How does Measurement Affect the Real Result?

Sylwester Kornowski

Abstract: Theoretical mass of the W boson is 80.423 GeV but we explain why experiments should give 80.388 GeV - this result is consistent with the PDG experimental value 80.379(12) GeV. We also answered the question of how measurements change the real masses of particles.

In many papers I calculated the exact masses of particles to show the power of the Scale-Symmetric Theory (SST) [1] which is based on a very simple mathematical description. The simplicity of the theory is due to the fact that quantum mechanics has both a classical interpretation [2] and superluminal interpretation [3].

The SST starts from only 7 parameters and 3 the iterative numbers which we can calculate after formulation of the theory because, due to the phase transitions of the SST inflation field, there appear new symmetries, especially, the Titius-Bode law for the strong interactions of baryons. For example, SST explains why the long-lived hyperons are created due to the strong interactions but decay because of the electroweak interactions.

In [4], we calculated mass of the W boson: $M_{W,theory} = 80{,}423.2$ MeV and we showed that inside such boson is muon. On the other hand, in [1], we described the internal structure of muon – there is a torus/electric-charge with the central condensate. Such central condensate in muon is built of the Einstein-spacetime components and there is the spin-0 pair composed of two energetic neutrinos with a total mass of $2M_{Neutrino} = 35.6$ MeV (see formula (79b) in [1]). I claim that the measurement (it is an interaction) of mass of the W boson forces decay of the muon inside the W boson in such a way that the two energetic neutrinos are emitted in opposite directions. Detection of such neutrinos is very difficult. But detection of them gives possibility to verify the Scale-Symmetric Theory. Detection of the two neutrinos would give us the possibility to prove that the model of muon described within SST is correct.

The measured mass of the W boson should be

$$M_{W,experiment} = M_{W,theory} - 2M_{Neutrino} = 80{,}387.6 \text{ MeV} . \quad (1)$$

The Particle-Data-Group (PDG) value is $M_{W,experiment,PDG} = 80{,}379(12)$ MeV [5] so the SST value is consistent with the PDG result. We claim that more precise experiments should give the central value closer to the SST result 80,388 MeV.

The second example is as follows.

As part of the SST, from the initial conditions, I calculated the mass, M_{LL}, of the single large loop. The neutral pion is made up of two such loops [1]. The theoretical result received from the initial conditions is $M_{LL,theory} = 67.5444107$ MeV [1]. I also calculated the mass of such a loop on the basis of experimental data $M_{LL,theory-experiment} = 67.54454508$ MeV [6]. Notice that, practically, there is valid following relationship

$$M_{LL,theory-experiment} = M_{LL,theory} (1 - 2\,\alpha_{W(electron-muon)}) \,, \qquad (2)$$

where $2\alpha_{W(electron-muon)} = 2 \cdot 0.9511082 \cdot 10^{-6}$ is the coupling constant for the weak interactions of the virtual electron-positron pairs [1].

The difference between the $M_{LL,theory-experiment}$ and $M_{LL,theory}$ and formula (2) **suggest that measurements (they force additional interactions), affect the results.**

In the above example, the difference is the weak mass of the large loop. The large loop creates the virtual electron-positron pairs which interact weakly with the loop – such interaction changes slightly mass of the loop. We can see that in this example the measurement forces creation of the virtual pairs – it leads to the additional weak interactions of the pairs with the large loop.

References

[1] Sylwester Kornowski (23 February 2018). "Foundations of the Scale-Symmetric Physics (Main Article No 1: Particle Physics)"
http://vixra.org/abs/1511.0188
[2] Sylwester Kornowski (1 January 2019). "Classical Interpretation of Quantum Mechanics"
http://vixra.org/abs/1812.0408
[3] Sylwester Kornowski (23 January 2016). "The Superluminal Interpretation of Quantum Mechanics"
http://vixra.org/abs/1505.0124
[4] Sylwester Kornowski (7 November 2019). "Theory with a Finite Mass Gap"
http://vixra.org/abs/1911.0122
[5] M. Tanabashi et al. (Particle Data Group), Phys. Rev. D **98**, 030001 (2018) and 2019 update
[6] Sylwester Kornowski (16 October 2019). "The Simplest and Accurate Theory of Proton and Neutron Based on Only Six Parameters that are Experimental Values"
http://vixra.org/abs/1803.0250