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Measurement of the Shared Momentum Fraction z_g using Jet Reconstruction in p+p and Au+Au Collisions with STAR

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Light quark and gluon jet quenching in heavy ion collisions is described within the overwhelming majority of models as resulting predominantly from pQCD-type gluon radiation, but details of the underlying mechanisms differ greatly.

One key difference lies in the treatment of the Altarelli-Parisi, AP, splitting functions.

While in some models, such as Q-PYTHIA, the splitting functions are directly modified in the medium, this core component remains unchanged in others (e.g. YaJEM).

It has been shown that the shared momentum fraction z_g can be made a Sudakov-safe measurement [1].

This quantity measures the p_T ratio between the two dominant branches as determined by the SoftDrop grooming process.

We will present the first study of z_g measurements at top RHIC energy in p+p and Au+Au.

The focus will be on the specific di-jet selection introduced in our previous momentum imbalance measurement,

i.e. jets geometrically matched to “hard core” jets found using

only constituents above 2 GeV/c and with a high tower above 5.5 GeV [2].

Such di-jet pairs were found to be significantly imbalanced with respect to p+p, yet regained balance when all soft constituents were included.

Individual examination of the splitting behavior of leading and recoil jet adds a new dimension to this observation, and new input to energy loss models.

[1] A. J. Larkoski, S. Marzani and J. Thaler, Phys. Rev. D 91, no. 11, 111501 (2015) [arXiv:1502.01719 [hep-ph]].

[2] K. Kauder (STAR Collaboration), Nuclear and Particle Physics Proceedings, Hard Probes 2015

Summary

Presentation type

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