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## Search for associated production of a Higgs boson and a single top quark in proton-proton collisions at root s=13 TeV

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### Abstract

A search is presented for the production of a Higgs boson in association with a single top quark, based on data collected in 2016 by the CMS experiment at the LHC at a center-of-mass energy of 13 TeV, which corresponds to an integrated luminosity of 35.9 fb<sup>-1</sup>. The production cross section for this process is highly sensitive to the absolute values of the top quark Yukawa coupling,  $y(t)$ ; the Higgs boson coupling to vector bosons,  $g(HVV)$ ; and, uniquely, their relative sign. Analyses using multilepton signatures, targeting  $H \rightarrow WW$ ,  $H \rightarrow \tau\tau$ , and  $H \rightarrow ZZ$  decay modes, and signatures with a single lepton and a  $b$  ( $\bar{b}$ ) over  $\bar{b}$  pair, targeting the  $H \rightarrow b$  ( $\bar{b}$ ) over  $\bar{b}$  decay, are combined with a reinterpretation of a measurement in the  $H \rightarrow \gamma\gamma$  channel to constrain  $y(t)$ . For a standard model-like value of  $g(HVV)$ , the data favor positive values of  $y(t)$  and exclude values of  $y(t)$  below about  $-0.9y(t)(SM)$ .

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