

# CMS measurements of top quark pair production

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Measurements of the inclusive and differential top quark pair production cross section in proton-proton collisions at 5.02 TeV, 7 TeV, 8 TeV and 13 TeV are presented using the CMS detector. The total cross section is measured using the lepton+jets, dilepton and fully hadronic channels, including the tau-dilepton and tau+jets modes. Indirect constraints on both the top quark mass and  $\alpha_S$  are obtained through their relation to the inclusive cross section. Measurements of top quark pair production in addition with jets, including heavy-flavoured jets are also presented. In addition, differential cross sections are measured and are given as functions of various kinematic observables, including the transverse momentum and rapidity of the (anti)top quark and the top-antitop system and the jets and leptons of the event final state. The measurements are extended to the TeV range using jet substructure techniques to exploit the boosted regime. The multiplicity and kinematic distributions of the jets produced in addition to the top pair are also investigated. The results are combined and confronted with precise theory calculations.

**Primary author:** CMS, Collaboration

**Presenter:** HINDRICHS, Otto Heinz (University of Rochester (US))

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