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Measurement of associated production of Higgs bosons decaying to pairs of W bosons with the ATLAS detector at the Large Hadron Collider

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Higgs boson production in association with a vector boson provides direct access to the Higgs boson's couplings to vector bosons given knowledge of the other branching fractions of the Higgs. The values of these couplings are predicted by measurements of the electroweak coupling strengths and the vacuum expectation value of the Higgs field, and so measurements of associated production provide stringent tests of the Standard Model of Particle Physics. In this talk, I will present a measurement of associated production of Higgs bosons (VH) decaying to pairs of W bosons ($H \rightarrow WW^*$) with the ATLAS detector. The measurement utilizes 139 fb^{-1} of proton-proton collision data collected by ATLAS at centre-of-mass energy 13 TeV during the Large Hadron Collider's Run 2. The corresponding analysis is performed in several categories across 2-, 3-, and 4-lepton final states and utilizes a diverse set of machine learning algorithms for signal extraction. The VH production cross sections times the $H \rightarrow WW^*$ branching ratio, measured both inclusively and in the context of the Simplified Template Cross Section Framework, are reported and found to agree with their Standard Model expectations. To date, this is the most precise measurement of VH production in the $H \rightarrow WW^*$ decay channel ever performed and a near observation of the process at 4.6σ above the background-only hypothesis.

Keyword-1

Higgs boson physics

Keyword-3

Machine learning

Keyword-2

Large Hadron Collider

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