UCLA NUCLEAR PHYSICS SEMINAR

Mapping out the phase diagram of QCD in hadronic transport

Presented by: Agnieszka Sorensen
UCLA/LBL

Critical behavior in hadronic transport is largely unexplored. With few exceptions, hadronic potentials are neglected in hybrid simulations, which means that transport may be missing many-body effects likely to be increasingly important at high baryon densities. Moreover, a consistent treatment of the entire span of a hybrid heavy-ion collision simulation calls for employing hadronic interactions that reproduce properties of a particular EOS used in the hydrodynamic stage. However, the few hadronic transport codes that do employ mean-field potentials only take into account the behavior of ordinary nuclear matter without the possible QGP phase transition. In this talk, I will present an approach to this problem in which the EOS of nuclear matter and the corresponding single-particle equations of motion used in transport are both obtained from a relativistic density functional with fully parametrizable interactions. I will show that this model is readily constrained to reproduce desired sets of the QCD EOS properties, which include the known behavior of ordinary nuclear matter as well as a family of possible phase transitions at high baryon number density. I will then discuss the behavior of nuclear matter in a number of scenarios simulated in hadronic transport, including evolution in the vicinity of a critical point of the QCD phase transition. I will also discuss the relation between quantities calculated in infinite, continuous matter calculations and observables obtained from simulations using a finite number of particles.
This work is based on https://arxiv.org/abs/2011.06635.

Thursday • Dec 3, 2020 • 2 PM

Zoom: https://lbnl.zoom.us/91964244775

UCLA