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Non-zero θ_{13} and Leptogenesis in Type-I seesaw with $\Delta(27)$ Discrete Symmetry

In this work, we consider a beyond the Standard Model (SM) framework, based on the non-abelian discrete group $\Delta(27)$ to accommodate the observed non-zero reactor mixing angle θ_{13}. The deviation from the tri-bimaximal (TBM) neutrino mixing pattern, in the context of the type-I seesaw, is realized by including new particles to the SM particle content, which thus provides a non-zero θ_{13}, consistent with the recent experimental results. The non-zero neutrino masses can be understood via type-I seesaw mechanism by introducing three right-handed neutrinos, which transform as triplets and a $SU(2)_L$ scalar singlet under $\Delta(27)$ symmetry. Similarly, to accommodate the charged lepton mass, $SU(2)_L$ scalar doublets transforming as singlets under $\Delta(27)$ symmetry are also included. We demonstrate that the model successfully explains all the neutrino oscillation parameters such as the atmospheric and solar mass squared differences, all the mixing angles, and the CP-violating phase δ_{CP}, as well as the cosmological bound on the sum of active neutrino masses ($\sum m_i$). In addition, it also explains the baryon asymmetry of the Universe through Leptogenesis. The non-zero lepton asymmetry is generated through the decay of the right-handed neutrinos, involving the neutrino Yukawa couplings.

Working group

WG5

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