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Identification of the Higgs boson produced in association with top quark pairs in proton-proton collisions: an analysis of the final state containing three leptons with the ATLAS detector

The associated production of the Higgs boson with top quarks ($t\bar{t}H$) allows to constrain the top Yukawa coupling. This coupling is a key parameter of the Standard Model and its direct study through the $t\bar{t}H$ production mode is one of the most challenging in the ATLAS physics program at LHC.

An explorative analysis for this process has been performed using Run2 data recorded by the ATLAS detector in 2015 and 2016 at a center of mass energy of 13 TeV. The studied final has three charged light leptons (electrons and muons) and hadronic jets. The primary targets are the Higgs boson decays in vector bosons and tau leptons ($H \rightarrow WW$, $H \rightarrow ZZ$, $H \rightarrow \tau\tau$).

This poster will describe the physical object definition, the analysis strategy, the estimation and the modeling of the main backgrounds. An event reconstruction technique has been performed in order to disentangle the $t\bar{t}H$ signal and the main backgrounds. The event reconstruction has been additionally used as input for a multivariate analysis technique.

Results are shown in terms of the ratio between the measured cross section and the one predicted by the Standard Model.

Experimental Collaboration

ATLAS

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