Light Charged Higgs Bosons in Two Higgs Doublet Models

ADARSH PYARELAL, University of Arizona — 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 $H^\pm \to \tau \nu / cs$ decay channels. For light $A$s, $H^\pm \to AW$ becomes kinematically accessible and competitive with the conventional channels. We examine the single top production channel with $t \to bH^\pm$, and the subsequent decay chain of $H^\pm \to AW \to \tau \ell \nu$. 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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