

Reconstruction of neutral-triggered full recoil jets in $\sqrt{s_{NN}} = 200$ GeV p+p collisions at the STAR experiment

In heavy-ion collisions, the study of recoil jets tagged by high transverse-momentum “direct photons” (γ_{dir}) should provide a measurement of the partonic energy loss in the hot, dense medium produced in such collisions^{X.-N. Wang, Z. Huang, and I. Sarcevic, Phys. Rev. Lett. 77, 231 (1996)}. Since a γ_{dir} does not interact strongly with the medium, it closely approximates the initial energy of the recoiling parton. It is also interesting to compare the recoil jets tagged by γ_{dir} to those tagged by high transverse-momentum π^0 . In contrast to the γ_{dir} , high transverse-momentum π^0 are assumed to be biased towards being produced near the surface of the medium. Moreover, the production mechanisms of γ_{dir} favor recoiling quarks over gluons, but the production mechanisms of π^0 show no such preference. Thus the comparison of γ_{dir} -tagged recoil jets to π^0 -tagged recoil jets may shed light on the path-length and color-factor dependence of in-medium partonic energy loss.

To establish a vacuum fragmentation reference, we present the measurement of the yields of full recoil jets (recoil jets consisting of both charged and neutral particles) in p+p collisions. The yields are measured using the STAR Time Projection Chamber and Barrel Electromagnetic Calorimeter in p+p collisions at $\sqrt{s_{NN}} = 200$ GeV tagged by neutral-particle triggers recorded during the running year 2009. The neutral-particle triggers satisfy $9 < E_T^{trig} < 20$ GeV and $|\eta^{trig}| < 1$, and are separated into a sample of identified π^0 triggers and a sample of triggers with an enhanced fraction of γ_{dir} . Jets are reconstructed from charged tracks and neutral towers with $p_T > 0.2$ GeV/c and $E_T > 0.2$ GeV respectively and $|\eta| < 1$ using the anti- k_T algorithm for resolution parameter $0.3 \leq R \leq 0.6$. To assay the effect of reconstructing full jets versus charged-only jets in such studies, the yields of charged recoil-jets are compared to the yields of full recoil-jets. The data are corrected for instrumental effects and compared to Pythia simulations^{T. Sjostrand, S. Mrenna and P. Z. Skands, Comput. Phys. Commun. 178 (2008) 852 [arXiv:0710.3820 [hep-ph]]}.

Preferred Track

Jets and High pT Hadrons

Collaboration

STAR

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