MAGIC

Science of the Cosmos

Contribution ID: **43** Type: **not specified**

On the possible role of the Planck length in fitting the neutron lifetime

At present, no unified formula is available for estimating the Planck length or the Newtonian gravitational constant in terms of elementary physical constants. In this context, considering our 4G model of final unification, we have noticed a simple relation for fitting the Planck length in terms of nuclear physical constants. The hypothetical distance travelled by photon in a time span equal to the neutron lifetime seems to be: Directly proportional to the squared proton mass and the nuclear volume; Inversely proportional to the nucleon mass difference, electron mass, nuclear charge radius and twice the Planck length. It may be noted that, twice the Planck length can be understood as the Schwarzschild radius of the Planck mass. This relation seems to highlight the need and accuracy of the nuclear charge radius and neutron lifetime. Considering our 4G model, nuclear charge radius is 1.2393 fermi. For a nuclear radius of (1.23 to 1.24) fermi, obtained neutron life time is (871 to 885) sec. Interesting point to be noted is that, a small reduction in nuclear volume seems to reduce the neutron lifetime significantly by the dominating weak interaction. Considering this approach, beam and bottle methods of neutron lifetimes can be analyzed. It needs further research.

Author: UTPALA VENKATA, Satya Seshavatharam

Co-authors: T, Gunavardhana Naidu (Dept. of Physics, Aditya Institute of Technology and Management, Tekkali-532201, AP, India); S, Lakshminarayana (Dept. of Nuclear Physics, Andhra University, Visakhapatnam-03, AP, India)

Presenter: UTPALA VENKATA, Satya Seshavatharam