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European Physical Journal C [Open Access](#)
Volume 79, Issue 5, 1 May 2019, Article number 368

Measurement of the $t\bar{t}$ production cross section, the top quark mass, and the strong coupling constant using dilepton events in pp collisions at $\sqrt{s}=13\text{TeV}$ (Article) [Open Access](#)

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Abstract

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A measurement of the top quark–antiquark pair production cross section $\sigma_{t\bar{t}}$ in proton–proton collisions at a centre-of-mass energy of 13 TeV is presented. The data correspond to an integrated luminosity of 35.9 fb⁻¹, recorded by the CMS experiment at the CERN LHC in 2016. Dilepton events ($e^+ \mu^\mp$, $\mu^+ \mu^-$, $e^+ e^-$) are selected and the cross section is measured from a likelihood fit. For a top quark mass parameter in the simulation of $m_{\text{TC}}=172.5\text{ Ge}$ the fit yields a measured cross section $\sigma_{t\bar{t}}=803 \pm 2(\text{stat}) \pm 25(\text{syst}) \pm 20(\text{lumi})\text{ pb}$, in agreement with the expectation from the standard model calculation at next-to-next-to-leading order. A simultaneous fit of the cross section and the top quark mass parameter in the powheg simulation is performed. The measured value of $m_{\text{TC}}=172.33 \pm 0.14(\text{stat}) - 0.72 + 0.66(\text{syst})\text{ Ge}$ is in good agreement with previous measurements. The resulting cross section is used, together with the theoretical prediction, to determine the top quark mass and to extract a value of the strong coupling constant with different sets of parton distribution functions. © 2019, CERN for the benefit of the CMS collaboration.

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Funding text

Acknowledgements We congratulate our colleagues in the CERN accelerator departments for the excellent performance of the LHC and thank the technical and administrative staffs at CERN and at other CMS institutes for their contributions to the success of the CMS effort. In addition, we gratefully acknowledge the computing centres and personnel of the Worldwide LHC Computing Grid for delivering so effectively the computing infrastructure essential to our analyses. Finally, we acknowledge the enduring support for the construction and operation of the LHC and the CMS detector provided by the following funding agencies: BMBWF and FWF (Austria); FNRS and FWO (Belgium); CNPq, CAPES, FAPERJ, FAPERGS, and FAPESP (Brazil); MES (Bulgaria); CERN; CAS, MoST, and NSFC (China); COLCIENCIAS (Colombia); MSES and CSF (Croatia); RPF (Cyprus); SENESCYT (Ecuador); MoER, ERC IUT, and ERDF (Estonia); Academy of Finland, MEC, and HIP (Finland); CEA and CNRS/IN2P3 (France); BMBF, DFG, and HGF (Germany); GSRT (G... View all 

ISSN: 14346044

Source Type: Journal

Original language: English

DOI: 10.1140/epjc/s10052-019-6863-8

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