

# Observation of $tW$ in lepton + jets channel and Study of $t\bar{t}H$ in multilepton channel with the CMS detector

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A measurement of the associated production of a single top quark and a W boson in the final states with an electron or muon and jets using pp collisions with  $s\sqrt{=13}$  TeV collected by the CMS detector at the CERN LHC is presented. The data used correspond to an integrated luminosity of 35.9 fb<sup>-1</sup>. This result is the first observation of the  $tW$  process in the final states containing a muon or electron and jets, with an observed significance clearly exceeding 5 standard deviations. The measured signal strength is  $\mu=1.24\pm 0.18$ , consistent with unity. The inclusive cross section is determined to be  $89\pm 4$  (stat)  $\pm 12$  (syst) pb. See more details in CMS-PAS-TOP-20-002 and EPJC 81 (2021) 378.

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