

Effective Field Theory interpretations of Higgs boson pair production searches in ATLAS

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After the discovery of the Higgs boson in 2012, an important test of the electroweak symmetry breaking would be to establish evidence of the Higgs boson self-coupling, which can be achieved through a measurement of Higgs boson pair production. In the Standard Model (SM), di-Higgs events are dominantly produced in gluon-gluon fusion processes at the LHC, e.g. involving the Yukawa coupling to top quarks (top-quark loops) or via the Higgs boson self-coupling. These two production modes interfere destructively, which leads to a very small di-Higgs production cross-section. However, deviations in couplings of the Higgs boson from SM expectation as well as new vertices in Effective Field Theories (EFT) could lead to a significant enhancement of the di-Higgs production rate. A re-interpretation of the search for non-resonant Higgs boson pair production in terms of Higgs EFT (HEFT) benchmark models is presented. Upper limits on the HH production cross-section are set for seven HEFT benchmark models and exclusion limits are set on two HEFT coupling parameters associated with the couplings of a Higgs boson pair with two gluons, $c_{\{ggh\}}$, and with a top-quark pair, $c_{\{tth\}}$.

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