Contribution ID: **2** Type: **not specified**

Search for Higgs boson pair production in WWWW, WWtautau, and tautautautau decay modes based on proton-proton collision data recorded by the CMS detector in LHC Run 2

The discovery of the Higgs boson by the ATLAS and CMS collaborations a decade ago launched the particle physics community to a new era of research, with the primary goal of determining other properties of the boson. While it is true that the mass of Higgs boson, measured to be around 125 GeV, was the last remaining free parameter of the Standard Model (SM), there are plenty of well-motivated phenomenological models beyond the SM that foresee deviations in interaction rates involving the boson. A particularly compelling case is the production of Higgs boson pairs (HH), which directly probes still-elusive Higgs self-coupling and thereby provides access to the shape of electroweak potential, which is responsible for giving particles their masses, but also plays a key role in the stability of the Universe. It is therefore important to confirm that HH production rate really corresponds to the SM prediction.

This talk presents the searches of HH production in the WW^*WW^*, $WW^*\tau\tau$ and $\tau\tau\tau\tau$ decay modes. The analysis is based on 138/fb of proton-proton collsion data at $\sqrt{s} = 13$ TeV that was recorded by the CMS detector from 2016 to 2018. The final state of interest includes at least two to four electron, muons and hadronic tau decay products. Upper limits are set for nonresonant HH production, for a variety of effective field theory models, and for resonant HH production mediated by a heavy spin-0 or spin-2 particle. Constraints on the Higgs boson self-coupling are also presented.

Primary author: EHATÄHT, Karl (National Institute of Chemical Physics and Biophysics (EE))

Presenter: EHATÄHT, Karl (National Institute of Chemical Physics and Biophysics (EE))