

Double Higgs production in the Standard Model with extended scalar sector

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When the Standard Model is extended with extra scalar particles, they mix to form physical mass eigenstates. One of these eigenstates is associated with the recently discovered 125 GeV Higgs boson. If one of the other eigenstates is sufficiently massive, it may decay to two 125 GeV states, and thus provide significant contribution to the $pp \rightarrow hh$ cross section which in the Standard Model is as low as 40 fb for $\sqrt{s} = 14$ TeV—too low to be measured before the high-luminosity LHC upgrade. In this talk three models will be considered, the first extends the SM with an isosinglet, the second with an isotriplet, and the third with two isotriplets (the Georgi-Machacek model). The first two models have two neutral scalar particles. Bounds on the $pp \rightarrow hh$ cross section coming from electroweak precision observables (isosinglet) and custodial symmetry violation (one isotriplet) will be discussed. In the case of the isosinglet bounds allow for cross section values as high as 0.5 pb, while for the isotriplet only 20 extra fb is feasible. In the Georgi-Machacek model $pp \rightarrow hh$ cross section can reach 2 pb depending on model parameters.

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