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# Probing a light charged Higgs boson at the LHC Run 3

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Most of the current experimental searches for charged Higgs bosons at the Large Hadron Collider (LHC) concentrate upon the  $tb$  and  $\tau\nu$  decay channels. In this study, we analyze the feasibility of the bosonic decay channel  $W^{\pm(*)}h$  instead, with the charged gauge boson being either on-shell or off-shell and  $h$  being a neutral light Higgs boson. Focusing on the Two-Higgs Doublet Model (2HDM), we consider the associated production of a charged Higgs with such a light neutral one,  $pp \rightarrow H^{\pm}h$ , at the LHC followed by the aforementioned charged Higgs boson decay, which leads to various signatures. We specifically study the  $W^{\pm(*)} + 4b/4\gamma$  final states and provide several Benchmark Points (BPs) for Monte Carlo (MC) analysis. We prove that there is a strong possibility that these signals could be found at the LHC with the centre of mass energy of 14 TeV and luminosity of  $300 \text{ fb}^{-1}$ .

## Collaboration / Activity

Collaborative Research

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