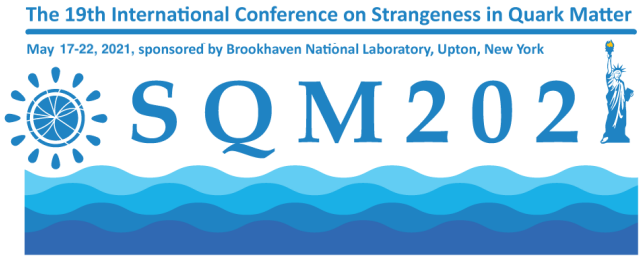

Contribution ID: **210** Type: **Theory talk**

Shear-induced spin polarization and "strange memory" in heavy-ion collisions

Wednesday, May 19, 2021 10:50 AM (20 minutes)

We analyze the spin polarization generated from the hydrodynamic gradients. In addition to the widely studied effects of thermal vorticity, we identify an undiscovered contribution, namely, shear-induced polarization (SIP). That is, shear strength $\sigma^{\mu\nu}$, the traceless and symmetric part of the flow gradient, will give rise to spin polarization in momentum space. SIP can be viewed as the fluid analog of strain-induced polarization observed in elastic and nematic materials in condensed matter physics, which converts anisotropy in fluid into eccentricity in spin space. The form of the SIP can be obtained either using the quantum kinetic equation or linear response theory and the form is identical in both approaches. Based on a realistic hydrodynamic model, we investigate the spin polarization on both beam direction (z) and out-plane direction (y), including SIP and thermal vorticity effects. We observe the azimuthal angle dependence of SIP always has the same trend comparing to the local lambda polarization observed in experiments in both z and y directions. Within the present study, we find that in the scenario that Λ inherits and memorizes the spin polarization of strange quark in the quark-gluon plasma phase, the total spin polarization shows an azimuthal angle dependence qualitatively agrees with the experimental data.

Collaboration

Primary author: Dr LIU, Shuai (Institute of Modern Physics (IMP))

Co-authors: FU, Baochi (PKU); SONG, Huichao (Peking University); PANG, LongGang (CCNU); YIN, Yi (IMP)

Presenter: Dr LIU, Shuai (Institute of Modern Physics (IMP))

Session Classification: Open and New (Charge and Flavor)