

# Searches for Higgs boson pair production in final states with two bottom quarks and two tau leptons and in multilepton final states at CMS

*Wednesday, November 9, 2022 4:30 PM (15 minutes)*

The latest results on non-resonant Higgs boson pairs (HH) production in the bbtatau final state (where one Higgs boson decays into a pair of bottom quarks and the other decays into a pair of tau leptons) as well as in the multilepton final state will be presented. Both the gluon fusion and vector boson fusion production mechanisms are investigated. The bbtatau final state gives a good trade-off between a sizeable branching fraction (7.3%) and the purity of the tautau selection. This purity makes the bbtatau channel one of the most sensitive among those studied. These results considerably improve the latest ones published in 2016, profiting both from increased luminosity and novel analysis techniques that enhance the sensitivity of the search, i.e. extensive use of machine learning techniques for both event selection and signal extraction. The multilepton analysis selects 2-4 leptons and targets final states with 4 W bosons, 2 W bosons and 2 tau leptons, or 4 tau leptons.

## Type of talk

Experimental measurements

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**Session Classification:** Wednesday Session B

**Track Classification:** Physics Topics: Double Higgs