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Flavour Physics meets Heavy Higgs Searches

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We point out that the stringent lower bounds on the masses of additional neutral and charged Higgs bosons crucially depend on the flavour structure of their Yukawa interactions. We show that these bounds can easily be evaded when flavour violation is allowed in the Higgs sector. As an illustration, we study the phenomenology of a two Higgs doublet model with a Yukawa texture arising from charging the right-handed top quarks under a new $U(1)_{PQ}$ symmetry, as arising from a variant axion model. We combine constraints from both low energy flavour physics measurements, LHC measurements of Higgs boson rates, and LHC searches for new Higgs bosons. We propose novel LHC searches for heavy Higgs bosons that could be performed in the coming years to unravel the existence of these new Higgs bosons.

Experimental Collaboration

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