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Probing the CP nature of the top-Higgs coupling in ATLAS

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The observation of the Higgs boson production in association with a top quark pair ($t\bar{t}H$) by ATLAS and CMS in 2018 directly confirmed the existence of the top quark Yukawa coupling. The Standard Model (SM) predicts a CP-even structure to this coupling, but a CP-odd component can arise in models beyond the SM (BSM). Recently, ATLAS and CMS searched for such a component in analyses targeting $t\bar{t}H$ events in which the Higgs decays to 2 photons. However, the Higgs-photon coupling is loop-induced and could be affected by BSM effects.

We will probe the CP nature of the top-Higgs interaction by analyzing $t\bar{t}H$ events in the $H \rightarrow b\bar{b}$ decay channel, using the full Run-2 data collected by the ATLAS experiment. I will present the analysis strategy for the measurement, the main challenges in modelling signal and background processes and the expected sensitivity for discovery or exclusion of new physics.

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