

Neutrino Magnetic Moments from Inverse Seesaw with Novel Horizontal Symmetry

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Mechanisms that generate large neutrino magnetic moments consistent with observed neutrino masses typically decouples the mechanism responsible for neutrino mass and the neutrino magnetic moment. In this letter, we propose a novel framework to explain neutrino mass while accommodating a large magnetic moment for the active neutrinos. The SM neutrinos get mass via the inverse seesaw mechanism. We introduce a novel horizontal-like softly broken $SU(2)_N$ symmetry in which SM particles are singlets. In the $SU(2)_N$ symmetric limit, one of the fermionic states participating in the inverse seesaw can possess a large magnetic moment while remaining massless. The $SU(2)_N$ symmetry is softly broken, and SM neutrinos obtain nonzero neutrino mass and large magnetic moment via sterile-active neutrino mixing. The active neutrinos can exhibit transition magnetic moments as large as $\mathcal{O}(10^{-11} \mu_B)$.

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