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Hunting for Hierarchies in $\mathcal{PSL}_2(7)$

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We present a model with the family group $\mathcal{PSL}_2(7)$ wherein the top quark hierarchy, through $SO(10)$ and the Seesaw mechanism, is mapped onto the vacuum values of familon fields and transferred to the $\Delta I_w = 0$ parameters of the ν MSSM: the right-handed neutrino Majorana mass \mathcal{M} and the mu term. It predicts tribimaximal mixing, and a normal hierarchy for the light neutrinos. The familon vacuum is used to derive the supersymmetric μ -masses of Higgs fields with family quantum numbers, as well as the Yukawa matrices of the quarks and leptons. We find, through the magic of $\mathcal{PSL}_2(7)$ invariants, a μ -matrix with a hierarchy of thirteen orders of magnitude. Only one Higgs field (per hypercharge sector) is light enough (with a μ -mass ~ 10 -100 GeV) to be destabilized by SUSY soft breaking at the TeV scale. Remarkably, their vacuum values generate unsuppressed masses only for t , b , and τ .

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