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Multiplicity-Momentum Correlations in Relativistic Heavy Ion Collisions

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The observation of anisotropic collective flow in the small systems produced by proton-proton and proton-nucleus collisions at the Relativistic Heavy-Ion Collider and the Large Hadron Collider has led theorists to the hypothesis that hydrodynamics can occur without thermal equilibration. Viscous hydrodynamic flow has the effect of smoothing out fluctuations in particle momenta, but conversely jets have the effect of simultaneously increasing particle number and transverse momentum while inducing fluctuations. We study a new observable that indicates the covariance of multiplicity and momentum of particles produced in nuclear collisions to discover if it can distinguish jet versus hydrodynamic dynamics. This observable is also sensitive to the level of equilibration. We use simulated events of proton-proton and nucleus-nucleus collisions to compare the behavior of our observable for collision events with high and low multiplicities.

Collaboration (if applicable)

Track

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Poster

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