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Probing the Anomalous FCNC Interactions in a Top-Higgs Final State and Charge Ratio Approach

We study the anomalous production of a single top quark in association with a Higgs boson at the LHC originating from flavor changing neutral current (FCNC) interactions in tqg and tqH vertices. We derive the discovery potentials and 68% C.L. upper limits considering leptonic decay of the top quark and the Higgs boson decay into a $b\bar{b}$ pair with 10 fb^{-1} integrated luminosity of data in proton-proton collisions at the center-of-mass energy of 14 TeV. We propose a charge ratio for the lepton in top quark decay in terms of lepton p_T and η as a strong tool to observe the signal. In particular, we show that the charge ratio increases significantly at large p_T of the charged lepton. While the main background from $t\bar{t}$ is nearly charge symmetric and W +jets background has much smaller charge ratio with respect to the signal. We show that this feature can also be used in the probe of anomalous single top production with a Z -boson or a photon which are under the attention of the experimental collaborations.

Summary

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