Why Is the Weak Mixing Angle in Electroweak Theory not Consistent with the Experimental Result?

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Abstract: In some experiments for the weak mixing angle we get the values close to 0.2223 while the electroweak (EW) theory within the Standard Model (SM) leads to the value of 0.23122(3). Here we show that such a discrepancy of 4% is a result of incorrect interpretation of the measured value. Moreover, we show that such discrepancy does not appear in the Scale-Symmetric Theory (SST) - we obtain 0.22229.

Introduction and motivation

The different size scales in Nature and the CP violation lead to the very simple initial conditions in the Scale-Symmetric Theory (SST) [1]. Such initial conditions lead to the atom-like structure of baryons and to the internal structure of bare fermions [1] which is neglected in the Standard Model (SM) and General Theory of Relativity. Due to the electroweak interactions, outside the core of baryons there are created orbits but they are embedded in the nuclear strong field. This means that the relativistic pion in the $d = 1$ state interacts with the core because of the three SM interactions i.e. electromagnetic, weak and strong [1], [2].

The three velocities, i.e. the toroidal one associated with the electromagnetic interactions, the poloidal associated with the weak interactions and the radial associated with the strong one, are orthogonal and their vectorial sum is equal to the velocity of the light in "vacuum" ***c*** so we have [2]

$$(v_{strong} / c)^2 + (v_{el\text{-}mag} / c)^2 + (v_{weak} / c)^2 = 1 . \qquad (1)$$

Such is the origin of orthogonality of the Standard-Model (SM) interactions.

In paper [2] we showed that when we measure momentums of particles after their interactions with nucleons then the elements of the PMNS and CKM matrices are directly proportional to ratios of characteristic masses

$$V_{ij} \sim m_1 / m_2 . \qquad (2)$$

On the other hand, when we neglect the binding energy of the nucleons $\Delta E \approx 15$ MeV then a nucleon consists of three elements: of the torus with a mass of $X \approx 318.2955$ MeV, of the relativistic pion with a mean mass of W ≈ 212.2015 MeV (notice that it is not the $W^{\pm}$ = 80.379(12) GeV boson [3]), and of the central condensate with a mass of Y ≈ 424.1245 MeV [1].

Approximate values of the elements V_{ij} in the SST CKM matrix define following formula

$$V_{ij} = 1 / (1 + B_{ij}) , \tag{3}$$

where the elements in the SM CKM matrix are $V_{us} = V_{cd} = 1 / (1 + B_{12}) = 1 / (1 + B_{21})$, where $B_{12} = B_{21} = (X + Y) / W$ [2]. Notice that value B_{12} is close to the ratio of masses of the b and c quarks calculated within SST: b = 4190 MeV and c = 1267 MeV [1]. From formula (2) and the above remarks we obtain

$$K = V_{us} = V_{cd} = W / (X + Y + W) = 0.222289 \approx 0.2223 . \tag{4}$$

Let's recall that the relativistic pion W is on the orbit created due to the electroweak interactions but this orbit is embedded in the nuclear strong field [1], [2]. It means that the pion W interacts due to the all SM interactions. We claim that the measured weak mixing angle s_w^2 is in reality the value K = 0.22229 which defines the ratio of the W mass and the sum of masses of the three fundamental parts of nucleons. Emphasize that at this time, there is no generally accepted theory that explains why the experimental value is so and not different.

Our value K is consistent with the experimental result obtained by the SLD Collaboration 0.22228(54) (see Table 10.7 in [3]). The SLD is a detector situated at the collision point of the Stanford Linear Collider (SLC) in Stanford, California. There is SLD + M_Z, Γ_Z, m_t. The SLD result is important because it has high accuracy.

Notice that following ratio is also very close to the SLD experimental result

$$K^* = (e^+ + e^-)_{bare} / (\pi^{\pm} - \pi^o) = 0.22223 , \tag{5}$$

where $e^{\pm}_{bare}$ = 0.51040701 MeV [1], $\pi^{\pm}$ = 139.57061(24) MeV [3], and π^o = 134.9770(5) MeV [3].

We know that the $V_{12} = \sin\Theta_{12}\cos\Theta_{13}$ while from formula (2) we have $V_{12} \sim m_1/m_2$. It leads to conclusion that the definition of the Weinberg angle should be as follows

$$s_w^2 = \sin^2\Theta_w = m_1 / m_2 = 1 - m_3 / m_2 , \tag{6}$$

so the formula applied in the orthodox EW theory $s_w^2 = 1 - (m_3 / m_2)^2$ is incorrect!!! It is very easy to prove it because $s_w^2 = m_1/m_2 = K \approx K^*$ are the results consistent with the SLD experimental result.

SST shows that the $W^{\pm}$ = 80.379(12) GeV and Z = 91.1876(21) GeV [3] bosons are the composite particles [4] and shows that for the weak interactions are responsible the Einstein-spacetime condensates [1], not the $W^{\pm}$ and Z bosons.

Let's recall that the Weinberg angle is estimated using the Paschos-Wolfenstein formula with the neutral- and charged-current (NC and CC) processes

$$(\sigma^{\nu}{}_{NC} - \sigma^{\nu,anti}{}_{NC}) / (\sigma^{\nu}{}_{CC} - \sigma^{\nu,anti}{}_{CC}) = 1/2 - \sin^2\Theta_W , \qquad (7)$$

where NC can be $\nu_\mu + p \rightarrow \nu_\mu + p + \pi^+ + \pi^-$ while CC can be $\nu_\mu + n \rightarrow \mu^- +$ Hadrons.

The general conclusion from this paper is that the orthodox electroweak theory is not realized by Nature.

References

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