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Low-scale seesaw from neutrino condensation

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Knowledge of the mechanism of neutrino mass generation would help understand a lot more about Lepton Number Violation (LNV), the cosmological evolution of the Universe, or the evolu tion of astronomical objects. Here we propose a verifiable and viable extension of the Standard model for neutrino mass generation, with a low-scale seesaw mechanism via LNV condensation in the sector of sterile neutrinos. To prove the concept, we analyze a simplified model of just one single family of elementary particles and check it against a set of phenomenological constraints coming from electroweak symmetry breaking, neutrino masses, leptogenesis and dark matter. The model predicts (i) TeV scale quasi-degenerate heavy sterile neutrinos, suitable for leptogenesis with resonant enhancement of the CP asymmetry, (ii) a set of additional heavy Higgs bosons whose existence can be challenged at the LHC, (iii) an additional light and sterile Higgs scalar which is a candidate for decaying warm dark matter, and (iv) a majoron. Since the model is based on simple and robust principles of dynamical mass generation, its parameters are very restricted, but remarkably it is still within current phenomenological limits.

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