

Upper limits on the branching ratio for top decaying to a bottom and a charged Higgs boson

Based on 1.03 fb⁻¹ of proton-proton collision data at $\sqrt{s} = 7$ TeV recorded with the ATLAS detector, upper limits on the branching ratio of top decaying to a bottom and a charged Higgs were extracted by performing a profile likelihood statistical analysis. Using the single- and di-lepton channels with leptonically decaying tau(s) in the final state, we found that data agree well with the Standard Model expectation. Assuming $B(H^+ \rightarrow \tau \nu) = 1$, the upper limits on the branching fraction $B(t \rightarrow bH^+)$ were found to be between 5.2% and 14.1% for H^+ masses in the range 90 GeV to 160 GeV. Previous measurements of the $t\bar{t}$ cross sections have usually been made under the assumption that the top decays exclusively to a bottom and a W boson, but this analysis can obviously not rely on such an assumption. Thus, a control region was used to estimate the $t\bar{t}$ cross section. However, one can not simply neglect a small, but potential signal contamination in the control region. In order to account for a potential signal contamination, the control region was implemented in the likelihood function as a counting experiment.

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