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Search for $t(\bar{t})$ over $\bar{b}H$ production in the all-jet final state in proton-proton collisions root $s=13$ TeV

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Abstract

A search is presented for the associated production of a Higgs boson with a top quark pair in the all-jet final state. Events containing seven or more jets are selected from a sample of proton-proton collisions at root $s = 13$ TeV collected with the CMS detector at the LHC in 2016, corresponding to an integrated luminosity of 35.9 fb⁻¹. To separate the $t(\bar{t})$ over $\bar{b}H$ signal from the irreducible $t(\bar{t})$ over $\bar{b} + b(\bar{b})$ over \bar{b} background, the analysis assigns leading order matrix element signal and background probability densities to each event. A likelihood-ratio statistic based on these probability densities is used to extract the signal. The results are provided in terms of an observed $t(\bar{t})$ over $\bar{b}H$ signal strength relative to the standard model production cross section $\mu = \sigma/\sigma(\text{SM})$, assuming a Higgs boson mass of 125 GeV. The best fit value is $(\mu)_{\text{over cap}} = 0.9 \pm 0.7(\text{stat}) \pm 1.3(\text{syst}) = 0.9 \pm 1.5(\text{tot})$, and the observed and expected upper limits are, respectively, $\mu < 3.8$ and < 3.1 at 95% confidence levels.

Keywords

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