Search for Pair Production of Boosted Higgs Bosons via Vector-Boson Fusion in the $b\bar{b}b\bar{b}$ Final State Using pp Collisions at $\sqrt{s} = 13TeV$ with the ATLAS Detector

A search for Higgs boson pair production via vector-boson fusion is performed in the Lorentzboosted regime, where a Higgs boson candidate is reconstructed as a single large-radius jet, using 140 fb^{-1} of proton–proton collision data at $\sqrt{s} = 13TeV$ recorded by the ATLAS detector at the Large Hadron Collider. Only Higgs boson decays into bottom quark pairs are considered. The search is particularly sensitive to the quartic coupling between two vector bosons and two Higgs bosons relative to its Standard Model prediction, κ_{2v}. This study constrains κ_{2v} to $0.55 < \kappa_{2v} < 1.49$ at 95% confidence level. The value $\kappa_{2v} = 0$ is excluded with a significance of 3.8 standard deviations with other Higgs boson couplings fixed to their Standard Model values. A search for new heavy spin-0 resonances that would mediate Higgs boson pair production via vector-boson fusion is carried out in the mass range of 1–$5TeV$ for the first time under several model and decay-width assumptions. No significant deviation from the Standard Model hypothesis is observed and exclusion limits at 95% confidence level are derived.

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