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Rapidity Correlation Structure in Nuclear Collisions[1] CHRISTOPHER ZIN, SEAN GAVIN, Wayne State Univ, GEORGE MOSCHELLI, Lawrence Technological University — The forces that drive the nuclear collision system towards local thermal equilibrium leave few observable traces. Heavy ion experiments report a range of features widely attributed to the hydrodynamic flow of a near-equilibrium quark gluon plasma. In particular, measurements of azimuthal anisotropy provide the most comprehensive support for the hydrodynamic description of these systems. In search of the source of this flow, we turned to smaller proton-proton, proton-nucleus and deuterium-nucleus collisions, expecting to find this effect absent. Instead, these collisions show an azimuthal anisotropy that is comparable to the larger ion-ion systems. How can we learn about the mechanisms that give rise to hydrodynamics if every available collision system exhibits flow? We show that measurements of the rapidity dependence of transverse momentum correlations can be used to determine the characteristic time τ_π that dictates the rate of isotropization of the stress energy tensor, as well as the shear viscosity $\nu = \eta/sT$. We formulate methods for computing these correlations using second order dissipative hydrodynamics with noise. Current data are consistent with $\tau_\pi/\nu \sim 10$ but targeted measurements can improve this precision.

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