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Probing hadronization and quark-gluon plasma using collinear-drop jet observables at RHIC

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Deciphering jet substructure modification patterns in heavy ion collisions holds the key to finding the inner working of the quark-gluon plasma. In the past few years, significant progress was made to studying the modifications of soft-drop jet observables, which were designed to probe the hard jet substructure. Collinear-drop observables were constructed to enhance the sensitivity to soft jet substructure, with the flexibility of scanning through phase space in search of characteristic medium signatures. With the new runs at Relativistic Heavy Ion Collider, we provide resummed calculations of a set of collinear-drop observables, including the new class of flattened jet angularity, at next-to-leading logarithmic accuracies using soft-collinear effective theory. The significant hadronization effects as modeled in Pythia event generator are included through the transfer matrix approach. We also investigate the medium effects to collinear-drop observables in heavy ion collisions using Q-pythia and Jewel Monte Carlo simulations, as well as analytic calculations with glauber interactions. We discuss strategies of designing collinear-drop observables for testing jet-medium interaction mechanisms. In the end we present theoretical predictions for the upcoming STAR measurement results.

Category

Theory

Collaboration

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