XENON1T Excess from the Scale-Symmetric Theory (SST)

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Abstract: Here we claim that the monoenergetic peak at (2.3 +- 0.2) keV in the XENON1T experiment is a result of exchange effects in beta decay emission. The SST leads to a peak at 2.415 keV. More precise data from XENON1T will show whether our proposal is correct.

Introduction and motivation

In the XENON1T experiment we observe a monoenergetic peak at (2.3 ± 0.2) keV (68% C.L.) with a 3.0σ global (4.0σ local) significance [1].

Here, on the basis of the Scale-Symmetric Theory (SST) [2], we show that the XENON1T peak is a result of exchange effects in β decay emission.

According to SST [2], the neutron is a result of two states that change with very high frequency: there is the positively charged core and relativistic negatively charged pion (with a mass of $M_{Rel,Pion(-)} = 215.760$ MeV) outside it, or neutral charged core and relativistic neutral pion outside it. On the other hand, the proton is a result of two states that change with very high frequency: there is the positively charged core and relativistic neutral pion outside it, or neutral charged core and relativistic positively charged pion outside it. The β decay of neutron is due to the decay of the relativistic negatively charged pion into relativistic neutral pion, electron, and electron antineutrino so we observe proton and the two last particles.

Within SST we calculated the proton-electron weak coupling constant [2] (see formula (86) in [2]): $\alpha'_{w(electron-proton)} = 1.11944 \cdot 10^{-5}$. The above remarks lead to conclusion that the weak mass, ΔE, of the relativistic negatively charged pion with respect of the nuclear weak interactions of electron with nucleons is

$$\Delta E = \alpha'_{w(electron-proton)} M_{Rel,Pion(-)} = 2.415 \text{ keV} . \quad (1)$$

Here we claim that the XENON1T peak is a result of the exchanged energy quanta with an energy of $\Delta E = 2.415$ keV in β decay emission. More precise data from XENON1T will show whether our proposal is correct.

References

[1] XENON Collaboration (16 October 2020). "Excess Electronic Recoil Events in XENON1T"
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[2] Sylwester Kornowski (25 September 2020). "Foundations of the Scale-Symmetric Physics (Main Article No 1: Particle Physics)"
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