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Predictions for the Dirac Phase in the Neutrino Mixing Matrix

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Using the fact that the neutrino mixing matrix $U = U_e^\dagger U_\nu$, where U_e and U_ν result from the diagonalisation of the charged lepton and neutrino mass matrices, and assuming 3-neutrino mixing, we consider a number of forms of U_ν associated with a variety of flavour symmetries: i) tri-bimaximal (TBM) and
ii) bimaximal BM) forms , the forms corresponding iii) to the conservation of the lepton charge $L' = L_e - L_\mu - L_\tau$ (LC), iv) to golden ratio type A (GRA) mixing, v) golden ratio type B (GRB) mixing, and vi) to hexagonal (HG) mixing. In this approach to neutrino mixing one obtains exact predictions for the Dirac phase δ in the neutrino mixing matrix if the matrix U_e has a minimal form in terms of angles and phases it contains that can provide the requisite corrections to U_ν so that the reactor, atmospheric and solar neutrino mixing angles θ_{13}, θ_{23} and θ_{12} have values compatible with the current data. The predictions for δ depend on the angles θ_{13}, θ_{23} and θ_{12} and have also simple
"leading order" and "next-to-leading order" approximate
forms. We compare the exact predictions for δ with
those obtained in the "leading order" approximation.
We investigate also the variation of the predictions
of δ with the variation of the values of the neutrino mixing angles θ_{13}, θ_{23} and θ_{12} in their
3σ experimentally allowed ranges.
Finally, we discuss other forms for the matrices U_e and U_ν which allow us to derive exact predictions for the CP violation phase δ. A measurement of $\cos\delta$
can allow to descriminate between the different forms of
U_e and U_ν considered in our study.

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