LEPTONS AND WEAK INTERACTIONS

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Abstract

The method used for creating 2nd and 3rd generations quarks and gluons is further adapted to include W/Z boson and leptons.

Keywords

Lepton, electron, muon, neutrino, quaternions, trionions

The Groundwork

The DGO Quaternion method for particle creation has so far allowed for the creation of all 12 quarks and anti-quarks, their constituent colour charges, the gluons, as well as the W and Z bosons. In this paper, we will examine how to create the weak interactions acting on the leptons.

An important feature of the leptons is their apparent separation from the quarks. Quarks can decay into leptons, but it is always by means of an intermediate boson, a virtual particle; like a photon, or a W boson. Taking this into consideration, it is obvious, we need a way to keep the quarks separate from the leptons, so their arithmetic does not get confused and lead to unexpected or undesired consequences.

In previous work, similar partitions between categories of particles were achieved by varying DGO logic, through spatial rotations and charge inversions. This time we will focus on a slightly different sort of methodology, which was seen in 'Quaternions Quarks and Polyhedra'.[1]

Remember that the gluons, W and Z bosons and quarks are all based on the Quaternions and are therefore 4-dimensional. In reality, the situation is a bit more complicated than that (they are actually 5-dimensional), but a more fuller explanation is best left for a later paper, featuring the Higgs Boson and the Graviton. In [1], we showed how we can take three quaternions, at a time, to create the Trionions.

There are two ways in which this can be achieved; we can either multiply three quaternion vectors together to gain the product, or we can multiply four vectors and select for three. Either way, both produce the same result and this, in turn, tells us something about the nature of the leptons. They

are not 3-dimensional. They are, in fact, 4-dimensional, but their own 4th dimension is — usually — inaccessible even to themselves.

This fact is also true of the quarks, which are actually 5-dimensional, but are unable to access the higher order information or energy and is therefore 'stuck' as *mere matter*.

Therefore, there are two groups of matrices; one of Order 3 (the Trionions) and one of Order 4 (the quaternions). Matrices of different sizes are unsuitable for basic multiplication, or any other kind of arithmetic, for that matter. While this fact may be somewhat restrictive in the ordinary sense, it becomes indispensable in our case, as we seek to keep both systems separate and from interacting, in the main.

The 1st Generation

We start with the 3-dimensional version of W and Z boson in Fig 1. Where have we seen this geometry before?

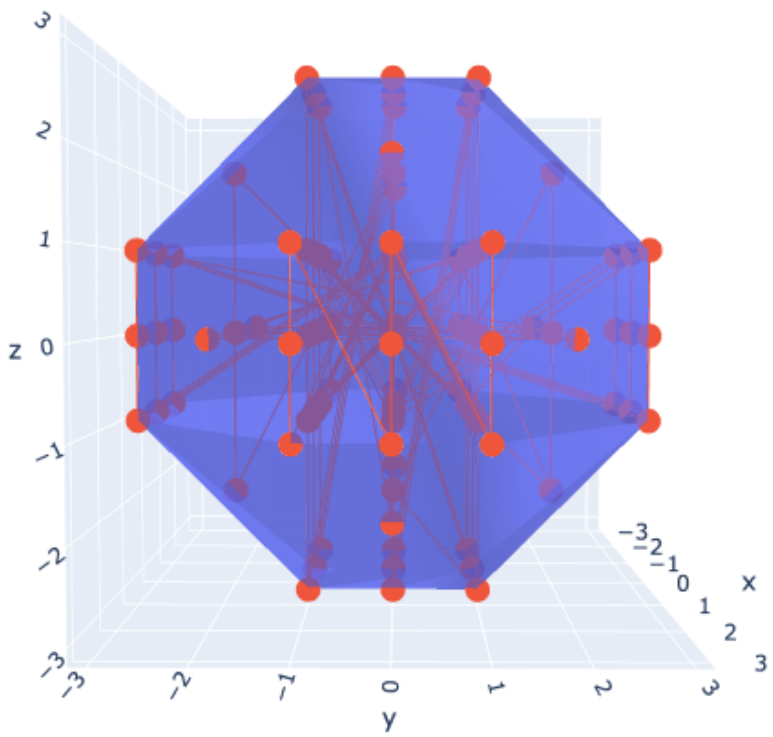

Fig 1: 3-dimensional version of a W/Z boson: A Trionionic rhombicuboctahedron.

It is identical to the *d* quark. Well, not quite identical, you say, because the *d* quarks is 4-dimensional and this is only 3-dimensional. Quite right.

There are also other subtle differences. For example, this figure has 99 unique points and 729 data points, as opposed to the 171 and 256 respectively

seen in the *d* quark (depending on the range, of course). The volume of the figure is also different.

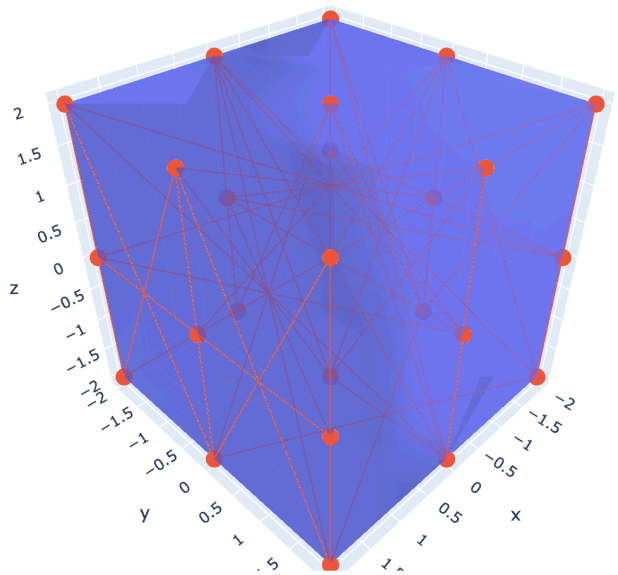

Fig 2: XNORed cube relates to the neutron.

Summing the W/Z boson with itself in XNOR produces (Fig. 2). This is a neutron (according to the model). The same action in XOR produces the electron (Fig 3). This shape is a cuboctahedron, which is interesting because it is the dual of the rhombic-dodecahedron. The rhombic-dodecahedron represents the W and Z bosons (as well as the gluons) in the 4-dimensional model, which makes sense because these particles mediate the creation of electrons, in some instances.

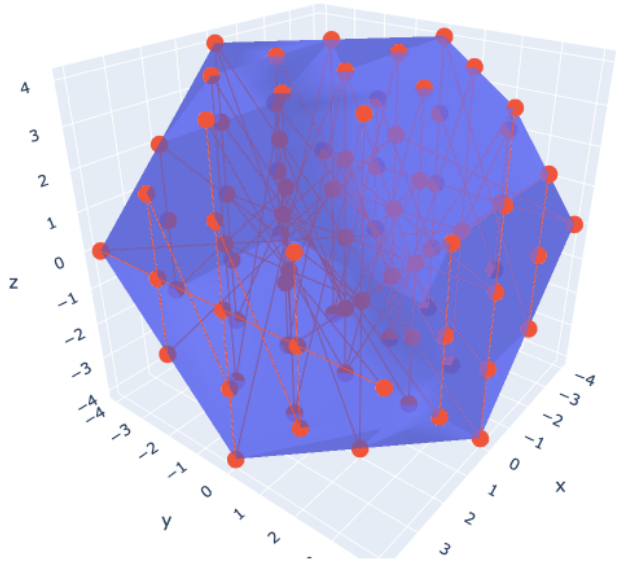

Fig 3: The electron

The Second Generation

Summing the neutron and the electron give us a W or Z boson of a different energy level. This is equivalent to the One W or One Z boson spoken of in [2] and [3]. And repeating the process above gives us the muon, the muon neutrino and their anti-particles.

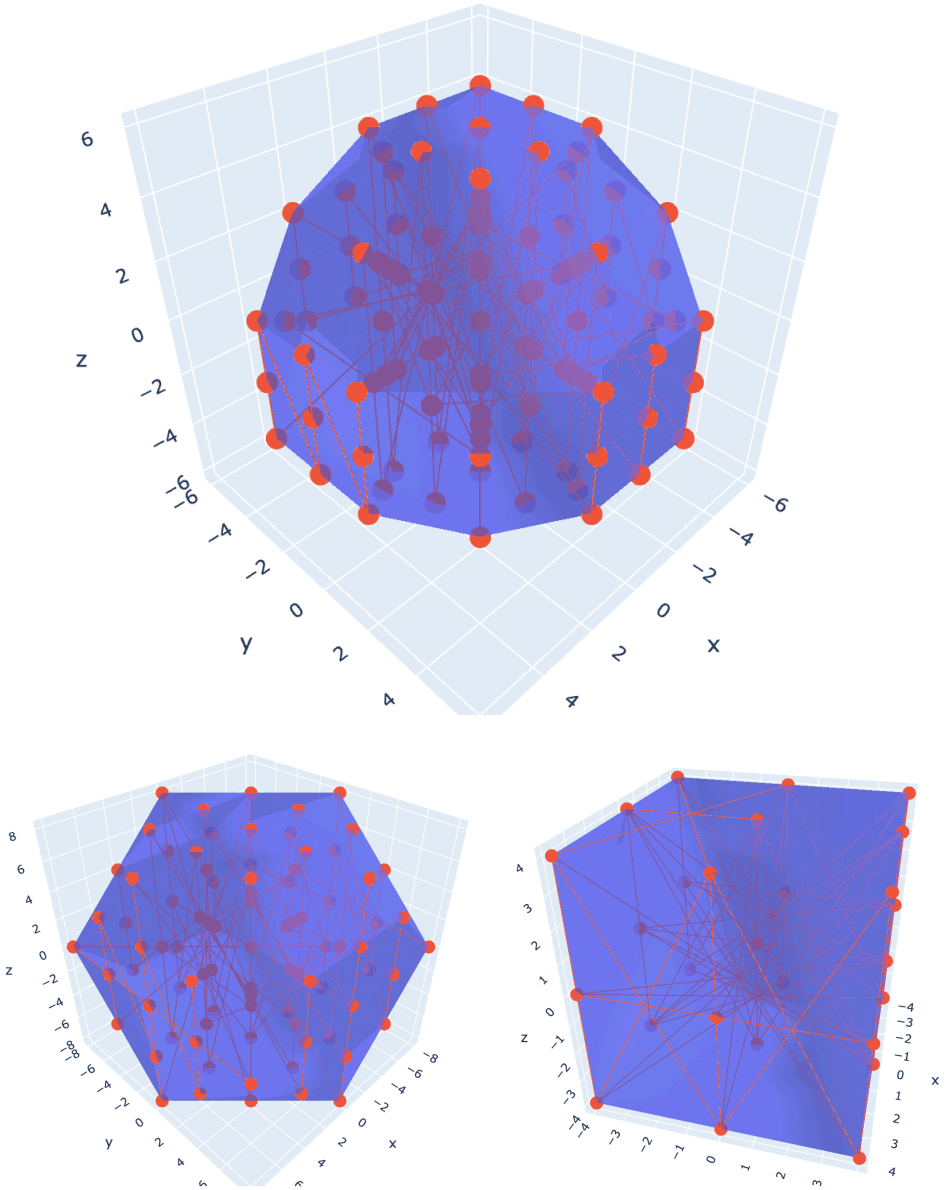

Fig 4: **Top**: W and Z boson. **Left**: XORed Muon. **Right**: XNORed Muon Neutrino.

The Third Generation

The 3rd Generation of the leptons gives us the Tau and the Tau neutrino and a different flavour of W and Z boson. These bosons are different

to the leptons in the sense that they can self interact. It is also different because it can access its own 4th-dimensional aspect. This makes sense, since the W and Z bosons were all formerly 4-th dimensional in the previous model. As such, only the gauge bosons permit movement between the different dimensions and this keeps the leptons separate from the quarks. The gauge bosons are the Dimensional Gate Operators, in a very literal sense.

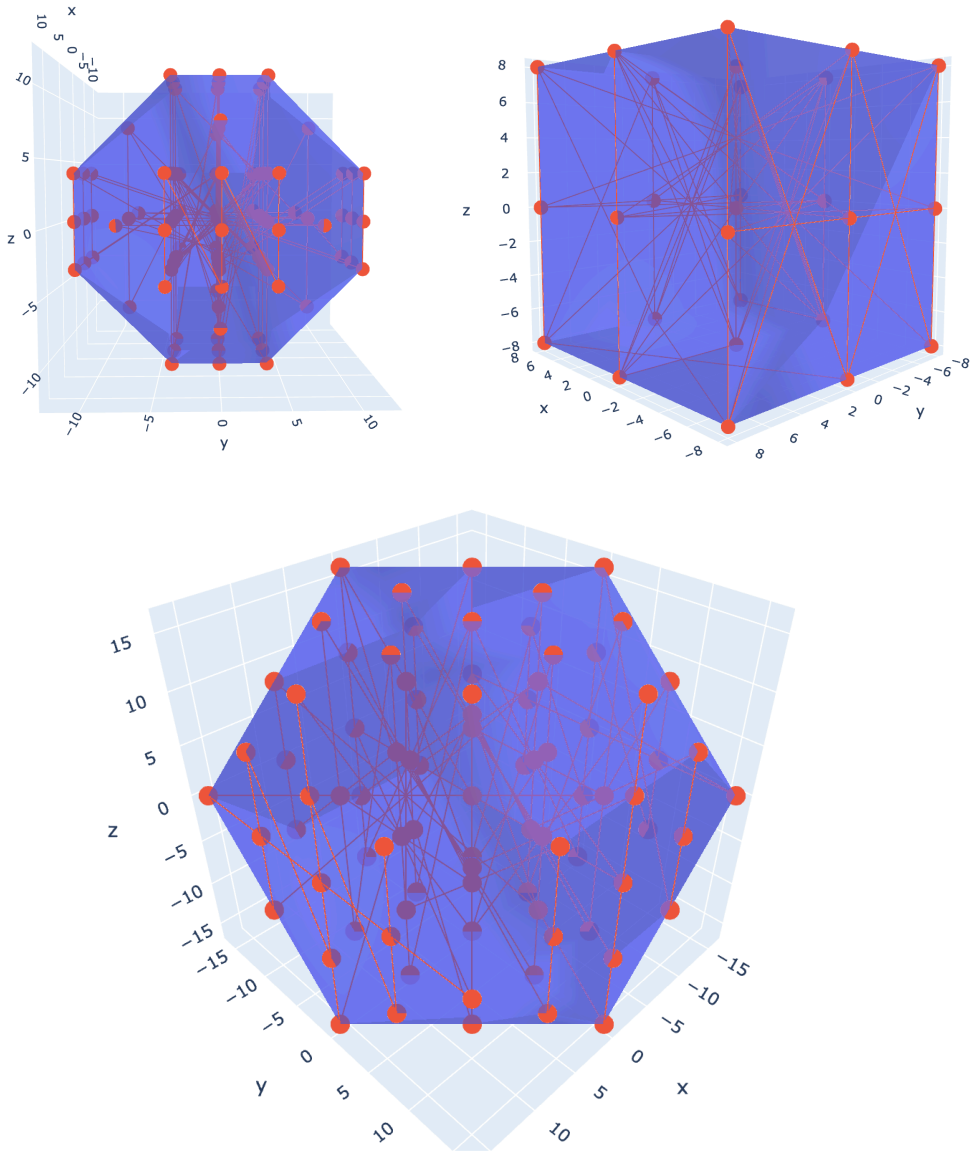

Fig 5: **Top Left**: W and Z boson. **Right**: XORed Tau. **Bottom**: XNORed Tau Neutrino.

But why should the bosons be summed to themselves? Why should the electron and neutrino be summed to one another? If it is meant to describe particle interactions shouldn't they be multiplied together? This is correct. We are using the term 'summed' as this is the operation that occurs, as the figures are being multiplied. Remember that the DGO particles are creating through the multiplication of one 5-dimensional vector with another.

The addition between particles, whether in XOR or XNOR, takes place during this multiplication process. We cannot (as far as I know) create a particle (like a gluon) and then create another particle (like a quark) and sum them together outside of the context of this process; It simply doesn't work. From this, we can logically infer that — at least from the perspective of this model — all particles are created together in the same interrelated instance and in the same process, hereby referred to as 'the Prime-Mover Process'. This Prime-Mover process is happening (potentially) on the order of the particle's frequency. In fact, there may be no difference between the two, from an observer point of view.

Conclusion

According to the DGO Standard Model, Trionionic W and Z bosons are represented by rhombicuboctahedrons, the electron, muon and tau are represented by various sized cuboctahedrons and the electron neutrino, muon neutrino and tau neutrino are all represented by cubes. Leptons shift from 3-dimensional into 4-dimensional particles by means of gauge bosons that act like dimensional gate-keepers. This separation explains why leptons and quarks fail to interact in a direct capacity.

Citations

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

[2] 'Construction of the 2nd and 3rd Generation of Quark Particles in the Standard Model', Christopher C. O'Neill, https://www.researchgate.net/publication/348191884_CONSTRUCTION_OF_THE_2ND_AND_3RD_GENERATION_OF_QUARK_PARTICLES_IN_THE_STANDARD_MODEL

[3] A Gauge Model With Light W and Z Bosons, Vernon D. Barger, Wai-Yee Keung, Ernest Ma; https://inspirehep.net/literature/152417