East Carolina University®
Department of Physics

Colloquium

Friday, September 13th, Room N109, Howell Science Complex
3:15 p.m. (Refreshments at 3:00 p.m.)

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`Far-from-Equilibrium' Hydrodynamics for Relativistic Heavy-Ion Collisions

Relativistic heavy-ion collisions at the Large Hadron Collider, CERN and Relativistic Heavy Ion Collider, BNL produce a novel state of matter, the quark-gluon plasma (QGP), where the fundamental constituents of nucleons, i.e., quarks and gluons, become deconfined over nuclear volumes. Understanding the thermodynamic and transport properties of QGP constitute one of the major goals of high energy nuclear physics. Research over the last two decades has established that the bulk evolution of QGP can be remarkably well-described by relativistic hydrodynamics. Although it is traditionally believed that hydrodynamics is applicable only for nearly equilibrated systems, recent discoveries reveal that it may be successful even for systems deviating substantially from local equilibrium. In this talk I shall present modern formulations of hydrodynamics and use the concept of `non-equilibrium attractors' to discuss why such formulations may be unreasonably effective beyond their expected domain of applicability. I will also present `maximum-entropy hydrodynamics', a new macroscopic framework which can serve as a proxy for relativistic kinetic theory in describing both near and far-off-equilibrium regimes of heavy-ion collisions.

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