

# An ultraviolet completion for the Scotogenic model

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The Scotogenic model is an economical scenario that generates neutrino masses at the 1-loop level and includes a dark matter candidate. This is achieved by means of an ad-hoc  $Z_2$  symmetry, which forbids the tree-level generation of neutrino masses and stabilizes the lightest  $Z_2$ -odd state. Neutrino masses are also suppressed by a quartic coupling, usually denoted by  $\lambda_5$ . While the smallness of this parameter is natural, it is not explained in the context of the Scotogenic model. We construct an ultraviolet completion of the Scotogenic model that provides a natural explanation for the smallness of the  $\lambda_5$  parameter and induces the  $Z_2$  parity as the low-energy remnant of a global  $U(1)$  symmetry at high energies. The low-energy spectrum contains, besides the usual Scotogenic states, a massive scalar and a massless Goldstone boson, hence leading to novel phenomenological predictions in flavor observables, dark matter physics and colliders.

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