PROCEEDINGS OF SCIENCE

Search for flavor changing neutral current in top quark and Higgs boson interaction at $\sqrt{s}$ =13 TeV

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Searches for flavor changing neutral currents in production and decay of top quark pair and single top process using the data collected by the Compact Muon Solenoid (CMS) experiment at $\sqrt{s}$ = 13 TeV in 2016 is presented, corresponding to an integrated luminosity of 35.9 fb^{-1}. Final states with one isolated lepton and at least three jets including 2 b-tagged jets are selected. In both single top (pp→tH) and $t\bar{t}$ (t→qH) decays, only the H→$b\bar{b}$ decay is selected. No significant deviation is observed from the standard model prediction. Observed (expected) upper limits are obtained at 95% confidence level, which are B(t→uH) < 0.47% (0.34%) and B(t→cH) < 0.47% (0.44%).

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1. Introduction

In the Standard Model (SM), the Flavor Changing Neutral Current (FCNC) can occur only at the loop level with the branching ratio of less than 10^{-13}[1]. However, various models beyond the SM predict measurable FCNC decays, e.g. the branching ratios of top decaying to a charm or up quark and a Higgs boson which are one of the most interesting research topic in top physics. Search for FCNC in production and decay of top quark pair and single top process using the data collected by the Compact Muon Solenoid (CMS) experiment at $\sqrt{s}$ = 13 TeV in Run II 2016 is presented at ICHEP 2018 conference.

2. Analysis Strategy

Firstly, the events with one isolated lepton and at least three jets including 2 b-tagged jets are selected. For signal events, Higgs decaying to $b\bar{b}$ channel is selected. Then the events divided into several categories with respect to the jet and b-tagged jet multiplicities. The events are reconstructed using kinematic fit and Boosted Decision Tree (BDT), to resolve missing transverse energy and perform jet assignment respectively. Finally, BDT is utilized with kinematic variables from event reconstruction to discriminate signal events from SM background. The dominant systematic uncertainty source is b-tagging discriminator shape correction.

3. Results

Since no significant deviation is observed from the standard model prediction, observed (expected) upper limits are obtained at 95% confidence level for each jet categories and combined. In Figure 1, expected and observed limits on cross sections and branching ratios are presented. The combined results are: B(t→uH) < 0.47% (0.34%) and B(t→cH) < 0.47% (0.44%).

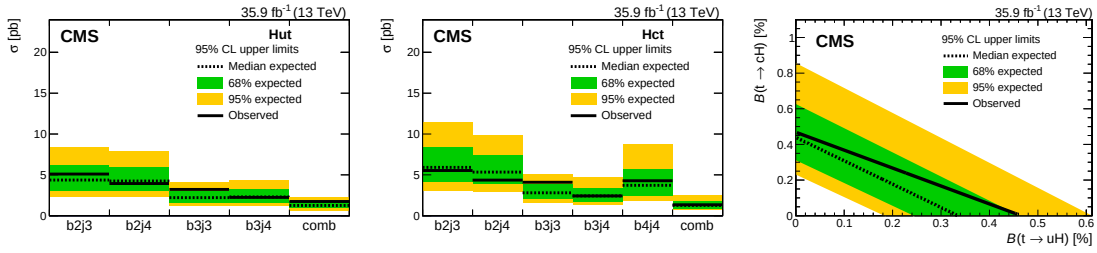

Figure 1: Observed and expected 95% CL upper limits on cross sections with respect to the Hut (left) and Hct (center) couplings, and branching ratios (right).

References

[1] J. A. Aguilar-Saavedra, *Top flavor-changing neutral interactions: Theoretical expectations and experimental detection*, Acta Phys. Polon. B **35**, 2695 (2004) [hep-ph/0409342].

[2] CMS Collaboration, *Search for the flavor-changing neutral current interactions of the top quark and the Higgs boson which decays into a pair of b quarks at $\sqrt{s}$= 13 TeV*, JHEP **1806**, 102 (2018).

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