Mass of the W Boson as Threshold Energy in Electroweak Interactions

Sylwester Kornowski

Abstract: The W and Z bosons are the normal particles that masses follow from weak interactions of pions and leptons. In reality, the weak interactions are defined by the scalar condensates in centres of fermions. Here we show that to produce the scalar condensate in centre of the baryons, involved energy must be equal to or higher than mass of the W boson.

The W and Z bosons are the normal mesons that masses follow from the weak interactions of pions and leptons [1]. It is an illusion that they are responsible for the nuclear weak interactions (see [2] and this paper).

According to the Scale-Symmetric Theory (SST), the nuclear weak interactions are defined by the scalar condensate in centre of the baryons [2]. Its mass is $Y = 424.12454$ MeV [3] but it is created because of collapse of the spin-1 large loop, m_{LL}, ($m_{LL} = 67.544411$ MeV) which is responsible for the nuclear strong interactions [2]. The neutral pion is the spin-zero binary system of the large loops [2]. In reality, there the spin-zero binary system of large loops collapses to two condensates.

There are two stages of creation of Y – after the first stage mass of the condensate is [4]

$$Y^* = 2\pi M_{LL} = 424.39405 \text{ MeV} . \qquad (1)$$

In this paper we will need also mass of the torus/electric-charge $X^{+,-} = 318.295537$ MeV inside the core of baryons [2], mass of the W boson calculated within SST $W^{+,-} = W = 80{,}423.2$ MeV [4], the definition of the coupling constant for electromagnetic interactions at high energies [4]

$$\alpha_{em,high\text{-}energy} = (X^+ + X^-) / (W + 2Y^*) = 1 / 127.66747 , \qquad (2a)$$

or

$$\alpha_{em,high\text{-}energy} = (X^+ + X^-) / (E + 2Y^*) \qquad (2b)$$

(where E is the involved energy), and formula that ties mean side of a square occupied by one Einstein-spacetime component on the torus/electric-charge of non-interacting electron (it concerns the self-interaction as well so it is an abstract situation) with mean side of a square in interacting electron [5]

$$F_{o,high-energy}\, R_{neutrino} = 3482.9021\, R_{neutrino}\, (1 + \alpha_{em,high-energy}) \,, \qquad (3a)$$

i.e.

$$F_{o,high-energy} = 3482.9021\, (1 + \alpha_{em,high-energy}) \,. \qquad (3b)$$

The range of Neutrino Quantum Gravity (NQG) is $R_{NQG} = 3510.1831\, R_{Neutrino}$ – it defines the range of the volumetric quantum confinement of the Einstein-spacetime components [6]. To create the scalar condensates (which are responsible for the weak interactions), the side of a mean square occupied by one Einstein-spacetime component must be equal to R_{NQG}. From this condition and applying formulae (3b) and (2b), we can calculate the threshold mass/energy E needed to create the Y condensates. We need following masses

$$E \geq 80{,}423.3 \text{ MeV} = W \,. \qquad (4)$$

Summary

The vector W and Z bosons are not directly responsible for the weak interactions. The W bosons carry energy which is able to create the real Y Einstein-spacetime scalar condensate in centre of baryons (so the Z bosons also can create such condensate) so it can create the illusion that the W and Z bosons are directly responsible for the weak interactions.

The virtual scalar condensates with a mass of ±Y produced by the real Y condensate in centre of baryons are the carriers of the nuclear weak interactions. At and above the threshold energy for production of the real Y condensates, i.e. at and above the mass of the W boson, such energy creates the Y condensate(s) so a system of E plus Y mimics the weak interactions described within SST.

Emphasize that the coupling constant for the nuclear weak interactions is ~0.018723 [3].

References

[1] Sylwester Kornowski (7 June 2017). “The Origin of the Z and W Bosons” http://vixra.org/abs/1705.0202

[2] Sylwester Kornowski (23 February 2018). “Foundations of the Scale-Symmetric Physics (Main Article No 1: Particle Physics)” http://vixra.org/abs/1511.0188

[3] Sylwester Kornowski (14 November 2019). “An Extension of the Dynamics of the Core of Baryons” http://vixra.org/abs/1911.0214

[4] Sylwester Kornowski (7 November 2019). “Theory with a Finite Mass Gap” http://vixra.org/abs/1911.0122

[5] Sylwester Kornowski (7 November 2019). “The Exact Mass of Tau Lepton” http://vixra.org/abs/1911.0118

[6] Sylwester Kornowski (23 September 2019). “Neutrino Quantum Gravity” http://vixra.org/abs/1909.0477