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Prediction for Neutrino Masses, CP Violation, Leptogenesis and Neutrinoless Double Beta Decay from $\mathcal{T}_{13}$ Flavor Symmetry

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We propose an $SU(5) \times \mathcal{T}_{13}$ model for both quarks and leptons. With tribimaximal (TBM) mixing for the seesaw matrix, symmetric Yukawa textures for down-quarks and charged leptons fail to explain the experimentally observed reactor angle. We derive the minimal asymmetric texture that not only reproduces the three lepton mixing angles assuming TBM mixing with a single phase, but also predicts the CP violating angle $\delta_{CP} = 1.32\pi$, consistent with the current global fit. We show that a straightforward origin of the "asymmetric texture" is traced back to the family symmetry $\mathcal{T}_{13}$, an order 39 discrete subgroup of $SU(3)$. With minimal number of familons having simple vacuum expectation values, the $\mathcal{T}_{13}$ symmetry makes very definite prediction for the light neutrino masses of $28, 29$ and 58 meV and neutrinoless double beta decay with $|m_{\beta\beta}| = 25$ meV. We demonstrate that the CP violation predicted in the model can explain the baryon asymmetry of the universe through flavored leptogenesis with right-handed neutrino masses of $\mathcal{O}(10^9 - 10^{12})$ GeV.

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