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Collider signatures of new neutral scalars in a flavored multi-Higgs model

We propose and explore for the first time a new collider signature of heavy neutral scalars typically found in many distinct classes of multi-Higgs models. This signature, particularly relevant in the context of the Large Hadron Collider (LHC) measurements, is based on a topology with two charged leptons and four jets arising from first and second generation quarks. As an important benchmark scenario of the multi-Higgs models, we focus on a recently proposed Branco-Grimus-Lavoura (BGL) type model enhanced with an Abelian U(1) flavor symmetry and featuring an additional sector of right-handed neutrinos. We discuss how kinematics of the scalar fields in this model can be used to efficiently separate the signal from the dominant backgrounds and explore the discovery potential of the new heavy scalars in the forthcoming LHC runs. The proposed method can be applied for analysis of the statistical significance of heavy scalars' production at the LHC and future colliders in any multi-Higgs model.

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