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Fermion mass hierarchy from nonuniversal abelian extensions of the Standard Model

A nonuniversal abelian extension $U(1)_X$ free from chiral anomalies is introduced into the Standard Model (SM), in order to evaluate its suitability in addressing the fermion mass hierarchy (FMH) by using seesaw mechanisms (SSM). In order to break the electroweak symmetry, three Higgs doublets are introduced, which give mass at tree-level to the top and bottom quarks, and the muon lepton. With an electroweak singlet scalar field, the $U(1)_X$ symmetry is broken and the exotic particles acquire masses. The light particles in the SM obtain their masses via SSM and Yukawa couplings differences. Active neutrino masses are generated through inverse seesaw mechanisms (ISM). Additionally, the algebraic expressions for the mixing angles for quarks and leptons are also shown.

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