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A Model of Neutrino Masses

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Using the fact that neutrinos only participate in weak and gravitational interactions, we explore the possibility of having their masses emerged at the intersection between extended electroweak theory and theory of gravity. We describe how these two seemingly incompatible theories could be embedded in a lepton-number violating 5-dimensional Lagrangian L_5 . A peculiar feature of this approach is its ability to generate effective Majorana neutrino masses via the spontaneous symmetry breaking (SSB) of Grand Unified Theory (GUT), $GGUTMX \rightarrow -G(321)\nu EW \rightarrow -G(1)$ and 4×4 symmetric matrix of gravitational couplings. Within the purview of this theoretical framework, we obtain values for the effective Majorana mass $M_{\text{mass-eff}}=3.7126$ meV, and the Majorana neutrino masses $m_1 = 0.6672$ meV, $m_2 = 14.4498$ meV, $m_3 = 43.3494$ meV, $m_4 = 0$ meV and $\Sigma m = 0.0585$ eV. Our results are in good agreement with both experimental and cosmological data.

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