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Search for new particles in events with energetic jets and large missing transverse momentum in proton-proton collisions at sqrt(s) = 13 TeV

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A search is presented for new particles in proton-proton collisions at $\sqrt{s} = 13$ TeV at the LHC, using events with energetic jets and large missing transverse momentum. The analysis is based on a data sample corresponding to an integrated luminosity of 101 fb⁻¹, collected in 2017–2018 with the CMS detector. Separate categories are defined for events with narrow jets from initial-state radiation and with large-radius jets consistent with a hadronic decay of a W or a Z boson. Novel machine learning techniques are used to identify hadronic W and Z boson decays, allowing for a significant improvement of the analysis sensitivity compared with earlier results. The analysis is combined with an earlier search based on a data sample corresponding to an integrated luminosity of 36 fb⁻¹, collected in 2016. No significant excess of events is observed with respect to the standard model background expectation, as determined from control samples in data. The results are interpreted in terms of limits on the branching fraction of an invisible decay of the Higgs boson, as well as constraints on simplified models of dark matter, on first-generation scalar leptoquarks decaying to quarks, and neutrinos, and on gravitons in models with large extra dimensions. Several of the new limits are the most restrictive to date.

Are you are a member of the APS Division of Particles and Fields?

Yes

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