

# Search for Higgs boson pairs with multi-lepton final states in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

A search is presented for non-resonant Higgs boson pair production decaying to multi-lepton final states using 140 fb<sup>-1</sup> of proton-proton collision data at centre-of-mass energy 13 TeV, recorded with the ATLAS detector during Run 2 of the LHC. Nine search channels with varying multiplicities of electrons, muons, taus, and photons are combined to determine the observed (expected) limit on the signal strength, found to be 17 (11) times the Standard Model prediction. The observed (expected) 95% confidence interval constraints on the HHH coupling modifier,  $\kappa\lambda$ , are  $-6.2 < \kappa\lambda < 11.6$  ( $-4.5 < \kappa\lambda < 9.6$ ). A projection of the sensitivity of this analysis to non-resonant Higgs boson pair production to the High Luminosity LHC (LH-LHC) is also presented, assuming a centre-of-mass energy 14 TeV and integrated luminosities up to 3000 fb<sup>-1</sup>.

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