Abstract for an Invited Paper
for the APR10 Meeting of
The American Physical Society

Direct jet reconstruction in $p+p$ and Cu + Cu collisions at PHENIX

YUE SHI LAI, Columbia University

Jet reconstruction in heavy ion collisions provides a direct measurement of the medium-induced parton energy loss and the in- medium fragmentation properties, and therefore can significantly enhance our understanding of the energy loss mechanism and medium property. However, the presence of a high multiplicity background prevents the direct application of traditional jet reconstruction techniques, which is e.g. known to give rise to a false apparent jet yield. Unlike at the LHC, the small jet cross section relative to the large background fluctuation makes the application to RHIC particularly difficult. We developed an algorithm that reconstructs jets using a Gaussian filter, which is both collinear/infrared safe and cone-like, but enhances the core versus periphery signal and therefore stabilizes the jet definition at the presence of a strongly fluctuating background and/or any detector aperture edges. This is then combined with a fake jet rejection strategy that can suppress the false background jet yield well below the jet production rate at RHIC. We show results from its application to the PHENIX $p+p$ and Cu + Cu data, including jet spectra, R_{AA}, jet-jet correlations, and fragmentation functions. Their theoretical implications will be discussed.