

The 21th IOPP Seminar : 尹伊 (Yi Yin) 研究员, 中国科学院近代物理研究所 (IMP, CAS), May 6th, 2021, Thursday, 2:30pm (Beijing time)

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Speaker: 尹伊 (Yi Yin) 研究员, 中国科学院近代物理研究所 (IMP, CAS)

Title: Shear-induced spin polarization in QCD matter

Abstract : The measurement of spin polarization and spin alignment of produced hadrons in heavy-ion collisions opens a new avenue to explore the properties of hot and dense QCD matter. We study the spin polarization generated by the hydrodynamic gradients. In addition to the widely studied thermal vorticity effects, we identify an undiscovered contribution from the fluid shear. This shear-induced polarization (SIP) can be viewed as the fluid analog of strain-induced polarization observed in elastic and nematic materials. We obtain the explicit expression for SIP using the quantum kinetic equation and linear response theory. Based on a realistic hydrodynamic, we study the azimuthal angle dependence of spin polarization in heavy-ion collisions. We find that SIP contribution always shows the same azimuthal angle dependence as experimental data and competes with thermal vorticity effects. In the scenario that Λ inherits and memorizes the spin polarization of strange quark, SIP wins the competition, and the resulting azimuthal angle-dependent spin polarizations agree qualitatively with the experimental data.

[1] Baochi Fu, Shuai Y.F. Liu, Longgang Pang, Huichao Song and Yi Yin, arXiv: 2103.10403

[2] Shuai Y.F. Liu and Yi Yin, arXiv: 2103.09200

About Yi Yin:

2014, Ph.D, U. Illinois of Chicago;

2014-16, Postdoc, Nuclear Theory Group, Brookhaven National Lab;

2016-19, Postdoc, Center for Theoretical Physics, MIT;

2019-Present, Scientist at Quark Matter Research Center, Institute of Modern Physics (Chinese Academy of Science).

Research Interest: the phase diagram of hot and dense nuclear matter, quantum effects in quark-gluon plasma, non-equilibrium statistical field theory, see antiann.org/yiyin/ for more