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Search for Higgs boson pair production in the bbtautau final state with the ATLAS detector

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The discovery of the Higgs boson and the measurement of its properties confirming the Standard Model (SM) is a major step towards the understanding of electroweak symmetry breaking. As a result, the potential of the Higgs field, and therefore the self-coupling of the Higgs boson, is precisely predicted in the SM. It can be probed by measuring the cross section of Higgs boson pair production, offering an additional test of the SM. In the SM such measurements are difficult due to the destructive interference of amplitudes containing the self-coupling and amplitudes only containing Yukawa couplings to top quarks, leading to a small production cross section at the Large Hadron Collider (LHC). An enhancement would indicate the presence of physics beyond the SM, for example due to scalar resonances decaying into pairs of Higgs bosons. A search for non-resonant and resonant Higgs boson pair production in events with two b-jets and two tau-leptons is presented. It is performed using 139/fb of pp collision data recorded at sqrt(s) = 13 TeV by the ATLAS experiment during Run 2 of the LHC. The analysis considers semi-leptonic and fully hadronic di-tau final states and aims to set upper limits on the production cross section of Higgs boson pairs in the SM as well as on the resonant production of narrow-width scalars with masses ranging from the Higgs pair production threshold up to 1.6 TeV.

speaker known

Authors: ATLAS COLLABORATION; RIU, Imma (IFAE Barcelona (ES))

Presenter: DEUTSCH, Christopher (University of Bonn (DE))

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