

An ultraviolet completion for the Scotogenic model

Thursday 30 June 2022 16:45 (15 minutes)

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 λ_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 λ_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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Session Classification: Parallel Session I.2