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Adjoint $SU(5)$ GUT model with T_7 flavor symmetry

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We propose an adjoint $SU(5)$ GUT model with a T_7 family symmetry and an extra $Z_2 \otimes Z_2' \otimes Z_3 \otimes Z_4 \otimes Z_{12}$ discrete group, that successfully describes the prevailing Standard Model (SM) fermion mass and mixing pattern. The observed hierarchy of the charged fermion masses and the quark mixing angles arises from the $Z_3 \otimes Z_4 \otimes Z_{12}$ symmetry breaking, which occurs near to the GUT scale. The light active neutrino masses are generated by type I and type III seesaw mechanisms mediated by the fermionic $SU(5)$ singlet and the adjoint **24**-plet. We construct several benchmark scenarios, which lead to $SU(5)$ gauge coupling unification and are compatible with the known phenomenological constraints originating from the lightness of neutrinos, proton decay, dark matter, etc. These scenarios contain TEV scale colored fields, which could give rise to a visible signal or be stringently constrained at the LHC.

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