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Stabilizing the SM with Vector-like Fermions

Tuesday 28 June 2022 18:00 (15 minutes)

We address the notorious (meta-)stability issue of the standard model and pose it as a model building question: What does it take, in a minimally invasive way, to extend the standard model into a model that has neither poles nor instabilities up to the Planck scale?

We point out new ways to achieve this using vector-like fermions, which correspond to BSM quarks or leptons. We identify viable ranges of BSM parameters such as fermion multiplicities, masses and Yukawa interactions, which give rise to stable and predictive RG trajectories up to the Planckian regime. The vector-like fermions can be in the TeV-range, and searched for at the LHC. For a nontrivial flavor structure of the BSM sector severe constraints arise from tree-level FCNC's yielding lower mass bounds of up to several hundred TeV.

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