

Search for a resonance decaying into a scalar particle and a Higgs boson in final states with leptons and two photons in proton–proton collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector

A search for a hypothetical heavy scalar particle, X , decaying into a singlet scalar particle, S , and a Standard Model Higgs boson, H , using 140 fb^{-1} of proton–proton collision data at the centre-of-mass energy of 13 TeV recorded with the ATLAS detector at the LHC is presented. The explored mass range is $300 \leq m_X \leq 1000$ GeV and $170 \leq m_S \leq 500$ GeV. The signature of this search is one or two leptons (e or μ) from the decay of vector bosons originating from the S particle, $S \rightarrow W^\pm W^\mp / ZZ$, and two photons from the Higgs boson decay, $H \rightarrow \gamma\gamma$. No significant excess is observed above the expected Standard Model background. The observed (expected) upper limits at the 95% confidence level on the cross-section for $gg \rightarrow X \rightarrow SH$, assuming the same $S \rightarrow WW/ZZ$ branching ratios as for a SM-like heavy Higgs boson, are between 530 (800) fb and 120 (170) fb.

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