Electron-to-Muon Abundance Ratio at High Energy Proton-Proton Collisions

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Abstract: The scale-symmetric physics (S-SET) leads to the atom-like structure of baryons containing the core, composed of entangled or/and confined Einstein-spacetime components, which is the black hole in respect of strong interactions. The structure of the core leads to conclusion that at high energy proton-proton collisions we should detect 25% more electrons than muons. On the other hand, at the LHC Physics conference in New York City (June 2014) the LHCb collaboration announced that probably there appear 25% more electrons than muons. In the Standard Model the electrons and muons (in the S-SET as well) are the particles of the same type so number of electrons and muons should be the same. This 25 percent excess of electrons follows from the internal structure of the core of baryons described within S-SET whereas within the Standard Model such excess is incomprehensible i.e. suggests existence of new physics. Just S-SET is the lacking part of ultimate theory.

1. Introduction, motivation and summary

The Scale-Symmetric Everlasting Theory (S-SET) [1] leads to the core of baryons which is the black hole in respect of the strong interactions. It consists of the charged torus and condensate in its centre composed of the entangled or/and confined Einstein-spacetime components. The mass distance between the charged and neutral core is $\Delta m \approx 2.663$ MeV ([1], Table 1] whereas mass of the condensate is 424.124 MeV.

At high energy collisions, the atom-like structure of baryons is destroyed so there dominate the phenomena inside the core of baryons.

On the other hand, in contrary to the real photons, the mass of virtual particles is not equal to zero. When mean mass density of a virtual photon is lower than the mean mass density of the Einstein spacetime then its mass is negative. When such density is higher then mass is positive. Mass of a 'hole' in the Einstein spacetime (i.e. of a region with lower mass density than the mean density) is negative and imaginary because the lacking mass has broken contact with real particles. This means that the negative mass is defined as –im, where i = sqrt(-1). This definition leads to the negative square of mass of the 'hole' $(-im)^2 = -m^2$. A vortex of massless energy E has mass $m = E/c^2$ i.e. the total energy is 2E. This means that in the field of a particle there can arise simultaneously the bare virtual particle-antiparticle pair(s) that total positive mass is two times greater than the bare mass of the real particle. For example, in the electromagnetic field of a resting electron simultaneously can be produced only one virtual bare electron-positron pair ([1], Chapter "Definitions" – see the term 'Virtual particles').

We can see that the mass Δm can produce simultaneously 5 virtual electron-positron pairs whereas the condensate can produce simultaneously 4 virtual muon-antimuon pairs. In the proton-proton collisions, the virtual particles become the real particles observed by detectors. Since 100%·5/4 = 125% so we should observe 25% more electrons than muons.

This 25 percent excess of electrons follows from the internal structure of the core of baryons described within S-SET whereas within the Standard Model such excess is incomprehensible i.e. suggests existence of a new physics. Just S-SET is the lacking part of ultimate theory.

References

[1] Sylwester Kornowski (14 March 2014). “The Everlasting Theory and Special Number Theory”.
http://www.rxiv.org/abs/1203.0021 [v3].