

Same-sign pair production of singly charged Higgs boson at hadron colliders

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We propose a new process of charged Higgs boson production in two Higgs doublet models, which is the weak boson scattering process where singly charged Higgs bosons are produced in a same-sign pair at current and future hadron colliders. The amplitude is proportional to the mass difference between additional CP-even and CP-odd neutral Higgs bosons in the alignment limit, which directly relates to the global symmetry structure of the Higgs potential. The produced charged Higgs bosons predominantly decay into a pair of the tau lepton and the neutrino or into a pair of top and bottom quarks, depending on the type of Yukawa interactions. We evaluate the signal and the background in the both cases at the high-luminosity LHC with the integrated luminosity of 3000 fb^{-1} and also at the high-energy LHC with the energy of 27 TeV . We find that this same-sign production can be feasible at the high-luminosity LHC when the charged Higgs boson decays into either the lepton pair or the top-bottom pair.

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