

# Search for doubly and singly charged Higgs bosons decaying into vector bosons in multi-lepton final states with the ATLAS detector using proton–proton collisions at $\sqrt{s} = 13$ TeV

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A search for charged Higgs bosons decaying into  $W^{\pm}W^{\pm}$  or  $W^{\pm}Z$  bosons is performed, involving experimental signatures with two leptons of the same charge, or three or four leptons with a variety of charge combinations, missing transverse momentum and jets.

A data sample of proton–proton collisions at a centre-of-mass energy of 13 TeV recorded with the ATLAS detector at the Large Hadron Collider between 2015 and 2018 is used.

The data correspond to a total integrated luminosity of  $139 \text{ fb}^{-1}$ .

The search is guided by a type-II seesaw model that extends the scalar sector of the Standard Model with a scalar triplet,

leading to a phenomenology that includes doubly and singly charged Higgs bosons.

Two scenarios are explored, corresponding to the pair production of doubly charged  $H^{\pm\pm}$  bosons, or the associated production of a doubly charged  $H^{\pm\pm}$  boson and a singly charged  $H^{\pm}$  boson.

No significant deviations from the Standard Model predictions are observed.

$H^{\pm\pm}$  bosons are excluded at 95% confidence level up to 350 GeV and 230 GeV for the pair and associated production modes, respectively.

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