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Light Yukawa couplings from double Higgs production

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One of the puzzles of the SM is the large hierarchy between the Yukawa couplings of different flavours. Yukawa couplings of the first and the second generation are constrained only very weakly so far. However, one can obtain large deviations in the Yukawa couplings in several New Physics (NP) models, such as e.g new vector-like quarks, or new Higgs bosons that couple naturally to individual fermion families. In this talk, we investigate the potential bounds on the NP Higgs Yukawa couplings modification κ_f for light quarks from double-Higgs at the LHC. We start discussing model-independent bounds and then we investigate specific models. We have looked at the Higgses' final states $b\bar{b}\gamma\gamma$, and the relevant experimental cuts to reduce backgrounds and estimated the potential exclusion bounds for κ_f and κ_λ that can be achieved at the LHC for some models.

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