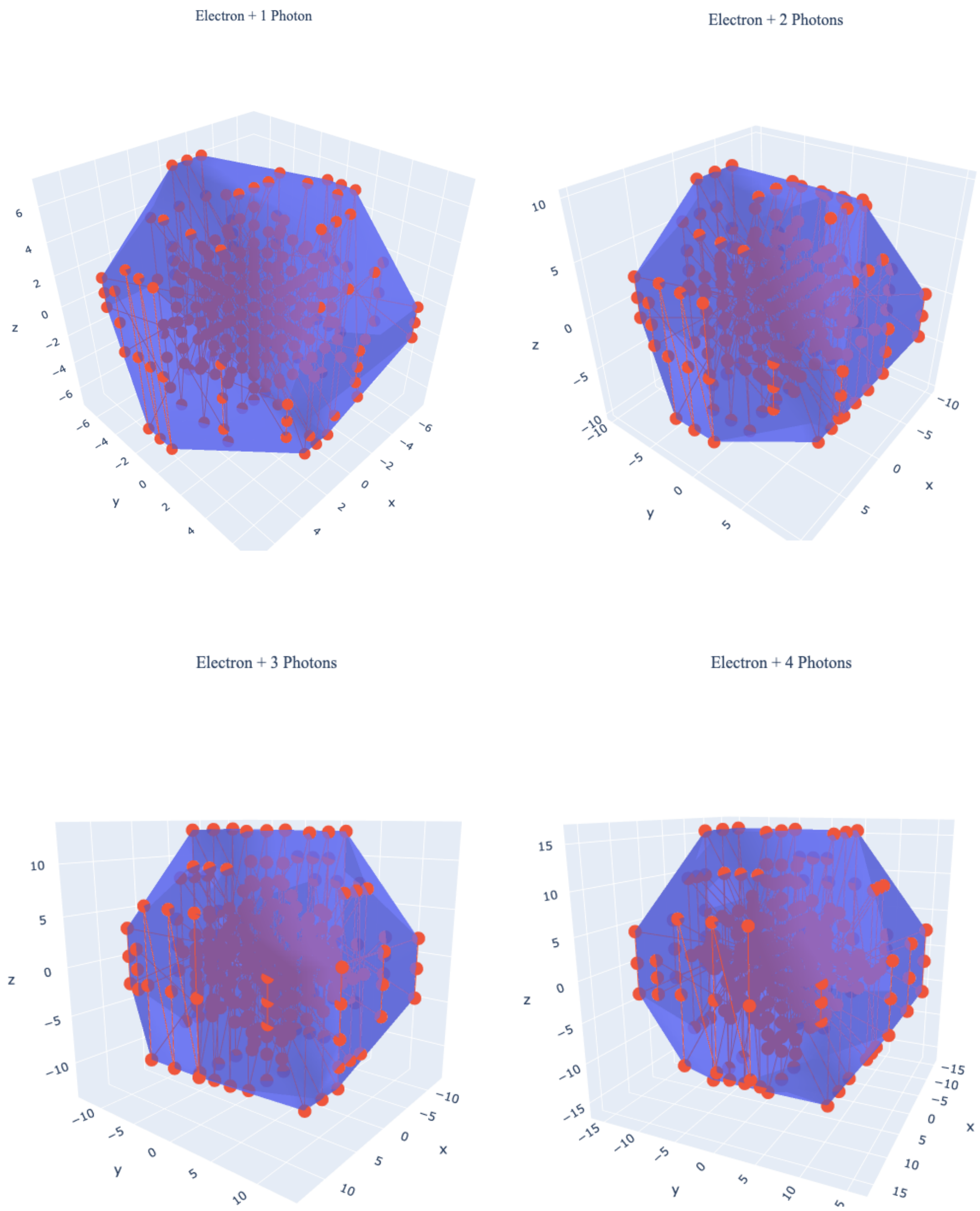

Fig 2: Electron excitations

By the time we reach 4 photons, we see that we are leaving behind the icosahedral form and heading in the direction of some other nonuniform geometry. After 17 photons, it is clear that this geometry is the RCO [See Fig. 3 (top)] and after 200 photons have been added, the transformation is largely complete. [See Fig. 3 (bottom)] As we can see, the geometry of the particle is becoming more and more like a photon, with each subsequent photon addition. This is to be expected, but we should not conclude that even after all this that the resulting particle is a photon. After all, its internal structure is still markedly different and its scale is monstrous.

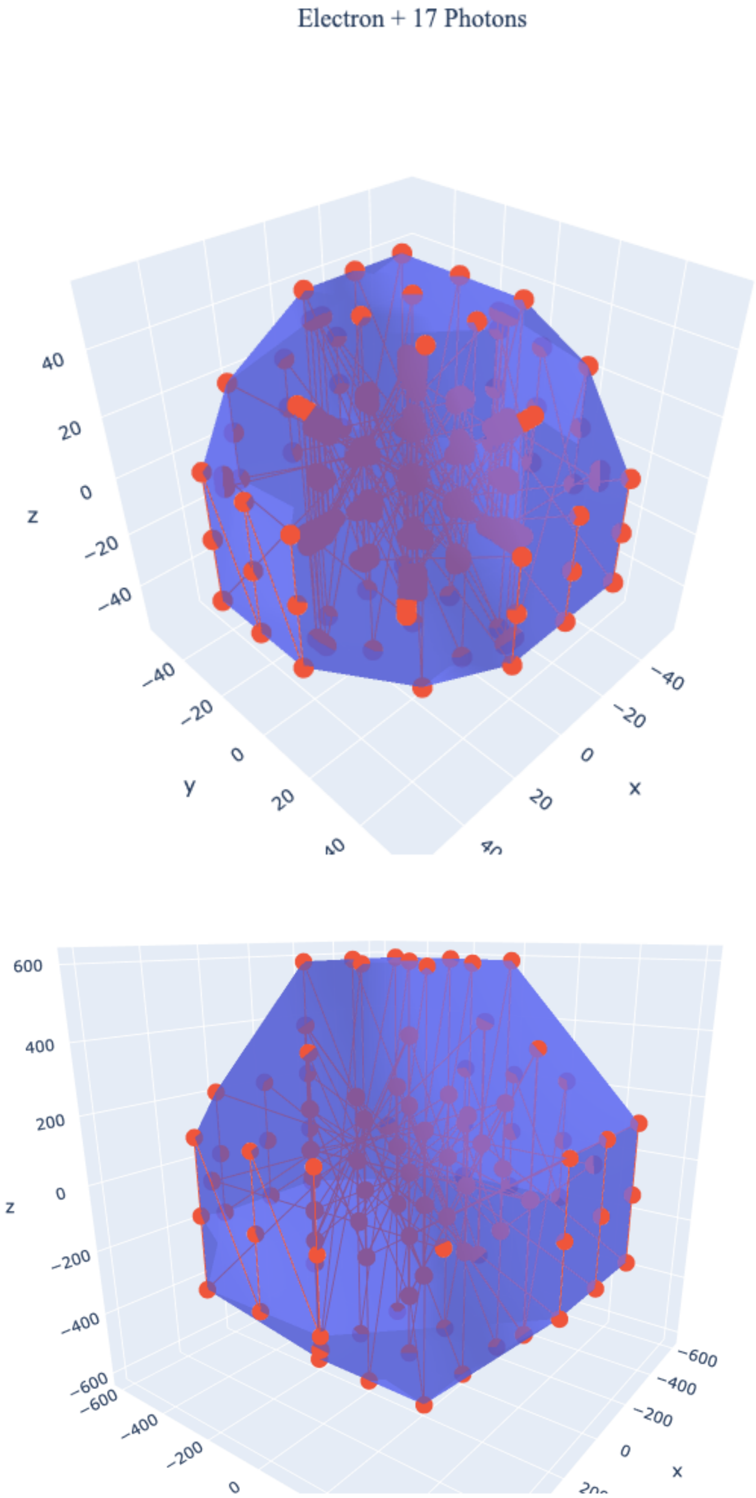

Fig 3: Top: Electron plus 17 photons. Bottom: Electron with 200 photons

3. Quantisation

When we add an infinite number of photons to an electron, we can say that we will arrive at an RCO. But what happens when we move the other way? Logic would dictate that as we approach the limit (i.e. zero photons), the form that the electron should take is that of a pyritohedral icosahedron.[11] The limit can be thought of as the ground state of the electron.

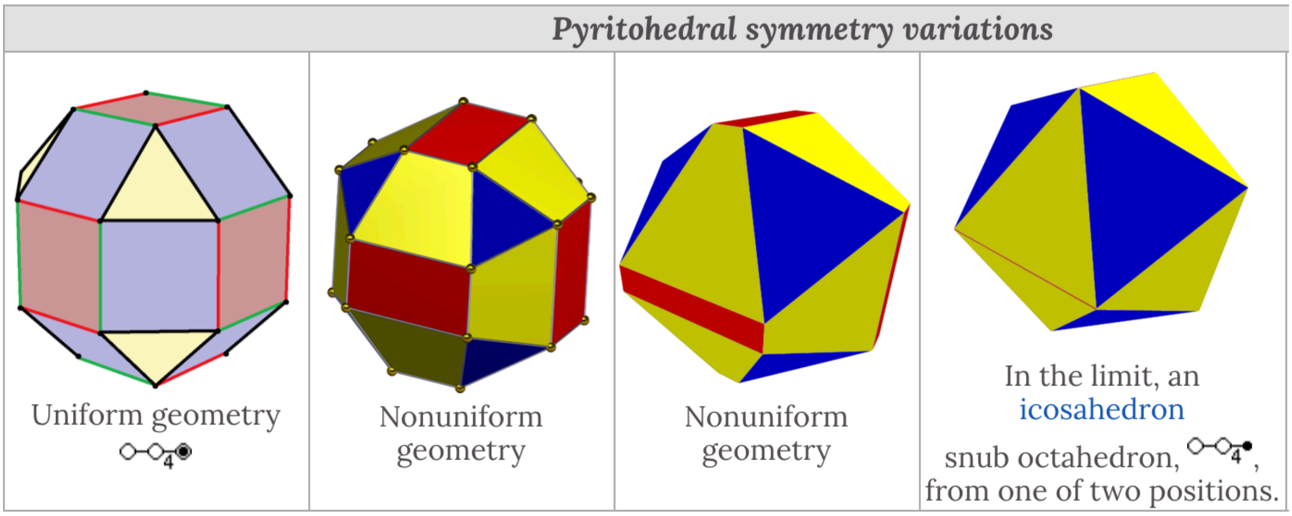

Fig 4: In the limit we reach an icosahedron [11]

This limit can be likened to those used in differential calculus and these have their use in the quantisation of matter particles in Quantum Physics. Following that logic, we can say that the limit, or ideal ground state electron has the form of an pyritohedral icosahedron (PI).

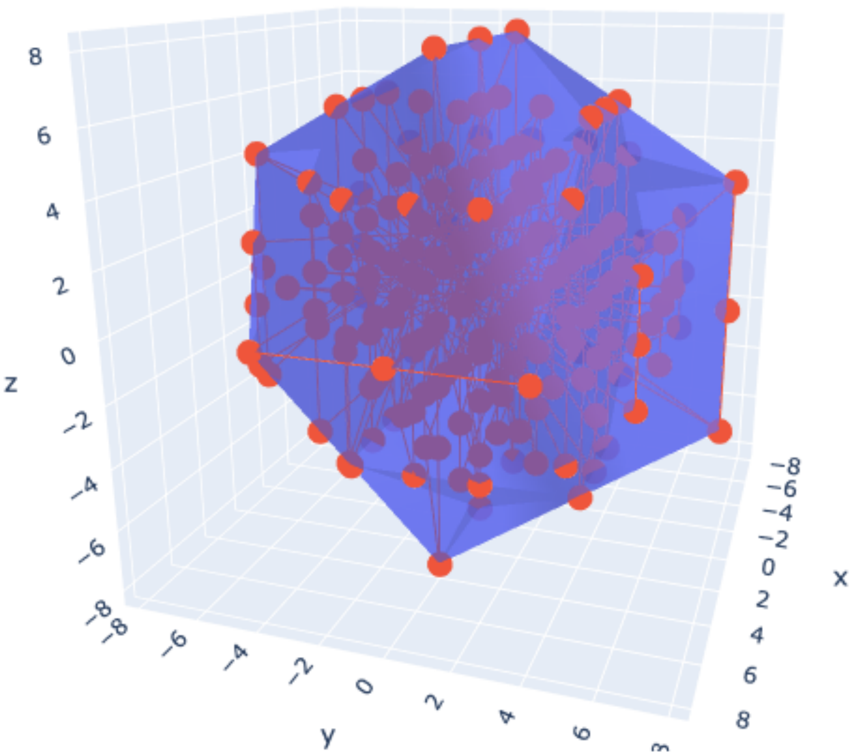

Fig 5: Pyritohedral icosahedron formed from the addition of a 1st generation charged lepton and a 2nd gen photon.

Does this mean that we can never achieve a perfect example of a PI using this method? No, it doesn't. On the contrary, we can create one by simply adding a higher energy photon to the electron. (See Fig 5) Or said another way:

$$e^1 + y^2 = PI$$

where e^1 is a 1st generation electron and y^2 is a 2nd generation photon.

---

4. Chirality

What is the significance of the pyritohedral icosahedron, you might ask?

The answer lies in the area of 'chirality'. The PI (otherwise known as the snub-octahedron) has chiral tetrahedral symmetry. [12] This is important when determining the spin-1/2 of our electrons, as well as in (potentially) describing chirality within the model. Re-examine Fig. 4. Notice how the coloured faces of the RCO on the far left are completely symmetric. This is known as achiral symmetry, or 'mirror symmetry'. However, once we collapse the polytope, which is equivalent to the excitation of the electron, the end result is not a symmetric colouring.

It has now lost the property of chirality. It now has handedness, and we can tell this particle from its mirror-image easily. But does this property really migrate over to the quantum world? Do quantum particles have an alternating pattern of colours?

No, of course, not.

However, depending on how the sides of the polytope collapse (whether to the right or left), it will make a difference to the overall structure. But the difference has a strange property; It can only be observed in reference to the coordinate system it exists in.

There is perhaps an even bigger problem. One which extends to the root of the definitions we are using. For there exists, in the present moment, a disconsolate split between those who view chiral polytopes in one way and those who view them entirely differently.[13] There are those who believe that chiral symmetry is impossible for convex polytopes in E_3 (3-dimensions).[14] And others who count the snub cube and the snub octahedron among their number.

Even if we were to grant chiral polytopes would it help us in anyway? Would it help to build a case that the quantisation of an electron via excitations results in a particle that can be thought of as chiral in an actual quantum sense? I highly doubt it, but only because the current concept of chirality is so complex to begin with it could hardly be encapsulated by a single 3-dimensional polytope. Nevertheless, discovering chirality in a formally symmetric world is certainly very promising and a step in the right direction.

What about spin, then? Will we fair any better there?

5. Spin States

Fermions and bosons are considered to be asymmetric and symmetric particles, respectively. Unlike bosons, two fermions cannot share the same position and energy state simultaneously. Fermions therefore requires more properties than bosons to distinguish their energy states. This is where the chirality of the icosahedron comes in.

Up until now, all of our particles exhibited octahedral symmetry (or O_h). Compared with the pyritohedral symmetry, O_h is positively achiral. Particles with achiral symmetry are those like spin-0. No matter which way you rotate them, they are always rotating back into themselves i.e. they have perfect symmetry. Therefore, this O_h symmetry is great for relating one particle to another, and even (potentially) in explaining their complementary structures, but it is not so useful in delineating the various spins of the particles.

Using the same methods employed in the section 2, we can get this same pyritohedral symmetry from the neutrinos. (See Fig. 6) As for quarks, the situation gets a bit more complex. Recall the split in opinion between those who think 3D chiral polytopes don't exist and those that do. Well, it turns out that both agree that there are many types of chiral geometry in the higher dimensions, like the 4-th dimension, for example.

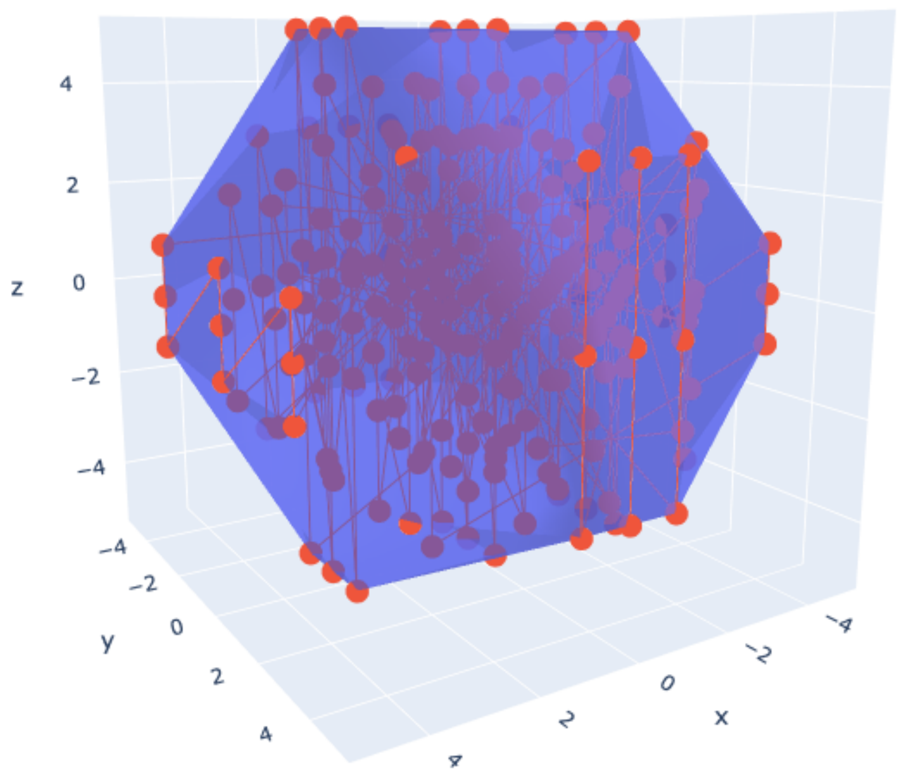

Fig 6: Photon + Electron Neutrino

According to Wikipedia, the rhombic dodecahedron (RD) and cuboctahedron (CO) both just barely miss out on being chiral.[13] This suggests that in the 4th dimension the RD is very likely to be chiral. If we attempt the same process of adding W-bosons to quarks, we see that they eventually obtain the RD geometry. Applying the same differential limit to the quarks, therefore, we see that the quarks have a chiral limit. But this also suggests that W-bosons and even gluons are chiral in some sense. They aren't chiral on the 3-dimensional level, but they appear to be chiral in higher dimensions.

All fermions have a kind of symmetry, known as spin-1/2.

Particles with spin-1/2 need to rotate twice in order to get back to the same orientation they started from i.e. one full rotation of a fermion equals 720 degrees. This is a remarkably strange property. But is it really accurate?

Take an electron aligned in the z-axis. Its state is defined as:

$$\Psi = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

Whatever the degree of uncertainty our equation gives us, the same degree of uncertainty (with opposite sign) will always be repeated at a rotation of 180 degrees. [15] This is hardly unexpected. We need to square our result anyway to get the probabilities, so this gets rid of our negative results. Does this mean that the 180 degree result is the same as the 360º result? It certainly does if you are dealing with the magical vagaries of imaginary numbers, but it doesn't appear to be the sensible way to approach the matter. [16]

If spin-1/2 completes a full turn after 720 degrees. And spin-2 after 180 degrees. That means spin-1 completes a turn in 360 degrees. But, if we are correct in our assertion that spin-1/2 actually completes a circuit in 180 degrees, then the graviton requires 2 full turns. And therefore the DGO results are an inversion of the main quantum mechanics results.

In some ways, this kind of result is to be expected, because, as we have pointed out in Section 1, the imaginary numbers have been reduced to real numbers in DGO and this results in unintended consequences.

As we can see, it wasn't difficult to invert the spin-1/2 model. The spin-1 doesn't require inversion, since it is 360 degrees in both models. But what about the spin-2 graviton? How do we solve that issue?

One way is to use the extra spatial dimensions of Lobachevskian space. In ordinary 3D space, we have 4 right angles in a circle of 360 degrees. In a 4-dimensional space, this circle gains an extra 90 degrees of freedom. In 5D, where the graviton and Higgs live, the circle now contains 540 degrees. In order for the graviton to rotate twice in a single 360 degree rotation it needs to have an intrinsic property — equivalent to surface area — which is twice the size of a normal particle or 720º. This means that we need an extra 180 degrees from somewhere.

Where are we going to get it from?

The answer comes in the form of the Higgs particle. Recall that in a previous Cataphysics preprint, we discussed how the mass of the Higgs is protected, because it has chiral fermionic symmetry.[8] We have already shown that chiral fermionic symmetry is equal to 180 degrees, in this paper. Therefore: 540º + 180º = 720º.

The fact that we have to add the graviton to the Higgs in order to get the correct results, confirms what we discovered in another preprint, entitled 'The Golden Ratio, the Graviton & the Tree Of Life', in which the Higgs and graviton were revealed to be in a 'superposition' of sorts.[6] It is almost as if the two particles are a composite of some kind. Interestingly, the Higgs being a composite particles was yet another potential way of explaining its protected mass.[8] Now, we have further confirmation that both of these particles can be considered composite with one another.

But, if there is any truth to the above statement, it could only be from some weird perspective within the DGO model. We know this because experimental evidence appears to confirm the almost ludicrous result of spin-1/2 particles requiring 720º of rotation for a single turn.[17] Then again, perhaps when we put spinors into the mix, it is not so ludicrous after all. Personally, I prefer the hyper-dimensional solution proposed above, but my personal preference doesn't matter in the face of the bare facts of reality.

In light of this, I would surmise that the property of spin is not an intrinsic property of the DGO Standard Model. In some ways, this kind of result is to be expected, because, as we have pointed out in Section 1, the imaginary numbers have been reduced to real numbers in DGO and therefore operations like rotations and using squares to find probabilities, can't be done using DGO math alone. Therefore, they are best deal separately, for example, within the confines of Quantum Mechanics, or wherever else they find their utility.

Conclusion

In this investigation, we attempted to model the excitations of electrons. From there we were able to take the limit of these excitations to produce a kind of differential, which we then used as the basis of a kind of 'quantisation' of the excitation. And from out of this we were able to discover a chirality that had been previously lacking in the geometry of the DGO Standard Model. However, when the results of this chirality was applied to quantum properties of spin, it ran afoul of both theoretical and experimental results. Therefore, I have had to reluctantly reiterate what I have said in previous preprints that the property of spin (being a function of a kind of closed ring group) has no place within the immediate and technical bounds of the DGO, which — as I understand it — remains open, ordered, and versatile, by dint of remaining associative and commutative.

References

[1] 'OCTONIONS, THE THREE FLAVOURS OF MATTER & A NEW KIND OF SUPER-SYMMETRY V. 2', DOI: 10.13140/RG.2.2.26663.98727, Christopher C. O'Neill, https://www.researchgate.net/publication/348305661_OCTONIONS_THE_THREE_FLAVOURS_OF_MATTER_A_NEW_KIND_OF_SUPER-SYMMETRY

[2] ‘A Complementary Geometric Explanation of the 3 Flavours’, Preprint, Christopher C. O’Neill, DOI: 10.13140/RG.2.2.12033.38240 https://www.researchgate.net/publication/349376074_A_Complementary_Geometric_Explanation_of_the_3_Flavours
[3] ‘MATTER ANTI-MATTER ASYMMETRY’, DOI: 10.13140/RG.2.2.25477.78565, Christopher C. O’Neill, https://www.researchgate.net/publication/348336008_MATTER_ANTI-MATTER_ASYMMETRY
[4] ‘THE GRAVITON AS 5D CHAMFERED CUBE’, Christopher C. O’Neill, https://www.researchgate.net/publication/348355596_THE_GRAVITON_AS_5D_CHAMFERED_CUBE
[5] MAKING SENSE OF THE STANDARD MODEL, Christopher C. O’Neill, DOI: 10.13140/RG.2.2.34132.12163, https://www.researchgate.net/publication/349110442_MAKING_SENSE_OF_THE_STANDARD_MODEL
[6] ‘THE GOLDEN RATIO, THE GRAVITON & THE TREE OF LIFE’, DOI: 10.13140/RG.2.2.14417.25444
, Christopher C. O’Neill, https://www.researchgate.net/publication/348884826_THE_GOLDEN_RATIO_THE_GRAVITON_THE_TREE_OF_LIFE
[7] ‘POLYHEDRAL PARTICLE INTERACTION PATHS & DARK MATTER’, DOI: 10.13140/RG.2.2.19605.76002, Christopher C. O’Neill, https://www.researchgate.net/publication/348336433_POLYHEDRAL_PARTICLE_INTERACTION_PATHS_DARK_MATTER
[8] ‘The Hierarchy Problem: Appear Weak When You Are Strong?’, DOI: 10.13140/RG.2.2.20269.31201, Christopher C. O’Neill, https://www.researchgate.net/publication/348733295_The_Hierarchy_Problem_Appear_Weak_When_You_Are_Strong
[9] ‘DGO Quaternion Multiplication, Quarks & Polyhedra’, DOI: 10.13140/RG.2.2.22968.57601, Christopher C. O’Neill, https://www.researchgate.net/publication/347495967_DGO_Quaternion_Multiplication_Quarks_Polyhedra
[10] ‘DGO Quaternion Multiplication & Gluon Structure’, DOI: 10.13140/RG.2.2.35073.07524, Christopher C. O’Neill, https://www.researchgate.net/publication/347522261_DGO_Quaternion_Multiplication_Gluon_Structure
[11] https://www.wikiwand.com/en/Icosahedron
[12] https://www.wikiwand.com/en/Tetrahedral_symmetry
[13] https://en.wikipedia.org/wiki/Chiral_polytope
[14] https://web.archive.org/web/20101117093511/http://www.math.neu.edu/~schulte/chiralone.pdf
[15] Quantum Spin - Visualizing the physics and mathematics - YouTube https://www.youtube.com/watch?v=3k5IWlVdMbo
[16] https://en.wikipedia.org/wiki/Spin-%C2%BD
[17] Rauch, Helmut; Werner, Samuel A. (2015). Neutron Interferometry: Lessons in Experimental Quantum Mechanics, Wave-Particle Duality, and Entanglement. USA: Oxford University Press.