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

Tuesday 5 May 2015 15:00 (15 minutes)

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 $\Delta I_\mathrm{w} = 0$ parameters of the νMSSM: 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 unsupressed masses only for t, b, and τ.

Primary author: PEREZ, Michael (University of Flordia)

Presenter: PEREZ, Michael (University of Flordia)

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