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The electron and its symmetry in empirical approach to the Standard Model development

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Unexpectedly accurate relations between nucleon masses and the electron rest mass as well as the role of QCD-based gluon-quark-dressing effect are considered in this review. In the Standard Model, particle masses are empirical parameters. However, different authors including Y. Nambu and R. Feynman turned attention to certain particle mass relations which are used in this work:

1) pion's mass splitting δ mπ=4594 keV is close to 9me=4599 keV. Hence the doubled value of pion's ß-decay energy is close to δ=16me.

2) Empirical relations found by Y. Nambu and A. Hautot mN=mμ + 6mπ and mπ/mμ = 17/13, allow to introduce the period of (mπ + mμ)/(17+13)=8174 keV, close to δ=8176 keV. Masses mμ, mπ, and mN are close to nδ (with n=13,17,115 where n is a number of the period δ). Pion's parameters fπ =130.7 MeV and ΔmΔ=147 MeV=(mΔ-mN)/2 correspond to n=16 and 18.

From CODATA evaluation one can find that the shift of the neutron mass value relative to 115δ - I am equal to δmn=161.56(6) keV which accounts an integer ratio with nucleon mass splitting δmN=1293 keV: δmN/δmn=8•(1.0001(1)). It was considered as a presence of fine structure with the period 161 keV=δmn=δmN/8. Discreteness with CODATA parameter δ=16me extended up to the higher energies. Lepton ratio L=mμ/me=207 was found between vector boson masses MZ, MW and constituent quark masses Mq, M'q. Long-range correlation with δ was noticed between the scalar mass and the top-quark mass as well. Mass grouping effect at 58 GeV observed in the L-3 experiment by S. Ting and coworkers as well as a remark by F. Wilczek about the distinguished position of the top-quark in the particle mass spectrum will be discussed.

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