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Is Electroweak Interaction – a Kind of Cosmological Lambda Term in Maintaining Nuclear Existence and Stability?

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Considering the interaction scheme associated with Up quarks, Down quarks and pions and interaction scheme associated with electroweak bosons, we have developed a new model of nucleus. We would like to emphasize the point that atomic nucleus cannot exist without the support of electroweak interaction. Clearly speaking, analogous to the cosmological Lambda term, electroweak interaction helps in maintaining the existence of atomic nucleus without collapsing due to strong interaction. Interesting points to be noted are: 1) Up quark and Down quark play a vital role in understanding nuclear structure. 2) Mass ratio of pions and weak bosons is 0.0016 and it is approximately twice the product of Fine structure ratio and strong coupling constant. 3) Twice the proton number and the coefficient 0.0016 play a significant role in understanding nuclear stability line. 4) Currently believed harmonic oscillator coupling and spin-orbit coupling seem to be a natural manifestation of Up and Down quark arrangement. 5) Number range associated with harmonic oscillator coupling and spin-orbit coupling can be considered as a representation of mass number range of a proton number having magic behaviour. 6) Coefficient of proportionality being 0.0016, number of free nucleons increases with half the sum of squared number of protons and squared number of nucleons. 7) Increasing number of free nucleons, increasing nuclear radii and increasing asymmetry about stable mass number play an important role in reducing nuclear binding energy. 8) Nuclear binding energy can be addressed with four simple terms and single energy coefficient. 9) Unified nuclear binding energy coefficient is associated with the average rest energy of 3 Up quarks and 3 Down quarks. 10) Nuclear stability line, proton drip lines and neutron drip lines can be understood in a unified approach.

The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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