ELECTRO-MAGNETIC INTERACTIONS OF LEPTONS

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29 December 2020

Abstract

Simple interactions between the charged leptons and the photon are examined with respect to the DGO Standard Model. After this step has been completed 30 of the 32 particles in the Standard Model will have been accounted for. The methodology for the Higgs particle and the Graviton will be left for a subsequent research paper, entitled 'Making Sense of the Standard Model'.

Keywords

Lepton, electron, muon, neutrino, photon, quaternions, trionions

Electro-Magnetic Free

In 'Leptons and Weak Interactions' [1], we used inter-dimensional matrices to produce the necessary structure of interactions between the weak force and the leptons. This allows us to create complex interactions and decays using all of the quarks and leptons. Ironically, it is the simpler interactions, like those seen exclusively among the charged leptons and the photons that proved more of a challenge and required a more novel approach.

Unlike electrons, neutrinos have no electric charge. This means that photons can't interact with neutrinos. Therefore, we cannot have a perturbation of the kind:

$$e + ve \longrightarrow y \longrightarrow e + ve$$

In order to solve this problem, we simply repeat the process laid out in [1] and apply slight modifications to it. First, we swap the Trionionic W and Z bosons with a photon. That much is obvious. Then we replace the neutrino flavours with operators. These operators are not particles, but act in a similar manner to the creation and annihilation (a and a†) operators of QFT.

Unlike those operators, which have to be put in by hand, our operators are simply part of the process.

The result of this process is seen in Fig. 1.

These tables follow the template laid out in [2], in which we made variants of the DGO model.

LEPTONS (Weak Interactions)					
W/Z	*e*	W/Z	*μ*	W/Z	*τ*
W/Z	*νe*	W/Z	*νμ*	W/Z	*ντ*

LEPTONS (Electromagnetic Interactions)					
y	*e*	y	*μ*	y	*τ*
y	*a†*	y	*a†*	y	*a†*

Fig. 1

Once again, we have a doubling up of representative figures. This time the W and Z bosons and the photons are all represented by 3D rhombicuboctahedra. We can overcome this either by having the photons represented by ^U logic (since the Z bosons are already !VD) or we could simply represent all electromagnetic lepton interactions in 2D, which would mean that the photon would look like a rhombus.

This is merely a stylistic concern, at this point. It does have some consequences, as far as Representation Theory is concerned, but I will leave that to a subsequent paper, when all 32 particles of the Standard Model are put into place.

Citations

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

[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