

# Examining the CP properties of the top-Yukawa and the ggH coupling

Wednesday 6 November 2024 15:40 (20 minutes)

The  $\mathcal{CP}$  structure of the Higgs couplings is a fundamental property which has not yet been constrained with high precision. The Higgs-top quark coupling is of particular interest due to its size and accessibility at the LHC via top-associated Higgs production and gluon fusion. To improve the sensitivity to the CP property of this coupling, we propose an extension to the STXS framework of the tH process by extending the binning in the transverse momentum of the Higgs boson  $p_{T,H}$  by either the pseudorapidity difference of the two top-quarks  $\Delta\eta_{t\bar{t}}$ , or a variable that is based on the top quark momenta, namely  $b_2$  or the Collins-Soper angle  $|\cos^*|$ . Furthermore, we exploit the  $\mathcal{CP}$  sensitivity of a so far neglected phase space region for gluon fusion with a multivariate approach. Our results suggest that significant improvements in current experimental limits are possible.

## Primary track

### Is the speaker a PhD student or post-doc?

Yes - I need some financial support (fee reduction) to attend Higgs 2024

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**Session Classification:** Common session: precision & BSM 2 - sal IX

**Track Classification:** BSM Higgs physics