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Neutrino mass, Dark Matter and stability of the electroweak vacuum in TeV Seesaw models

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We consider the Standard model extended by fermion and scalar singles. These singlet can account for the generation of neutrino mass at the TeV scale and the existence of dark. For the neutrino sector we consider models with extra singlet fermions which can generate neutrino mass via the inverse seesaw mechanism whereas a singlet scalar is introduced as the candidate for dark matter. We show that although these two sectors are disconnected at low energy, the coupling constants of both the sectors get correlated at high energy scale by the constraints coming from the perturbativity and stability/metastability of the electroweak vacuum. In addition, we also discuss a class of U (1) extensions of the standard model with the minimal inverse seesaw mechanism for neutrino mass generation. We also discuss possibility of a fermionic dark matter candidate within this framework. We obtain constraints on the U (1) quantum numbers of the Higgs doublet and the additional scalar from vacuum stability as well as perturbativity considerations.

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