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Neutrino Mass Models at Three-Loop and their Phenomenology

We consider classes of standard model (SM) extensions with a scalar representation (charged singlets and/or triplet) and three generation fermionic representations (right handed neutrinos or triplets). In these models, the neutrino masses are generated at three loops, which provide an explanation for their smallness, and the lightest neutral fermion, is a dark matter candidate. We find that for three generations of RH neutrinos, the model can be consistent with the neutrino oscillation data, lepton flavor violating processes, give a relic density in agreement with the recent Planck data, and the electroweak phase transition can be strongly rst order. We also show that the charged scalars may enhance the branching ratio h-> gamma gamma , where as h-> gamma Z get can get few percent suppression. We also discuss the phenomenological implications of the RH neutrinos at both LHC and future electron positron colliders.

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