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Generalised geometrical CP violation in a T' lepton flavour model

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We analyse the interplay of generalised CP transformations and the non-Abelian discrete group T′ and use the semi-direct product Gf=T′⊠HCP, as family symmetry acting in the lepton sector. The family symmetry is shown to be spontaneously broken in a geometrical manner. In the resulting flavour model, naturally small Majorana neutrino masses for the light active neutrinos are obtained through the type I see-saw mechanism. The known masses of the charged leptons, lepton mixing angles and the two neutrino mass squared differences are reproduced by the model with a good accuracy. The model allows for two neutrino mass spectra with normal ordering (NO) and one with inverted ordering (IO). For each of the three spectra the absolute scale of neutrino masses is predicted with relatively small uncertainty. The value of the Dirac CP violation (CPV) phase δ in the lepton mixing matrix is predicted to be δ≅π/2 or 3π/2. Thus, the CP violating effects in neutrino oscillations are predicted to be maximal (given the values of the neutrino mixing angles) and experimentally observable. We present also predictions for the sum of the neutrino masses, for the Majorana CPV phases and for the effective Majorana mass in neutrinoless double beta decay. The predictions of the model can be tested in a variety of ongoing and future planned neutrino experiments.

Based on work done with I. Girardi, A. Meroni, S. T. Petcov and M. Spinrath
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