

Tri-bimaximal-Cabibbo mixing: flavour violations in the charged lepton sector

The well understood structure of U_{pmns} matrix mandates a Cabibbo mixing matrix in the first two generations of the charged lepton sector if we assume Tri-bimaximal mixing in the neutrino sector. This ansatz, called Tri-bimaximal-Cabibbo mixing, is ruled out immediately by the experiments searching for charged lepton flavour violating currents. In this article, we aim to show that the resurrection of the theoretically well motivated Tri-bimaximal mixing scenario comes naturally within Minimal Flavour Violation hypothesis in the lepton sector. We analyse the flavour violating currents $\mu \rightarrow eee$, $\mu Ti \rightarrow eTi$, $\mu \rightarrow e\gamma$, $\pi^0 \rightarrow e^+\mu^-$ and $K_L \rightarrow \mu^+e^-$ in this scenario and show that the New Physics that generates mixing among the charged lepton could lie within the reach of hadron colliders. In the minimal field content scenario, though the most stringent constrain on New Physics is

$g_{trsim}\mathcal{O}(10 \text{ TeV})$ for maximal coupling, considering more natural couplings relaxes it to

$g_{trsim}\mathcal{O}(4 \text{ TeV})$. On the other hand, New Physics with the extended field content is even more strongly constrained to

$g_{trsim}\mathcal{O}(75 \text{ TeV})$ for maximal coupling, while it gets relaxed to

$g_{trsim}\mathcal{O}(31 \text{ TeV})$ for natural scenario.

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