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Search for a Higgs boson decaying to a pair of 125 GeV Higgs bosons (hh) or for a Higgs boson decaying to Zh, with tau leptons in the final state

A search for a Higgs boson (H) decaying into a pair of lighter (Standard Model like) 125 GeV Higgs bosons (h) or a Higgs boson (A) decaying into a Z boson and an h boson is presented. This search is performed on a dataset corresponding to an integrated luminosity of 19.7 fb^{-1} of pp collision data collected by CMS in 2012. A final state consisting of two tau leptons and two b-jets is used to search for the $H \rightarrow hh$ decay and a final state consisting of two tau leptons and two additional leptons, compatible with being the decay products of a Z boson, is used to search for the decay $A \rightarrow Zh$. This search is performed in the context of two benchmark scenarios: one scenario of the minimal supersymmetric extension to the standard model and one scenario of a two Higgs Doublet Model. No excess is found and upper limits at 95% confidence level are set on the production cross-section in the mass range $220 < m_A < 350 \text{ GeV}$ and $260 < m_H < 350 \text{ GeV}$.

Author: DEWANJEE, Ram Krishna (Tata Inst. of Fundamental Research (IN))

Presenter: DEWANJEE, Ram Krishna (Tata Inst. of Fundamental Research (IN))

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