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Diagonal reflection symmetries and universal four-zero texture

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In this seminar, we consider a set of new symmetries in the SM: {it diagonal reflection} symmetries $R m_{u,\nu}^* R = m_{u,\nu}$, $m_{d,e}^* = m_{d,e}$ with $R = \text{diag}(-1, 1, 1)$. These generalized CP symmetries predict the Majorana phases to be $\alpha_{2,3}/2 \sim 0$ or $\pi/2$.

By combining the symmetries with the four-zero texture, the mass eigenvalues and mixing matrices of quarks and leptons are reproduced well.

This scheme predicts the normal hierarchy, the Dirac phase $\delta_{CP} \simeq 203^\circ$, and $|m_1| \simeq 2.5$ or 6.2 [meV].

In this scheme, the type-I seesaw mechanism and a given neutrino Yukawa matrix Y_ν completely determine the structure of the right-handed neutrino mass M_R . A $u - \nu$ unification predicts the mass eigenvalues to be $(M_{R1}, M_{R2}, M_{R3}) = (O(10^5), O(10^9), O(10^{14}))$ [GeV].

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