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Between even and odd: probing the CP nature of the Higgs-top Yukawa coupling

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As we enter the era of precision at the LHC, excluding specific charge-parity (CP) scenarios is no longer enough: we want to detect and precisely measure the angle that determines the possible admixture of CP-even and CP-odd components in the Higgs-top Yukawa coupling. The Higgs boson production in association with top-quarks ($t\bar{t}H$ and tH), in the $H \rightarrow b\bar{b}$ decay channel, offers a unique possibility to study this interaction since it depends only on Yukawa couplings and relies on the tree-level couplings between the Higgs and the fermions. Targeting events where one or both top quarks decay leptonically provides a handle to reconstruct the top-quarks, whose four-momenta can be used to construct CP-sensitive observables. In this communication, the first measurement of the CP-mixing angle in the $t\bar{t}H(H \rightarrow b\bar{b})$ channel using the full Run-2 dataset collected by the ATLAS experiment will be presented.

In-person participation

Yes

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