

## Exploring the top-Higgs FCNC couplings at colliders

The search for the Flavor Changing Neutral Current (FCNC) processes, has been one of the leading tools to test the Standard Model (SM), in an attempt of either discovering or putting stringent limits on the new physics scenarios.

Within the SM, there are no FCNC transitions at

tree level, mediated by the Higgs Boson. These processes are severely suppressed by the unitarity constraints of the Cabibo-Kobayashi-Maskawa matrix. The top quark being the heaviest of all the quarks has the largest Yukawa coupling to the Higgs boson. The large production rate of the top quarks in the LHC, allows one to look for transition of the top quark to a quark of different flavor but same charge. This suggests looking for rare neutral flavor changing transitions,  $t \rightarrow cH$ ,  $t \rightarrow uH$ , as no symmetry prohibits this decay. The SM branching ratio of this process is extremely small, of the order  $BR(t \rightarrow cH)_{SM} \approx 10^{-15}$ . This is many orders of magnitude too small to be measured in the 14 TeV LHC. Therefore an affirmative observation of the process  $t \rightarrow qH$ , well above the SM rate, will be a conclusive indication of new physics beyond the SM.

We explore the FCNC top-Higgs decays in detail at polarized linear colliders and compare results with the existing LHC searches to constrain the FCNC couplings. Moreover, we emphasize advantages of linear collider searches over the hadronic ones, in particular for discriminating between chiralities of FCNC couplings.

### I intend to submit my contribution for the proceedings

Yes

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