

# Search for black holes and sphalerons in high-multiplicity final states in proton-proton collisions at $\sqrt{s} = 13$ TeV with CMS

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A search for new-physics signals resulting in energetic, high-multiplicity final states, such as black holes, string balls, and electroweak sphalerons, is presented using a data sample corresponding to an integrated luminosity of  $35.9 \text{ fb}^{-1}$  collected with the CMS experiment at the LHC in proton-proton collisions at a center-of-mass energy of 13 TeV in 2016. Standard model backgrounds, dominated by multijet production, were determined from control regions in data. No excesses characteristic of new-physics signals resulting in such final states were observed. Model-independent 95% confidence level upper limits on the cross section of new-physics signals in these final states are set and further interpreted in terms of limits on semiclassical black hole, string ball, and sphaleron production.

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