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Quantifying in-medium jet structure modification and medium response with direct photon and pi-zero triggered hadron correlations in PHENIX

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Jet measurements have long established that as hard scattered partons traverse the quark gluon plasma (QGP) they lose energy resulting in modified jets in A+A collisions relative to p+p collisions with no QGP. Understanding how the jets, their constituents and substructure are modified is crucial to discriminating between energy loss models and extracting the in-medium transport properties. Equally important is quantifying the response of the medium to this lost energy and disentangling such effects from the modified parton showers. By triggering on a high momentum hadron and measuring the distribution of hadrons opposite it in azimuth, we can study the particles correlated with the opposing jet. Model comparisons to the PHENIX π^0—hadron correlations suggest that medium response plays an important role for describing the low momentum hadron distribution. PHENIX has final results for the ratio (I_{AA}) and difference (Δ_{AA}) of Au+Au to p+p as a function of the azimuthal angle. In addition, PHENIX is extracting these observables using direct photons as a trigger. The unmodified direct photon provides access to the kinematics of the initial hard scattering and selects a population of opposing jets predominantly from quarks. These measurements utilizing the highest statistics PHENIX 200 GeV Au+Au data set are also complimentary to LHC Z boson-track correlation studies, by exploring lower momentum jets at RHIC and further constraining energy loss models.

Category

Experiment

Collaboration

PHENIX

Authors: HODGES, Anthony (Univ. Illinois at Urbana Champaign (US)); CONNORS, Megan (Georgia State University)

Presenter: HODGES, Anthony (Univ. Illinois at Urbana Champaign (US))

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