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Evolution of jet shapes and fragmentation functions in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV with the STAR experiment at RHIC

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The modification of jet substructure in heavy-ion collisions compared to that in the vacuum reference is one of the main features of jet quenching. Such modification has been observed at LHC kinematics with various observables, such as jet fragmentation and jet shapes. In this talk, we report measurements of the differential jet shape and semi-inclusive jet fragmentation functions in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV with the STAR detector at RHIC.

Based on the semi-inclusive population of jets recoiling from a high-p_T trigger hadron, the fragmentation functions are constructed from the fraction of the transverse momentum of charged particles projected onto the jet axis over that of the jet. The fragmentation functions are corrected for uncorrelated background effects and instrumental effects via the Mixed-Event technique and unfolding, and the results for central and peripheral collisions will be compared. Similarly, the differential jet shape, $\rho(r)$, is defined as the average fraction of the transverse momentum contained inside an annulus with inner radius $r_a = r - \delta/2$ and outer radius $r_b = r + \delta/2$. The differential jet shapes will be measured for full (charged + neutral) jets at low p_T (10-40 GeV/c) using constituent information jet-by-jet. This kinematic range will provide a complementary measurement to the LHC to demonstrate whether there is a modification and a broadening of the jet profile at RHIC energies. The differential jet shapes will explore the dependence of modifications based on jet size (R), centrality, event-plane angle (defined by the beam direction and the vector of the impact parameter), and additionally include a comparison to baseline p+p collisions. Both jet fragmentation function and jet shape results indicate medium-induced modifications in heavy-ion collisions.

Collaboration (if applicable)

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