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Search for charged Higgs bosons in the $H^{+/-} \rightarrow \tau^{+/-}\nu(\tau)$ decay channel in proton-proton collisions at $s=13$ TeV

By: Sirunyan, AM (Sirunyan, A. M.)^[1]; Tumasyan, A (Tumasyan, A.)^[1]; Adam, W (Adam, W.)^[2]; Ambrogio, F (Ambrogio, F.)^[2]; Asilar, E (Asilar, E.)^[2]; Bergauer, T (Bergauer, T.)^[2]; Brandstetter, J (Brandstetter, J.)^[2]; Dragicevic, M (Dragicevic, M.)^[2]; Ero, J (Ero, J.)^[2]; Del Valle, AE (Del Valle, A. Escalante)^[2] ...More

Group Author(s): CMS Collaboration

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Abstract

A search is presented for charged Higgs bosons in the $H^{+/-} \rightarrow \tau^{+/-}\nu(\tau)$ decay mode in the hadronic final state and in final states with an electron or a muon. The search is based on proton-proton collision data recorded by the CMS experiment in 2016 at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb⁻¹. The results agree with the background expectation from the standard model. Upper limits at 95% confidence level are set on the production cross section times branching fraction to $\tau^{+/-}\nu(\tau)$ for an $H^{+/-}$ in the mass range of 80 GeV to 3 TeV, including the region near the top quark mass. The observed limit ranges from 6 pb at 80 GeV to 5 fb at 3 TeV. The limits are interpreted in the context of the minimal supersymmetric standard model $m(h)(\text{mod-})$ scenario.

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Author Information

Reprint Address: Sirunyan, AM (reprint author)

Yerevan Phys Inst, Yerevan, Armenia.

Addresses:

[1] Yerevan Phys Inst, Yerevan, Armenia

[2] Inst Hochenergiephys, Vienna, Austria

[3] Inst Nucl Problems, Minsk, BELARUS

[4] Univ Antwerp, Antwerp, Belgium

[5] Vrije Univ Brussel, Brussels, Belgium

[6] Univ Libre Bruxelles, Brussels, Belgium

[7] Univ Ghent, Ghent, Belgium

[8] Catholic Univ Louvain, Louvain, Belgium

[9] Ctr Brasileiro Pesquisas Fis, Rio De Janeiro, Brazil

[10] Univ Estado Rio De Janeiro, Rio De Janeiro, Brazil

[11] Univ Estadual Paulista, Sao Paulo, Brazil

[12] Univ Fed ABC, Sao Paulo, Brazil

[13] Bulgarian Acad Sci, Inst Nucl Res & Nucl Energy, Sofia, Bulgaria

[14] Univ Sofia, Sofia, Bulgaria

[15] Beihang Univ, Beijing, Peoples R China

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- + [62] Indian Inst Sci Educ & Res IISER, Pune, Maharashtra, India
- [63] Inst Res Fundamental Sci IPM, Tehran, Iran
- + [64] Univ Coll Dublin, Dublin, Ireland