

Search For Low-Mass Quark-Antiquark Resonances Produced With an Initial State Photon at 13 TeV Using the CMS Detector

We present a search for low-mass narrow $q\bar{q}$ resonances. This search uses data from LHC pp collisions at a center of mass of 13 TeV in Run 2, and corresponds to an integrated luminosity of 137 fb⁻¹, currently using 10% of data. Utilizing full Run 2 data allows the use of a lower photon pT threshold trigger than a previous analysis performed with only 2016 data, allowing this analysis to be more sensitive to resonances in the low mass region. We require an initial state photon recoiling against the narrow resonance, leading to the resonance having a high transverse momentum. The high pT decay products of the resonance collimate and are reconstructed as a single large jet with an internal two-pronged substructure. A two-pronged dijet score based on the ParticleNet tagger is used to select jets with two-pronged substructure. The background is estimated via a data-driven method using a transfer factor between the distributions which fail and pass the two-pronged substructure requirement. The new physics signal is searched for as a narrow peak excess above the Standard Model backgrounds in the jet mass spectrum.

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