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Search for Low-Mass Quark-Antiquark Resonances Produced in Association with a Photon at $s = 13$ TeV (Article) [\(Open Access\)](#)

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Abstract

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A search for narrow low-mass resonances decaying to quark-antiquark pairs is presented. The search is based on proton-proton collision events collected at 13 TeV by the CMS detector at the CERN LHC. The data sample corresponds to an integrated luminosity of 35.9 fb⁻¹, recorded in 2016. The search considers the case where the resonance has high transverse momentum due to initial-state radiation of a hard photon. To study this process, the decay products of the resonance are reconstructed as a single large-radius jet with two-pronged substructure. The signal would be identified as a localized excess in the jet invariant mass spectrum. No evidence for such a resonance is observed in the mass range 10 to 125 GeV. Upper limits at the 95% confidence level are set on the coupling strength of resonances decaying to quark pairs. The results obtained with this photon trigger strategy provide the first direct constraints on quark-antiquark resonance masses below 50 GeV obtained at a hadron collider. © 2019 CERN. for the CMS Collaboration. Published by the American Physical Society under the terms of the <https://creativecommons.org/licenses/by/4.0/> Creative Commons Attribution 4.0 International license. Further distribution of this work must maintain attribution to the author(s) and the published article's title, journal citation, and DOI.

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Engineering uncontrolled terms

Confidence levels Coupling strengths Initial state radiations Integrated luminosity
Invariant-mass spectra Proton proton collisions Quark antiquark pair
Transverse momenta

Engineering main heading:

Resonance

EMTREE medical terms:

article body weight hadron mass spectrometry photon quark

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