

Searches of double Higgs boson production with CMS

Friday 6 July 2018 15:00 (15 minutes)

The search for standard model (SM) double Higgs boson (HH) production using data collected by the CMS detector at the CERN LHC will be presented, using final states from various decay channels: $HH \rightarrow bbbb$, $bbVV$, $bb\tau\tau$, and $bb\gamma\gamma$. The HH production serves to measure the self-coupling of the Higgs boson, the rate of which is small in the SM. However, contributions from beyond standard models can significantly enhance the rate. Furthermore, many BSM particles may decay to HH, which are then manifested as a resonance in the HH invariant mass spectrum. Also final state topologies are considered with highly Lorentz-boosted H bosons, which occur for high mass resonance decays, and for large non-SM contributions to the top quark-Higgs boson coupling strength. In this case, jet substructure-based H tagging techniques are used to identify H bosons in the hadronic decay channel. The results showcase the latest upper limits on the production cross sections of the double Higgs boson production, assuming SM and several non-SM Higgs boson self-coupling values. Upper limits are also placed on the production cross sections of massive spin-0 and spin-2 resonances decaying to a HH.

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Session Classification: Higgs Physics

Track Classification: Higgs Physics