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Fluctuating Hydrodynamics Confronts the Rapidity Dependence of Transverse Momentum Fluctuations RAJENDRA POKHAREL, SEAN GAVIN, Wayne State University, GEORGE MOSCHELLI, Frankfurt Institute for Advanced Studies — Interest in the development of the theory of fluctuating hydrodynamics is growing [1]. Early efforts suggested that viscous diffusion broadens the rapidity dependence of transverse momentum correlations [2]. That work stimulated an experimental analysis by STAR [3]. We attack this new data along two fronts. First, we compute STAR's fluctuation observable using the NeXSPheRIO code, which combines fluctuating initial conditions from a string fragmentation model with deterministic viscosity-free hydrodynamic evolution. We find that NeXSPheRIO produces a longitudinal narrowing, in contrast to the data. Second, we study the hydrodynamic evolution using second order causal viscous hydrodynamics including Langevin noise. We obtain a deterministic evolution equation for the transverse momentum density correlation function. We use the latest theoretical equations of state and transport coefficients to compute STAR's observable. The results are in excellent accord with the measured broadening. In addition, we predict features of the distribution that can distinguish 2nd and 1st order diffusion.

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