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Single charged Higgs boson production at the LHC

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A search for charged Higgs may yield clear and direct sign
of new physics outside the realm of the Standard Model (SM). In the Two-Higgs
Doublet Model (2HDM), we investigate two of the main single charged Higgs
production channels at the Large Hadron Collider (LHC), assuming that either h or
H replicates the detected resonance at ~ 125 GeV; we ponder the practicality of
the associated charged Higgs production through the channel pp ⟶ H ± W ∓ and
pp ⟶ H ± bj that could have further substantial challenges at the LHC experiments.
Our study in this regard shows that the cross sections can have sizable rates, at
low tanβ so long the condition M H ± < m t − m b is satisfied, in the viable
parameter space. We propose a set of benchmark points with various unexplored
LHC signatures, arising from the aforementioned charged Higgs boson production
in both 2HDM type-I and type-X, to enhance the LHC search for such a particle.

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