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Radiative neutrino mass and chiral dark matter from $U(1)$ symmetry

We carry out a systematic investigation for minimal Scotogenic models based on a dark $U(1)_D$ gauge symmetry, in which the neutrino masses are induced at the one-loop level and include a chiral dark matter (DM) candidate. Moreover, we assume this $U(1)_D$ gauge symmetry is broken by only one Higgs singlet scalar that also generates masses to all dark fermions. The stability of the DM candidate is ensured by a residual $U(1)_D$ symmetry. As a result, we achieve a complete chiral-DM model with additional dark matter candidates possible in a general Scotogenic theory. We explore the phenomenology of the various interesting possible DM scenarios in this framework (scalar DM (singlet-doublet mixture), Fermion DM (Majorana/Dirac DM)).

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