



Production of the heaviest charged Higgs boson in 3-3-1 models

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In this work we study the production cross section of the heaviest charged Higgs bosons ($H_{2^{\pm}}$) predicted by the $SU(3)_c \times SU(3)_L \times U(1)_x$ gauge model (3-3-1 model) without exotic charges. Taking into account intermediate vector bosons, including a new Z' neutral boson predicted by the model, we calculate the cross section of $H_{2^{\pm}}$ pair production in Drell-Yan processes at CERN-LHC hadron collider. For two Z' masses ($M_{Z'}=1.8$ and 2.2 TeV) we found that the cross section decreases appreciably at the $H_{2^{\pm}}$ mass values of 0.9 TeV and 1.1 TeV, respectively. In order to explore differences with other charged Higgs bosons, we compare our results with the lighter $H_{1^{\pm}}$ Higgs of the same model and the charged Higgs boson of the Two Higgs Doublet Model (2HDM), where we found that it is possible to distinguish the $H_{2^{\pm}}$ bosons from others charged bosons.

Summary

Models with gauge symmetry $SU(3)_c \times SU(3)_L \times U(1)_x$, also called 3-3-1 models, arise as an interesting alternative that explains some of the fundamental problems of the Standard Model (SM). For example, introducing a family non-universal $U(1)$ symmetry, the 3-3-1 models can account for the family replication problem and may generate a hierarchical difference between the heaviest quark family and the two lighter. These models introduce new types of heavy particles, which may be searched at Hadron Colliders, providing additional information on the nature of the extended gauge structure beyond the SM. In particular, these models extend the scalar sector of the SM into three $SU(3)_L$ scalar triplets. In the version without exotic charges, after the spontaneous breaking of the gauge symmetry, the model contains 4 massive charged Higgs ($H_{1^{\pm}}, H_{2^{\pm}}$), one neutral CP odd Higgs (A^0), 3 neutral CP even Higgs (h^0, H^0, H_{2^0}), and one complex neutral Higgs (H_{3^0}). In particular, several production and decay channels of the lightest charged Higgs bosons $H_{1^{\pm}}$ at LHC have been calculated in the literatura. In this work, we study the Drell-Yan pair production cross section of the heaviest charged Higgs bosons ($H_{2^{\pm}}$), including the contribution of a new Z' neutral boson associated to the $SU(3)_L$ gauge sector.

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