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Production of charged Higgs boson pairs in the $pp \rightarrow ppH^+H^-$ reaction at the LHC and FCC

We present differential cross sections for production of charged scalar, weakly interacting, particles via photon-photon fusion in the $pp \rightarrow ppH^+H^-$ reaction with exact kinematics.

We give predictions for $\sqrt{s} = 14$ TeV (LHC) and at the Future Circular Collider (FCC) for $\sqrt{s} = 100$ TeV.

We present distributions in rapidities, transverse momenta and correlations in azimuthal angles between the protons and between the charged Higgs bosons.

The results are compared with those obtained within equivalent-photon approximation.

We discuss the role of the Dirac and Pauli electromagnetic form factors of the proton.

We discuss also first calculations of cross section for exclusive diffractive pQCD mechanism with estimated limits on the $g_{hH^+H^-}$ coupling constant within 2HDM based on the LHC experimental data. The diffractive contribution is much smaller than the $\gamma\gamma$ one.

Absorption corrections are calculated for the first time differentially for various distributions.

In general, they lead to a damping of the cross section.

The damping depends on $M_{H^+H^-}$ invariant mass and on four-momentum transfers squared in the proton line.

We discuss a possibility to measure the exclusive production of two charged Higgs bosons with the help of so-called forward proton detectors.

Literature:

P. Lebedowicz and A. Szczurek, Phys. Rev. D91 (2015) 095008.

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