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Search for a light charged Higgs boson in the $H^\pm \rightarrow cs$ channel in proton - proton collisions at $s = 13$ TeV search for a light charged Higgs Boson in the ... Sirunyan A. M. et al. (Article) [\(Open Access\)](#)

Sirunyan, A.M.^a, Tumasyan, A.^a, Adam, W.^b, Ambrogio, F.^b, Asilar, E.^b, Bergauer, T.^b, Brandstetter, J.^b, Brondolin, E.^b, Dragicevic, M.^b, Erö, J.^b, Escalante Del Valle, A.^b, Flechl, M.^b, Frühwirth, R.^{b,†}, Ghete, V.M.^b, Hrubec, J.^b, Jeitler, M.^{b,†}, Krammer, N.^b, Krätschmer, I.^b, Liko, D.^b, Madlener, T.^b, Mikulec, I.^b, Rad, N.^b,

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Abstract

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A search is conducted for a low-mass charged Higgs boson produced in a top quark decay and subsequently decaying into a charm and a strange quark. The data sample was recorded in proton - proton collisions at $s = 13$ TeV by the CMS experiment at the LHC and corresponds to an integrated luminosity of 35.9 fb⁻¹. The search is performed in the process of top quark pair production, where one top quark decays to a bottom quark and a charged Higgs boson and the other to a bottom quark and a W boson. With the W boson decaying to a charged lepton (electron or muon) and a neutrino, the final state comprises an isolated lepton, missing transverse momentum, and at least four jets, of which two are tagged as b jets. To enhance the search sensitivity, one of the jets originating from the charged Higgs boson is required to satisfy a charm tagging selection. No significant excess beyond standard model predictions is found in the dijet invariant mass distribution. An upper limit in the range 1.68%-0.25% is set on the branching fraction of the top quark decay to the charged Higgs boson and bottom quark for a charged Higgs boson mass between 80 and 160 GeV. © 2020 CERN.

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