

Democratic neutrino mass matrix from generalized Fridberg-Lee model

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We propose a phenomenological model of the Dirac neutrino mass matrix based on the Fridberg-Lee neutrino mass model at a special point. In this case, the Fridberg-Lee model reduces to the Democratic mass matrix with the S_3 permutation family symmetry. The Democratic mass matrix has an experimentally unfavored degenerate mass spectrum on the base of tribimaximal mixing matrix. We rescue the model to find a nondegenerate mass spectrum by adding the breaking mass term as preserving the twisted Fridberg-Lee symmetry. The tribimaximal mixing matrix can be also realized. Exact tribimaximal mixing leads to $\theta_{13} = 0$. However, the results from Daya Bay and RENO experiments have established a nonzero value for θ_{13} . Keeping the leading behavior of U as tribimaximal, we use Broken Democratic neutrino mass model. We characterize a perturbation mass matrix which is responsible for a nonzero θ_{13} along with CP violation, besides the solar neutrino mass splitting has been resulted from it. We consider this work in two stages: In the first stage, we obtain the perturbation mass matrix with real components which breaks softly the $\mu - \tau$ symmetry and this leads to a nonzero value for θ_{13} . In the second stage, we extend the perturbation mass matrix to a complex symmetric matrix which leads to CP violation. Therefore obtain a realistic neutrino mixing matrix with $\theta_{23} = 45^\circ$. We obtain the solar mass splitting, the ordering of the neutrino masses is inverted. Using only two sets of the experimental data, we can fix all of the parameters of mass matrix and predict the masses of neutrinos and phases. These predictions include the following:

$$m_1 \approx (4.82 - 4.93)10^{-2}eV,$$

$$|m_2| \approx (4.90 - 5.01)10^{-2}eV, m_3 \approx 0 \text{ and,}$$

$$\phi \approx (0.687^\circ - 10.31^\circ) \text{ as the origin of the Majorana phases.}$$

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