Abstract Submitted
for the DNP17 Meeting of
The American Physical Society

Constraints on Three-dimensional Entropy Deposition in Relativistic Heavy-ion Collisions from Longitudinal Multiplicity Observables for pA and AA at the LHC WEIYAO KE, JOHN MORELAND, JONAH BERNHARD, STEFFEN BASS, Duke Univ — Relativistic viscous fluid dynamics (rRFD) has been highly sucessful in describing bulk observables of the QGP formed in ultrarelativistic heavy-ion collisions. However, vRFD requires an initial condition that is challenging to calculate from first-principles. Although reliable boost-invariant (2D) initial conditions are well developed, little is known about the longitudinal structures. We systematically study a parametric model for the initial 3D entropy distribution of the QGP formed in the collisions. We apply a cumulant generating function approach to parametrize the rapidity dependence of local entropy deposition as functions of participant densities, extending the 2D initial condition model TRENTo to 3D. This initial condition is integrated into a 3+1D ideal (for computational expediency) hydrodynamic model and a hadronic afterburner to calculate the centrality dependent charged particle pseudorapidity density and two-particle pseudorapidity correlation. Parameters are optimized by comparing to experimental measurements for p+Pb and Pb+Pb collisions using Bayesian inference. Finally, we use the calibrated model and a 3+1D viscous hybrid model to predict pseudorapidity dependent flows, event-plane decorrelations and flow correlations beyond mid-rapidity as a validation.

Weiyao Ke
Duke Univ

Date submitted: 13 Jun 2017 Electronic form version 1.4