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## Search for natural and split supersymmetry in proton-proton collisions at root $s=13$ TeV in final states with jets and missing transverse momentum

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### Abstract

A search for supersymmetry (SUSY) is performed in final states comprising one or more jets and missing transverse momentum using data from proton-proton collisions at a centre-of-mass energy of 13 TeV. The data were recorded with the CMS detector at the CERN LHC in 2016 and correspond to an integrated luminosity of 35.9 fb<sup>-1</sup>. The number of signal events is found to agree with the expected background yields from standard model processes. The results are interpreted in the context of simplified models of SUSY that assume the production of gluino or squark pairs and their prompt decay to quarks and the lightest neutralino. The masses of bottom, top, and mass-degenerate light-flavour squarks are probed up to 1050, 1000, and 1325 GeV, respectively. The gluino mass is probed up to 1900, 1650, and 1650 GeV when the gluino decays via virtual states of the aforementioned squarks. The strongest mass bounds on the neutralinos from gluino and squark decays are 1150 and 575 GeV, respectively. The search also provides sensitivity to simplified models inspired by split SUSY that involve the production and decay of long-lived gluinos. Values of the proper decay length CT0 from 10(-3) to 10(5) mm are considered, as well as a metastable gluino scenario. Gluino masses up to 1750 and 900 GeV are probed for CT0 = 1mm and for the metastable state, respectively. The sensitivity is moderately dependent on model assumptions for CT0 greater than or similar to 1 m. The search provides coverage of the CT0 parameter space for models involving long-lived gluinos that is complementary to existing techniques at the LHC.

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