

# Light charged Higgs boson with dominant $cb$ decay from 3HDM and its search at LHC and future colliders

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I am working with Professor Stefano Moretti and Doctor Andrew Akeroyd on charged Higgs phenomenology in the University of Southampton recently. We posted the paper in October 2018 on arXiv:1810.05403.

The possibility of a light charged Higgs boson  $H^\pm$  that decays predominantly to quarks ( $cs$  and/or  $cb$ ) and with a mass in the range  $80 \text{ GeV} \leq m_{H^\pm} \leq 90 \text{ GeV}$  is studied in the context of Three- Higgs-Doublet Models (3HDMs). At present the Large Hadron Collider (LHC) has little sensitivity to this scenario, and currently the best constraints are from LEP2 and Tevatron searches. The branching ratio of  $H^\pm \rightarrow cb$  can be dominant in two of the five types of 3HDM, and we determine the parameter space where this occurs. The decay  $H^\pm \rightarrow cb$  has recently been searched for at the LHC for the first time, and with increased integrated luminosity one would expect sensitivity to the region  $80 \text{ GeV} \leq m_{H^\pm} \leq 90 \text{ GeV}$  due to the smaller backgrounds with respect to  $H^\pm \rightarrow cs$  decays.

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