ABSTRACT

SEARCH FOR CHARGED HIGGS BOSONS IN THE $\tau + \ell$FINAL STATE WITH 36.1 fb^{-1}OF ppCOLLISION DATA AT $\sqrt{s} = 13$ WITH THE ATLAS EXPERIMENT

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This dissertation uses 139 $\text{fb}^{-1}$of ppcollision data collected at a center of mass energy of $\sqrt{s} = 13$ by the ATLAS detector to search for charged Higgs bosons decaying to a tau lepton and a neutrino ($H^{\pm} \to \tau^{\pm}\nu_{\tau}$) in association with a leptonically decaying top quark. No significant excess was found, therefore limits are set at the 95% confidence level on the charged Higgs production cross section times the branching fraction into the $\tau^{\pm}\nu_{\tau}$ranging from XX pb to XX fb. These limits are interpreted in the hMSSM benchmark scenario as an exclusion at 95% confidence on tanas a function of $m_{H^{\pm}}$. In this scenario, for $tan = 60$, the $H^{\pm}$mass range up to $XXXXGeV$ is excluded, with all values of tanexcluded for $m_{H^{\pm}} \leq XXXGeV$

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DEDICATION

To Dr. Dhiman Chakraborty. Thank you for everything.

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