

First measurement of the jet axis decorrelation with photon-tagged jets in pp and PbPb at 5.02 TeV with CMS

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A search for medium-induced jet transverse momentum broadening is performed with isolated photon-tagged jet events in proton-proton (pp) and lead-lead (PbPb) collisions at nucleon-nucleon center-of-mass energy 5.02 TeV. The difference between jet axes as determined via energy-weight and winner-take-all clustering schemes, also known as the decorrelation of jet axes and denoted Δj , is measured for the first time in photon-tagged jet events. This observable is sensitive to both multiple scattering and large-angle scattering effects in the QGP. The pp and PbPb data samples were recorded with the CMS detector at the LHC and correspond to integrated luminosities of 1.69 nb^{-1} and 302 pb^{-1} respectively. Events are required to have a leading isolated photon with $60 < p_T^\gamma < 200 \text{ GeV}$, which is correlated with anti-kt $R = 0.3$ jets with $30 < p_T^{jet} < 100 \text{ GeV}$ opposite in azimuthal angle. Event selection on colorless high-pT bosons reduces the medium-induced survivor's bias present in inclusive jet measurements of Δj . The PbPb results are reported as a function of collision centrality and compared to pp reference data. Jets with $p_T^{jet} < 60 \text{ GeV}$ have consistent shape in PbPb relative to pp. However, jets with $p_T^{jet} > 60 \text{ GeV}$ in central PbPb show signs of narrowing relative to pp. The results are compared to the Jewel and Pyquen theoretical models, which include different methods of energy loss.

Category

Experiment

Collaboration

CMS

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