Contribution ID: **586** Type: **Poster**

Exploring the chirality and criticality of QCD matter with effective field theory for fluctuating hydrodynamics

Wednesday 6 April 2022 18:14 (4 minutes)

Very recently, a non-equilibrium effective field theory framework has been formulated for fluctuating hydrodynamics [1]. In this talk, we present examples of applying this novel formalism to study the properties of QCD-like systems. In the first example, we study the dependence of the conductivity/resistivity on the external magnetic field in a chiral medium (the constituent of which includes chiral fermions). While it is widely believed that chiral magnetic effect (CME) would lead to a negative magneto-resistivity, we find that CME together with hydrodynamic fluctuations gives rise to a positive magneto-resistance [2]. Second, in the view that non-Gaussian fluctuations of baryon density are important for the QCD critical point search, we derive evolution equations for the critical non-Gaussian fluctuations of a conserved density and obtain closed-form solutions based on field theory techniques [3]. Those results can be readily implemented for simulations in realistic situations of heavy-ion collisions. In addition, we find that nonlinear interactions among noise fields, which are missing in traditional stochastic hydrodynamics, could potentially contribute to the quartic (fourth-order) fluctuations in the scaling regime in off-equilibrium situations.

[1] Michael Crossley, Paolo Glorioso and Hong Liu, "Effective field theory of dissipative fluids,"JHEP **09** (2017) 095.

[2] Noriyuki Sogabe, Naoki Yamamoto and Yi Yin, "Positive magnetoresistance induced by hydrodynamic fluctuations in chiral media,"JHEP **09** (2021) 131.

[3] Noriyuki Sogabe and Yi Yin, "Off-equilibrium non-Gaussian fluctuations near the QCD critical point: an effective field theory perspective,"[arXiv:2111.14667 [nucl-th]].

Primary authors: SOGABE, Noriyuki (Institute of Modern Physics, Chinese Academy of Sciences); YIN, Yi (Institute of Modern Physics, Chinese Academy of Sciences)

Co-author: YAMAMOTO, Naoki (Keio University)

Presenter: SOGABE, Noriyuki (Institute of Modern Physics, Chinese Academy of Sciences)

Session Classification: Poster Session 1 T06 / T07

Track Classification: New theoretical developments