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Radiatively Induced Neutrino Masses and Mixings with Dark Matter

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We present an extension of the standard model that naturally generate small neutrino masses and provide a dark matter candidate. The dark matter particle is part of a new scalar doublet field that plays a crucial role in radiatively generating neutrino masses. The symmetry that stabilizes the dark matter also suppresses neutrino masses to appear first at three-loop level. Without the need of right-handed neutrinos or other very heavy new fields, this offers an attractive explanation of the hierarchy between the electroweak and neutrino mass scales. The model has distinct verifiable predictions for the neutrino masses, flavor mixing angles, neutrinoless double beta decay, colliders and dark matter signals.

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