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Emergence of dark symmetry as well as neutrino mass scales from A_4 flavor symmetry

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We worked on a model for hybrid neutrino mass generation, wherein scotogenic dark sector particles, including dark matter, are charged non-trivially under the A_4 flavor symmetry. The spontaneous breaking of the A_4 group to the residual Z_2 subgroup results in the "cutting"of the radiative loop. As a consequence the neutrinos acquire mass through the hybrid "scoto-seesaw"mass mechanism, with the residual Z_2 subgroup ensuring the stability of the dark matter. The flavor symmetry also leads to several predictions including the normal ordering of neutrino masses and "generalized $\mu-\tau$ reflection symmetry"in leptonic mixing. Additionally, it gives testable predictions for neutrinoless double beta decay and a lower limit on the lightest neutrino mass. The model allows only scalar dark matter, whose mass has an upper limit of $\sim$ 600 GeV, with viable parameter space satisfying all dark matter constraints, available only up to about 80 GeV. Conversely, fermionic dark matter is excluded in our model due to constraints from the neutrino sector. Various aspects of this highly predictive framework can be tested in both current and upcoming neutrino and dark matter experiments.

Track type

Dark Matter

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