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## Measurement of the $Z/\gamma^*$ $\rightarrow$ $\tau\tau$ cross section in pp collisions at $\sqrt{s}=13$ TeV and validation of $\tau$ lepton analysis techniques

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### Abstract

A measurement is presented of the  $Z/\gamma^* \rightarrow \tau\tau$  cross section in pp collisions at  $\sqrt{s} = 13$  TeV, using data recorded by the CMS experiment at the LHC, corresponding to an integrated luminosity of 2.3 fb<sup>-1</sup>. The product of the inclusive cross section and branching fraction is measured to be  $\sigma(\text{pp} \rightarrow Z/\gamma^* + X) \text{B}(Z/\gamma^* \rightarrow \tau\tau) = 1848 \pm 12 \text{ (stat)} \pm 67 \text{ (syst + lumi)}$  pb, in agreement with the standard model expectation, computed at next-to-next-to-leading order accuracy in perturbative quantum chromodynamics. The measurement is used to validate new analysis techniques relevant for future measurements of  $\tau$  lepton production. The measurement also provides the reconstruction efficiency and energy scale for  $\tau$  decays to hadrons +  $\nu(\tau)$  final states, determined with respective relative uncertainties of 2.2 and 0.9%.

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KeyWords Plus: [PROTON-PROTON COLLISIONS](#); [MODEL HIGGS-BOSON](#); [ATLAS DETECTOR](#); [SEARCH](#); [PAIR](#); [MASS](#); [LHC](#)

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