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Fragmentation Functions in Medium, two-particle correlations and Jets in PHENIX at RHIC

Content :

For the past decade, measurements of semi-inclusive single identified particle spectra and two-particle correlations in p-p and A+A collisions at RHIC have produced a treasure trove of results which indicate a suppression of hard-scattered partons in the medium produced in A+A collisions. It still remains to be determined unambiguously whether the partons emerge from the medium having lost energy (or even emerge from well within the medium without having lost energy) then fragment normally outside; whether vacuum fragmentation is modified inside the medium; or whether partons are stopped or absorbed so that only surface emission occurs. One important lesson learned is that the away-side p_T distribution of particles opposite to a trigger particle (e.g. a pizero), which is itself the fragment of a jet, does not measure the fragmentation function. The key to measuring the fragmentation function and its possible modification is to know the energy of the original parton which fragments. This can be accomplished by measuring the correlated hadrons opposite to a direct-single-gamma from the reaction $g+q \rightarrow \gamma+q$. Additionally, for this reaction the parton opposite to the gamma is highly likely to be a u quark. Comparison to the $x_i = \ln 1/z$ representation of fragmentation functions measured in e^+e^- collisions, where z is the fragmentation variable, becomes useful for direct-gamma-h measurements over the full z or x_i range when a semi-log plot is used. Measurements will be shown for p-p and AuAu collisions where a modification is clearly seen. Although the fragmentation function can not be measured using two-particle correlations where both particles are fragments of jets, the ratio of the away parton transverse momentum to the trigger parton transverse momentum and, hence, the fractional imbalance of the outgoing jets can be deduced from these measurements. Results will be shown for Au+Au compared to p-p collisions and compared to results from fully reconstructed jets at LHC. Finally, measurements of reconstructed jets in PHENIX from p-p and A+A collisions will be presented.

Collaboration Name :

PHENIX

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Comments :

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