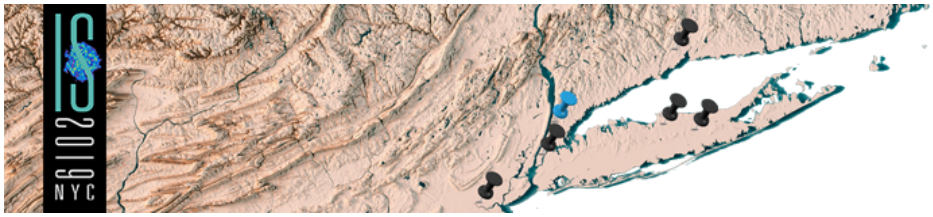

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Anisotropic hydrodynamics with a realistic collisional kernel

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In this work, we implement an effective kinetic theory based scattering kernel in the anisotropic hydrodynamics (aHydro) formalism. We compare the realistic kernel results to those obtained from aHydro with the Anderson-Witting scattering kernel (RTA). For the purpose of this study, we consider a conformal system undergoing transversally-homogenous and boost-invariant Bjorken expansion. The collisional kernel is given by the leading order $2 \leftrightarrow 2$ scattering kernel in the massless scalar $\lambda\phi^4$. We explicitly enforce number conservation through the incorporation of a dynamical chemical potential (fugacity) in the underlying aHydro distribution function and focus on the case of a system obeying classical statistics. We first compare the time evolution of the aHydro microscopic parameters and components of the energy-momentum tensor. Then, we determine the anisotropic non-equilibrium attractor for a system subject to this realistic collisional kernel. Our results indicate that when the near-equilibrium relaxation-times in the Anderson-Witting and scalar collisional kernels are matched, the aHydro dynamics receive quantitatively important corrections using the LO scalar kernel, however, the aHydro attractor itself is not substantially modified.

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