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Search for non-resonant di-Higgs production in the $b\bar{b}\gamma\gamma$ final state at 13 TeV with the ATLAS experiment

The $b\bar{b}\gamma\gamma$ channel is one of the most sensitive HH final states for measuring the Higgs self-coupling and di-Higgs production cross-section. This analysis capitalizes on the clean signature of the two photons in the final state combined with the high branching ratio of $H \rightarrow b\bar{b}$. This talk will present the latest non-resonant ATLAS $HH \rightarrow b\bar{b}\gamma\gamma$ results with the full Run 2 dataset of 139 /fb at 13 TeV. The analysis uses a multivariate approach to target high and low HH mass regions to maximize the sensitivity to modifications of the Higgs self-coupling. This result sets the observed (expected) upper limits on the non-resonant HH production cross-section at a 95% confidence level at 130 fb (180 fb), which corresponds to 4.1x (5.5x) the Standard Model value. The analysis provides the strongest observed (expected) limits on the self-coupling of -1.5-6.7 (-2.4-7.7) to date.

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