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TeV -Scale Resonant Leptogenesis with New Scaling Ansatz on Neutrino Dirac Mass Matrix from A4 Flavor Symmetry

We propose a new scaling ansatz in the neutrino Dirac mass matrix to explain the low energy neutrino oscillations data, baryon number asymmetry and neutrinoless double beta decay. In this work, a full reconstruction of the neutrino Dirac mass matrix has been realized from the low energy neutrino oscillations data based on type-I seesaw mechanism. A concrete model based on A4 flavor symmetry has been considered to generate such a neutrino Dirac mass matrix and imposes a relation between the two scaling factors. In this model, the right-handed Heavy Majorana neutrino masses are quasi-degenerate at TeV mass scales. Extensive numerical analysis studies have been carried out to constrain the parameter space of the model from the low energy neutrino oscillations data. It has been found that the parameter space of the Dirac mass matrix elements lies near or below the MeV region and the scaling factor $|\kappa 1|$ has to be less than 10. Furthermore, we have examined the possibility for simultaneous explanation of both neutrino oscillations data and the observed baryon number asymmetry in the Universe. Such an analysis gives further restrictions on the parameter space of the model, thereby explaining the correct neutrino data as well as the baryon number asymmetry via a resonant leptogenesis scenario. Finally, we show that the allowed space for the effective Majorana neutrino mass mee is also constrained in order to account for the observed baryon asymmetry.

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