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## Measurements of $t(\bar{t})$ over-bar differential cross sections in proton-proton collisions at root $s=13$ TeV using events containing two leptons

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### Abstract

Measurements of differential top quark pair  $t(\bar{t})$  over bar cross sections using events produced in proton-proton collisions at a centre-of-mass energy of 13 TeV containing two oppositely charged leptons are presented. The data were recorded by the CMS experiment at the CERN LHC in 2016 and correspond to an integrated luminosity of 35.9 fb<sup>-1</sup>. The differential cross sections are presented as functions of kinematic observables of the top quarks and their decay products, the  $t(\bar{t})$  over bar system, and the total number of jets in the event. The differential cross sections are defined both with particle-level objects in a fiducial phase space close to that of the detector acceptance and with parton-level top quarks in the full phase space. All results are compared with standard model predictions from Monte Carlo simulations with next-to-leading-order (NLO) accuracy in quantum chromodynamics (QCD) at matrix-element level interfaced to parton-shower simulations. Where possible, parton-level results are compared to calculations with beyond-NLO precision in QCD. Significant disagreement is observed between data and all predictions for several observables. The measurements are used to constrain the top quark chromomagnetic dipole moment in an effective field theory framework at NLO in QCD and to extract  $t(\bar{t})$  over bar and leptonic charge asymmetries.

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