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Probing Higgs couplings to light quarks via Higgs pair 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, I will talk about the potential bounds on the NP Higgs Yukawa couplings modification, and new $hh\bar{f}f$ coupling for light quarks from double-Higgs at the LHC, starting from a model independent formalism, to studying specific models. We have looked at the Higgs's' final states $b\bar{b}\gamma\gamma$, and the relevant experimental cuts to reduce backgrounds and estimated the potential exclusion bounds for light quark couplings with the Higgs. I will also talk about the potential for double Higgs production to probe non-linearity between Yukawa and $hh\bar{f}f$ couplings

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