



Contribution ID: 104

Type: Poster

Search for non-resonant HH production in the $b\bar{b}\gamma\gamma$ final state with the ATLAS detector

Since the discovery of the Higgs boson in 2012, a priority of the ATLAS and CMS Collaborations has been to better understand its properties and couplings, including those fundamental parameters that are related to interactions involving multiple Higgs bosons. A direct probe of the Higgs boson trilinear self-coupling is possible via Higgs boson pair production, making di-Higgs analyses particularly interesting. In addition, HH production via vector boson fusion, the second-leading HH production process, has a unique sensitivity to the interaction between two Higgs bosons and two vector bosons. Furthermore, enhancements to the di-Higgs production rate would point to new physics beyond the Standard Model, making such analyses interesting with the Run 2 dataset.

This poster presents a search for non-resonant production of Higgs boson pair in the two bottom quarks plus two photons final state. This final state benefits from the high BR for the $H \rightarrow b\bar{b}$ decay while the low BR for the $H \rightarrow \gamma\gamma$ decay is compensated by the excellent photon trigger and resolution, resulting in a clean signature. The data set used corresponds to an integrated luminosity of 140/fb of proton-proton collisions at a center-of-mass energy of 13 TeV recorded by the ATLAS detector at the CERN Large Hadron Collider. The analysis strategy is optimised for HH production via the two dominant production modes (gluon-gluon fusion and vector-boson fusion) to probe anomalous values of the trilinear Higgs boson self-coupling modifier $k\Lambda$ and of the quartic HHVV ($V=W,Z$) coupling modifier k_2V . No excess over the SM background expectations is found and upper limits on the Higgs boson pair production signal strength are set. Constraints on the two coupling parameters $k\Lambda$ and k_2V will also be presented. The results are further interpreted in an effective field theory framework in terms of constraints on anomalous Higgs boson (self-)interactions.

Collaboration / Activity

ATLAS

Presenter: JIA, Zihang (Nanjing University)**Session Classification:** Poster session**Track Classification:** Higgs Physics