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Neutrino mass hierarchy from the discrete dark matter model

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We explore a possible explanation for the hierarchy in scale between the atmospheric and solar neutrino mass differences ($|\Delta m^2_{31}|$ and Δm^2_{21})
through the presence of two distinct neutrino mass mechanisms from tree-level and one-loop-level contributions. We demonstrate
that the ingredients needed to explain this hierarchy are present in the minimal discrete dark matter mechanism. This scenario is characterized by adding new RH neutrinos and $SU(2)$ scalar doublets to the Standard Model as triplet representations of an A_4 flavour symmetry. The A_4 symmetry breaking, which occurs at the electroweak scale, leads to a residual $\mathbb{Z}_2$ symmetry responsible for the dark matter stability and dictates the neutrino phenomenology. We show that CP breaking in the scalar potential is needed to fit the neutrino mixing angles.

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