

4th Family is Natural in Technicolor

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Imagine to discover a new fourth family of leptons at the Large Hadron Collider (LHC) but no signs of an associated fourth family of quarks. What would that imply? An intriguing possibility is that the new fermions needed to compensate for the new leptons gauge anomalies simultaneously address the big hierarchy problem of the Standard Model. A natural way to accomplish such a scenario is to have the Higgs itself be composite of these new fermions. This is the setup we are going to investigate in this paper using as a template Minimal Walking Technicolor. We analyze a general heavy neutrino mass structure with and without mixing with the Standard Model families. We also analyze the LHC potential to observe the fourth lepton family in tandem with the new composite Higgs dynamics. We finally introduce a model uniting the fourth lepton family and the technifermion sector at higher energies.

Author: Prof. SANNINO, francesco (CP3-Origins)

Presenter: Prof. SANNINO, francesco (CP3-Origins)

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