

## 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]

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

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

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  $W \approx 212.2015$  MeV (notice that it is not the  $W_{\pm} = 80.38$  GeV boson), and of the central condensate with a mass of  $Y \approx 424.1245$  MeV [1].

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

$$V_{ij} = 1 / (1 + B_{ij}), \quad (2)$$

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 remarks below it we obtain

$$K = V_{us} = V_{cd} = W / (X + Y + W) = 0.222289 \approx 0.2223. \quad (3)$$

**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  $K = 0.222289$  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. We claim that the Weinberg angle has nothing with the measured value about 0.2223.**

Our value  $K$  is consistent with the CODATA experimental result 0.2223(21) [3] and result obtained by the SLD Collaboration 0.22228(54) (see Table 10.7 in [4]; SLD is a detector situated at the collision point of the Stanford Linear Collider (SLC) in Stanford, California).

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

### References

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Phys. Rev. D **98**, 030001 (2018)  
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