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Determining neutrino mass hierarchy from new physics

We derive the lower bound on absolute scale of lightest neutrino mass for normal hierarchy and inverted hierarchy patterns of light neutrinos by studying the new physics contributions to charged lepton flavour violations in a TeV scale left-right symmetric model. The framework allows large light-heavy neutrino mixing where the light neutrino mass formula is governed by natural type-II seesaw mechanism unlike the generic type-II seesaw dominance which assumes suppressed light-heavy neutrino mixing. We demonstrate how sizeable loop-induced contribution to light neutrino mass is kept under control such that light neutrino mass formula is dominantly explained by type-II seesaw mechanism. We examine the heavy neutrino contributions to charged lepton flavour violating processes like $\mu \to e\gamma$, $\mu \to 3e$ and $\mu \to e$ conversion inside a nuclei. We also present a complementary study between neutrinoless double beta decay and charged lepton flavour violation taking into account single beta decay bound, double beta decay bound and cosmology bounds on neutrino mass sum.

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