Contribution ID: **80** Type: **Poster**

Phenomenological predictions of 3+1d anisotropic hydrodynamics

We make phenomenological predictions for particle spectra and flow in heavy-ion col- lisions using 3+1d anisotropic hydrodynamics (aHydro) including the effects of both bulk and shear viscosities. The dynamical equations necessary are derived by taking moments of Boltzmann equation allowing for three distinct momentum-space anisotropy parameters. The formulation is based on relaxation-time approximation for the collisional kernel and a lattice-QCD-based equation of state. Evolving the system to late times, we calculate par- ticle production using THERMINATOR modified to account for an ellipsoidal distribution function. We obtain particle spectra for different particle types such as pions, kaons, and protons and elliptic flow, v_2, as a function of centrality, transverse momentum, and rapidity. In our model, we have four free parameters, i.e. freeze-out temperature, initial energy den- sity, initial momentum-space anisotropy, and shear viscosity to entropy density ratio. Using a multidimensional fit to LHC experimental data, we extract these parameters. We find good agreement between 3+1d aHydro and available experimental data.

Preferred Track

New Theoretical Developments

Collaboration

Not applicable

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Session Classification: Poster Session