Nuclear Theory Seminar

Friday, April 15th, 4:00 PM

Dynamics of an anisotropic quark gluon plasma

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Abstract:

In this talk I will review our theoretical understanding of the dynamics of a non-equilibrium quark gluon plasma. I will begin by discussing the emergence of strong local momentum-space anisotropies in the plasma due to the rapid longitudinal expansion of the plasma at early times. While strongly-coupled plasmas might remain approximately isotropic in the center of the collision region at late times, weakly-coupled plasmas do not, and even strongly-coupled plasmas generate large momentum-space anisotropies near the transverse and longitudinal edges of the plasma. I will explain why second order viscous hydrodynamics should not be trusted to describe such highly anisotropic plasmas and present a framework to derive hydro-like equations that can better describe highly anisotropic systems. I will present results of the application of this framework to two specific cases: boost-invariant and non-boost-invariant evolution of the quark gluon plasma. If time permits, I will close by discussing the implications for the collective modes of an anisotropic plasma and present recent numerical simulations of Yang-Mills coupled to hard particles in a dynamically expanding background.