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Search for the Standard Model Higgs boson produced in association with top quarks in pp collisions at 8 TeV with the ATLAS detector at the LHC

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The physics program of the ATLAS experiment pursued at the Large Hadron Collider (LHC) at CERN succeeded in the observation of a new particle in the search for the Standard Model Higgs boson. The Higgs boson production in association with a top-quark pair provides key features to further investigate the nature of the Higgs boson. Its coupling to other bosons was discovered and evidence for its coupling to fermions is given. The associated $t\bar{t}H$ production with the Higgs decay into two bottom quarks provides a good opportunity to probe its coupling strength to top and bottom quarks in the production and decay, respectively. In order to improve the signal sensitivity of the search, multivariate analysis techniques are used to enhance the background and signal separation power relying on robust signal and background models. Therefore, dedicated studies of the $t\bar{t}H$ signal predictions by various Monte Carlo generators at different orders in QCD perturbation theory including differing features and the evaluation of systematic uncertainties assessed to the signal model were studied. The search for the $t\bar{t}H$ ($H \rightarrow b\bar{b}$) in pp collisions at ATLAS is presented. The analysis is based on the 8 TeV data recorded during Run I of the LHC and corresponds to an integrated luminosity of 20.3 fb^{-1} .

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