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Study of Higgs boson pair production in the □□ → □□□□ final state with 308 fb−1 of data collected at √ □ = 13 TeV and 13.6 TeV by the ATLAS experiment

Saturday, 1 November 2025 18:00 (20 minutes)

A search for Higgs boson pair production in the $b\bar{b}\gamma\gamma$ final state is performed.
The proton–proton collision dataset corresponds to an integrated luminosity of 308 fb^{-1}, consisting of two samples, 140 fb^{-1} at a centre-of-mass energy of $\sqrt{s} = 13TeV$ and 168 fb^{-1} at $\sqrt{s} = 13.6TeV$, recorded between 2015 and 2024 by the ATLAS detector at the CERN Large Hadron Collider.
In addition to a larger dataset, this analysis improves upon the previous search in the same final state through several methodological and technical developments.
The Higgs boson pair production cross section divided by the Standard Model prediction is found to be $\mu_{HH} = 0.9^{+1.4}_{-1.1}$ ($\mu_{HH} = 1^{+1.3}_{-1.0}$ expected), which translates into a 95\% confidence-level upper limit of $\mu_{HH} < 3.8$.
At the same confidence level the Higgs self-coupling modifier is constrained to be in the range $-1.7 < \kappa_\lambda < 6.6$ ($-1.8 < \kappa_\lambda < 6.9$ expected).

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