

Searching for Dark Matter in top quark production with the CMS experiment

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January 7, 2021

Astronomical observations provide strong evidence that a large proportion of the matter in the universe is “Dark Matter” (DM) not described in the Standard Model (SM) of particle physics. Furthermore, many cosmological models suggest Dark Matter should couple to the SM on the 100 GeV scale, and hence may be produced at the LHC, appearing as missing transverse momentum. We present a search for Dark Matter produced in association with top quarks in the dileptonic channel, with an interaction via a spin-0 mediator. However, the dileptonic channel also includes missing transverse momentum in the SM process due to the presence of neutrinos, and so we introduce novel variables and machine learning techniques to separate signal from background.

This search, which uses the full Run 2 dataset and will be part of the CMS combination across all $t\bar{t}$ final states, is also the first in the dilepton channel to include the single top + DM process, which can greatly aid sensitivity to the highest mediator masses in the search.