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Search for dark matter particles produced in association with a Higgs boson in proton-proton collisions at √s = 13 TeV (Article) (Open Access)

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Abstract

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A search for dark matter (DM) particles is performed using events with a Higgs boson candidate and large missing transverse momentum. The analysis is based on proton- proton collision data at a center-of-mass energy of 13 TeV collected by the CMS experiment at the LHC in 2016, corresponding to an integrated luminosity of 35.9 fb^{-1}. The search is performed in five Higgs boson decay channels: $h \to b\bar{b}$, $\gamma\gamma$, $\tau^+\tau^-$, W^+W^-, and ZZ. The results from the individual channels are combined to maximize the sensitivity of the analysis. No significant excess over the expected standard model background is observed in any of the five channels or in their combination. Limits are set on DM production in the context of two simplified models. The results are also interpreted in terms of a spin-independent DM-nucleon scattering cross section and compared to those from direct-detection DM experiments. This is the first search for DM particles produced in association with a Higgs boson decaying to a pair of W or Z bosons, and the first statistical combination based on five Higgs boson decay channels. [Figure not available: see fulltext.]. © 2020, The Author(s).

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