

Search for W Boson Decays to Three Charged Pions

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**Abstract**

For the first time, a search for the rare decay of the W boson to three charged pions has been performed. Proton-proton collision data recorded by the CMS experiment at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 77.3 fb<sup>-1</sup>, have been analyzed. No significant excess is observed above the background expectation. An upper limit of 1.01 x 10<sup>-6</sup> is set at 95% confidence level on the branching fraction of the W boson to three charged pions. This provides a strong motivation for theoretical calculations of this branching fraction.

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