THE HIGGS BOSON & THE GRAVITON

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26 December 2020

Abstract

A 5-dimensional model for the Graviton and the Higgs Boson is constructed. We also reveal the 5D chamfered cube structure of the graviton and clear up the geometry of the gluon. After this, we embark on a brief overview of the DGO Stand Model.

5-dim & Corrections

In previous preprint papers, I hinted that the previously thought 4-dimensional model of the quarks, gluons and W and Z bosons was actually embedded in a 5-dimensional Higgs field.[1][2] I will now expand on what I mean by that.

In [1], we showed how the photons and charged leptons could be thought as 2-dimensional matrices embedded in the 3-dimensional matrices of the leptons and W/Z bosons. Creating the Higgs is really the same process, but this time moving from 4 to 5 dimensions.

Since, it is easier to loose dimensional information than gain it (i.e. we can't make a new dimension out of nothing), it makes sense that all the particles in the DGO Standard Model are at least 5-dimensional to begin with and get 'paired down' during the perturbation process. Following the same quaternionic process that we used to generate the gluons and photons — only this time using 5-dimensional 'Pentonion' vectors — gives us our model for the Higgs Boson.

Previously, I had said that the first generation of the 5-dimensional (or Pentonion) vector multiplication in Δ and !Δ leads to a rhombicuboctahedron — albeit a 5D version. I realise now that on closer inspection, I was wrong about this. It turns out that the 1st generation Graviton is a mixture between the rhombic-dodecahedron and the rhombicuboctahedron, which means that it shares the geometries of the photon, the W and Z bosons, the gluons and numerous quarks.

Another correction that I feel it is necessary for me to make is in regards to the masses of the gluons in ‘DGO Quaternion Multiplication, Quarks & Polyhedra’ [4]. In [4], it was believed the gluon had a mass somewhere between the up and the down quark. However, this is not the generally accepted view of the gluon, which is considered massless.

While it is very difficult to measure the mass of a gluon due to colour confinement, the view of the scientific community at large is in favour of a massless gluon and any version of the Standard Model reflects this.

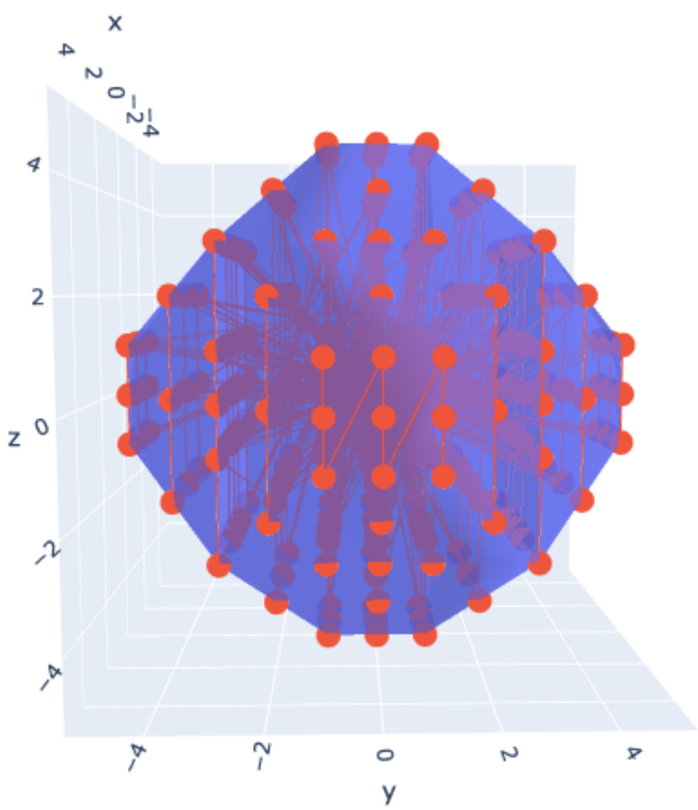

Fig 1: The Graviton

Another related point that needs addressing is the mass — or lack thereof — of the photon. In the DGO view of the Standard Model, as we can see, photons have a type of ‘volume’, which we were previously equating with mass. They also have a similar shape, or geometry, to the more massive quarks. Assuming that the geometry of the particles contributes to its mass (something we have yet to address properly), you would think that the photon too would have mass. But we know that photons, like the gluons, are massless.

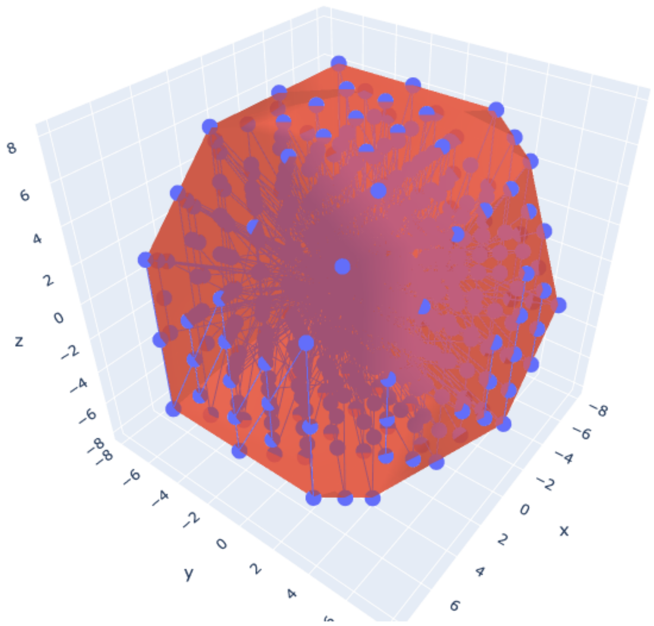

Fig 2: XORed Higgs

Since both of the first generation gauge bosons in 2 and ^U-4 dimensions are massless, this suggest that their mass is contained in the 5-dimensional part of the Graviton and that this is ‘cut off’, when the lower dimensions are selected.

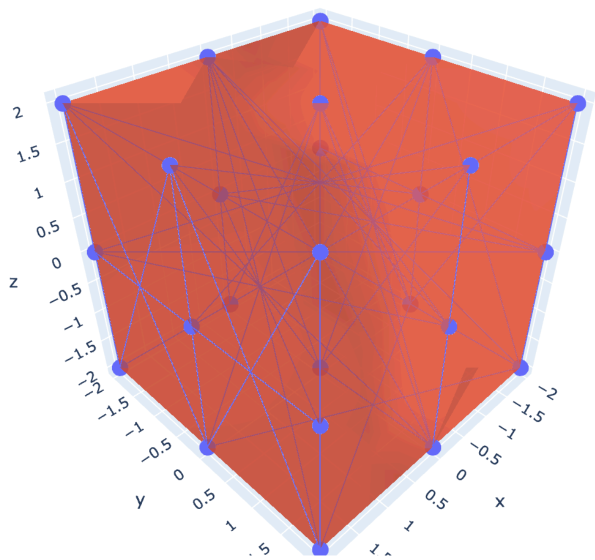

Fig 3: XNORed Higgs

The reason why this might effect the photon and the gluon — but not the leptons and quarks (who also lack these extra dimensions) — is that they are the first to experience it and have no additional DGO operations, multiplications or reactions to inform their mass, like the subsequent generations of might. Otherwise, we can say that the photon has some — very negligible —amount of mass. Experiments at Fermilab have shown that mass does not increase with acceleration and therefore, the concept of a massive photon should not interfere with any aspect of relativity. [5]

Boson Geometry

The geometry of the Graviton looks could be described as a 'truncated rhombic-dodecahedron'. In actuality, it is a tetra-truncated rhombic dodecahedron. The ideal version of this is the chamfered cube. [3] As we can see, we are not dealing with the ideal version, but it is close enough for most purposes. The chamfered cube contains 12 hexagons and 6 squares.

The hexagons have 2 internal angles of about 109.47° arccos(-1/3). Previously, we noted that the gluon had an acute angle of arctan(1/3), which we equated with the interaction of charged particles, whose charges are themselves multiples of 1/3. Now we see the negative charges of these particles in the chamfered cube. Not that we need this, since at this level, we can make up all of the charges symmetrically via Δ and $!\Delta$:

$$u, c, t = \Delta(2/3) = 2/3$$
$$d, s, b = !\Delta(1/3) = -1/3$$
$$u^*, c^*, t^* = \Delta(-2/3) = -2/3$$
$$d^*, s^*, b^* = !\Delta(-1/3) = 1/3$$

According to the Wikipedia article; "the chamfered cube is the Minkowski sum of a rhombic dodecahedron and a cube of side length 1 when eight vertices of the rhombic dodecahedron are at (±1, ±1, ±1) and its six vertices are at the permutations of (±√3, 0, 0)." Once again we see the value √3, which we said provides a tenuous link back to the Gell-Mann matrices of the Strong Force. There is a far more concrete relationship between the Graviton and the Strong Force, but that will be left to a separate paper.

The final representation of the Graviton therefore is a 5-dimensional chamfered cube. The geometry of this figure needs to be explored more thoroughly, before any definitive comments can be made. But, a cursory glance, suggests that it forms a 5-dimensional network of 3-dimensional honey-combed tunnels or tubes. These tubes are like empty space, or negative space. You can see them in the figure below (Fig. 4). This is one face of the 5-dimensional chamfered cube graviton. The front chamfered cube has been removed to show the tube pathways.

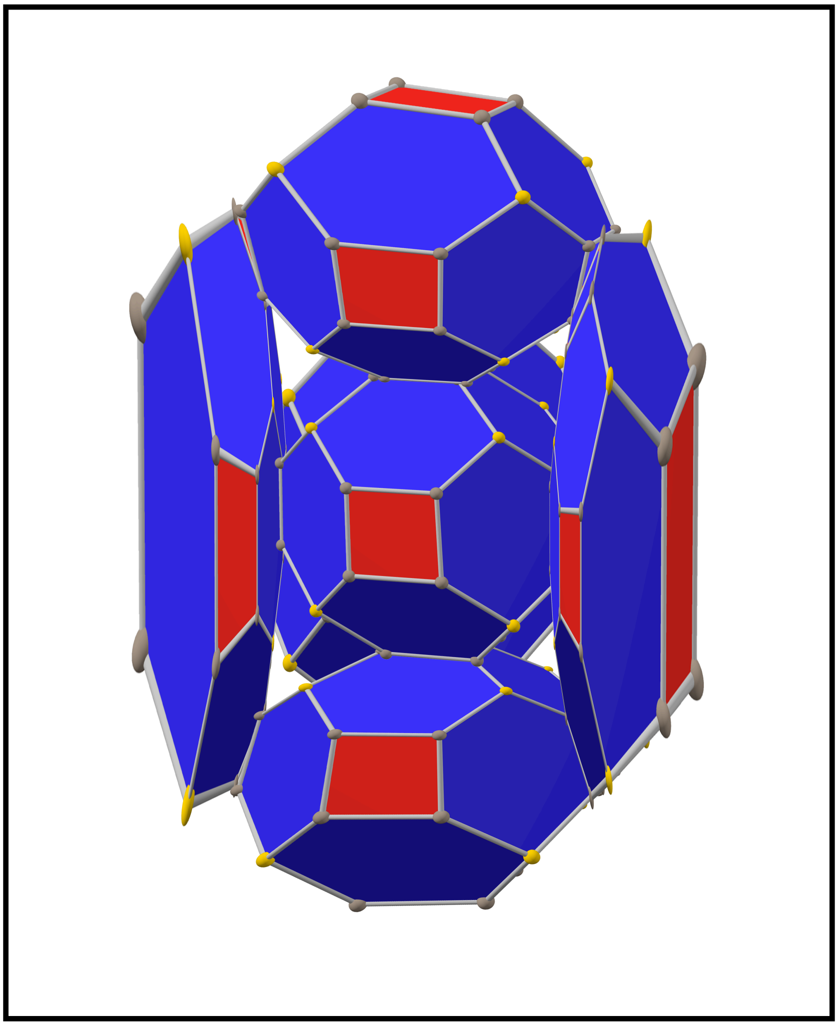

Fig 4: Partial representation of one face of a 5D chamfered cube.

This geometry also gives us an alternative way of looking at the 4D geometry of the rhombic dodecahedron (RD) from the vertex-first project that we examined in [6]. In some ways, this solves the problem of whether each individual gluon is a complete RD or simply a hexahedron component of the RD. It turns out that it is is a complete RD, which means that stretching the gluon leads to rotation. Therefore, the movement of the quarks inside the colour confinement leads to colour changes of the gluons and quarks. This is a much more complex view of the nucleon than we had counted on, but it appears to be the correct one.

There is much more to say about the geometry of the 5D chamfered cube and how it relates to the graviton. But that will be reserved for another preprint or research paper.

5D			
G	H	G	H
G	H	G	H

(^U) 4D					
g	u	g	s	g	b
g	d	g	c	g	t

(Δ, !Δ) 4D					
g	u	W/Z	s	W/Z	b
g	d	W/Z	c	W/Z	t

3D					
W/Z	*e*	W/Z	*μ*	W/Z	*τ*
W/Z	*ve*	W/Z	*vμ*	W/Z	*vτ*

2D					
y	*e*	y	*μ*	y	*τ*
y	*a†*	y	*a†*	y	*a†*

(!VD) 4D					
W/Z	u	W/Z	s	W/Z	b
W/Z	d	W/Z	c	W/Z	t

Fig. 5: Six tables showing the hierarchy of bosons and flavours

The XORed summation of the Graviton gives us the XORed Higgs (Fig. 3), which is revealed to be another interesting amalgamation of the rhombic-dodecahedron and the rhombicuboctahedron. The Higgs will have a similar (although much less regular) network of particle interaction hyper-tubes, which will include Weak Force interactions. The XNORed version is predictably just another cube; albeit a 5-dimensional hypercube this time round. The Higgs field being 5-dimensional naturally explains its ubiquity in space and ability to effect all of the particles with their associated weak forces, including the 4D ones.

Is it accurate to say that there are 3 generations of Higgs particles, just as there are 3 flavours of quark and lepton? Not likely. The Higgs particle breaks the pattern, since it is a boson. Therefore, we have no reason to suggest that there are 3 generations of it. But that does not mean there are no generations of it. After careful considerations of the numbers, I believe that there may be two flavours of these particles, at most.

The reason for that will be examined in a subsequent paper.

Overview

For full effect, I've laid out all 6 tables relating to the ultimately 6-dimensional structure needed for the DGO Standard Model (Fig. 5). The table entitled '2D' could just as easily be titled '^U-3D'. It represents the electromagnetic force interacting with the charged leptons. The table marked '3D' represents the Weak force acting on the leptons, as a whole. '(!VD) 4D' represents the Weak Force acting on the quarks.

'(Δ, !Δ) 4D' is the unification of these forces and the table that we generally use to represent this set of particles, but all of them have their uses. For instance, '(^U) 4D' represents the Strong Force acting solely on the quarks. Finally, we have the 5D (pentonionic) representation of the Graviton and Higgs boson.

Citations

[1] 'Electro-Magnetic Interactions of Leptons', Christopher C. O'Neill, https://www.researchgate.net/publication/348305211_ELECTRO-MAGNETIC_INTERACTIONS_OF_LEPTONS

[2] 'Leptons and Weak Interactions', Christopher C. O'Neill, https://www.researchgate.net/publication/348192066_LEPTONS_AND_WEAK_INTERACTIONS_The_Groundwork

[3] https://en.wikipedia.org/wiki/Chamfer_(geometry)#Chamfered_cube

[4] 'DGO Quaternion Multiplication, Quarks & Polyhedra', Christopher C. O'Neill; https://www.researchgate.net/publication/347495967_DGO_Quaternion_Multiplication_Quarks_Polyhedra

[5] ‘On Fermilab's discovery that mass doesn't change with velocity’, Thierry De Mees, https://www.researchgate.net/publication/331907513_On_Fermilab's_discovery_that_mass_doesn't_change_with_velocity
[6] ‘DGO Quaternion Multiplication Gluon Structure’, Christopher C. O’Neill, https://www.researchgate.net/publication/347522261_DGO_Quaternion_Multiplication_Gluon_Structure