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Search for the associated production of the Higgs boson with a top quark pair at the ATLAS experiment

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The associated production of the Higgs boson with a pair of top-anti top quarks ($t\bar{t}H$) is the only process providing the direct access to the measurement of the Yukawa coupling between the Higgs boson and the top quark. Moreover, it allows to investigate new possible scenarios of physics Beyond Standard Model. The presented results exploit the data collected by the ATLAS experiment at LHC at a center-of-mass energy of 13 TeV, during 2015 and 2016. The results and the statistical significance will be shown for different final states, sensitive to different Higgs boson decay modes, and for their combination. A special focus will be presented for the experimental techniques used for the extraction of this rare signal and the estimate of the main backgrounds. The current status of the analyses and several possible future perspectives will be discussed with a particular attention to the innovative channel at high transverse momentum.

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