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## Enhancing the $t\bar{t}$ Higgs signal through top-quark spin polarization effects at the LHC

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We compare the impact of top-quark spin polarization effects in Higgs (H) boson production in association with top-quark pairs and in corresponding backgrounds at the LHC. Because of the spin-zero nature of the Higgs boson, one expects, in the chiral limit for the top quarks, a substantial complementarity in  $t\bar{t}$  spin correlations for a Higgs decaying into fermions/gauge-bosons and  $t\bar{t}$  spin correlations for the corresponding irreducible  $t\bar{t}f\bar{f}/VV$  backgrounds. Although top mass effects in  $t\bar{t}H$  production are in general dominant, and seriously spoil the chiral-limit expectations, one can find observables that capture the  $t\bar{t}$  angular spin correlations and can help in separating the signal from irreducible backgrounds. In particular, we show that, for both  $H \rightarrow b\bar{b}$  and  $H \rightarrow \gamma\gamma$ , taking into account  $t\bar{t}$  spin correlations in  $t\bar{t}H$  production and irreducible backgrounds could appreciably improve the LHC sensitivity to the  $t\bar{t}H$  channel.

### Summary

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