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Hierarchical fermions and detectable Z' from an effective two-Higgs-triplet 3-3-1 model

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We develop a 3-3-1 model with new charged leptons where the cancellation of gauge anomalies fixes the number of fermion generations. Symmetry breaking is achieved effectively with two scalar triplets so that the scalar spectrum at the TeV scale contains just a charged and two CP even scalars. Such a scalar sector is simpler than the one in the Two Higgs Doublet Model, hence more attractive for phenomenological studies, and has no flavor changing neutral currents (FCNC) mediated by scalars except for the ones due to the mixing of Standard Model (SM) fermions with heavy fermions. We identify a global residual symmetry of the model which is later broken explicitly, with the introduction of effective operators, in such a way that all fermions become massive. The masses so generated require less fine-tuning for most of the SM fermions, and FCNC are naturally suppressed by the small mixing between the third family of quarks and the rest. The effective setting is justified by an ultraviolet completion of the model from which the effective operators emerge naturally. A detailed particle mass spectrum is presented, and an analysis of the Z' production at the LHC run II is performed.

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