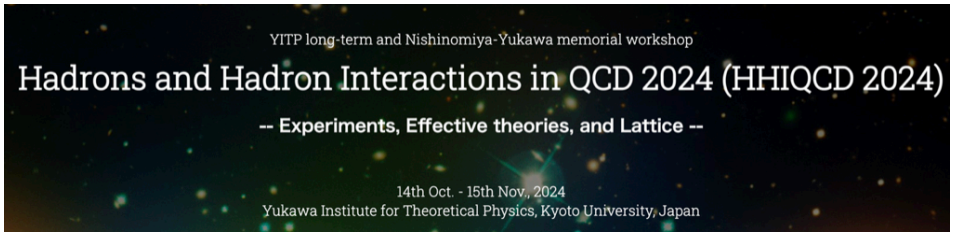

Contribution ID: **17** Type: **5th week (Formal developments and other frontiers in lattice QCD)**

Quantum computing of shear viscosity for 2+1D SU(2) gauge theory

Thursday, November 14, 2024 3:30 PM (1 hour)

Relativistic hydrodynamics has been used to study collective behavior of light particles produced in heavy ion collisions. It has been shown that hydrodynamic calculations with a small shear viscosity give results that agree well with experimental data. Furthermore, a holographic calculation showed that the ratio of shear viscosity and entropy density is as small as 1/(4pi) for strongly coupled N=4 supersymmetric Yang-Mills theory, which is consistent with the value extracted from experimental data via hydrodynamic simulations. On the other hand, calculating shear viscosity in QCD is very challenging: Perturbative calculations are not applicable in the temperature range of interest and Euclidean lattice QCD calculations have uncontrolled systematic uncertainties caused by the ill-defined spectral reconstruction problem. In this talk, I will discuss the Hamiltonian lattice approach which enables real-time calculations. I will take the 2+1D SU(2) pure gauge theory as an example and show some results obtained on a small lattice. The calculations take into account the running coupling in the continuum limit and find the ratio of shear viscosity and entropy density is consistent with 1/(4pi). Finally I will discuss a quantum algorithm to calculate the shear viscosity, which may help us to perform calculations on bigger lattices.

Primary authors: Dr TURRO, Francesco (fturro@uw.edu); Dr CIAVARELLA, Anthony (Lawrence Berkeley National Laboratory); YAO, Xiaojun (University of Washington)

Presenter: YAO, Xiaojun (University of Washington)

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