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Light Charged Higgs Bosons in Single-Top Production

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The Two Higgs Doublet Model (2HDM) is one of the simplest extensions to the Standard Model Higgs sector, and predicts the existence of additional Higgs bosons, including a pair of charged Higgs bosons H^\pm and a pseudoscalar Higgs boson A . Existing searches for the charged Higgs mostly focus on the $H^\pm \rightarrow \tau\nu/cs$ decay channels. For light A 's, $H^\pm \rightarrow AW$ becomes kinematically accessible and competitive with the conventional channels. We examine the single top production channel with $t \rightarrow bH^\pm$, and the subsequent decay chain of $H^\pm \rightarrow AW \rightarrow \tau\tau\nu$. We perform a collider analysis and obtain exclusion and discovery reach at the 14 TeV LHC with 100 fb⁻¹ integrated luminosity. We further study the implication of the search limits on the Type II 2HDM.

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