Contribution ID: **15** Type: **not specified**

Probing QCD matter from a little bang with spin transport

Wednesday 20 August 2025 15:30 (25 minutes)

In relativistic heavy ion collisions, the so-called little bang by analogy with the big bang in early universe can be realized in laboratories, where a deconfined phase of the quantum chromodynamic (QCD) matter at high temperature known as the quark gluon plasma (QGP) is produced. The QGP behaves as a nearly perfect fluid with the anisotropic flow that can be macroscopically described by relativistic hydrodynamics. Recent measurements of the spin polarization of Lambda hyperons further indicate the presence of strong vorticity of the rotating QGP and manifest the relativistic Barnett effect at the subatomic scale. Nevertheless, the related spin alignment phenomena of vector mesons cannot be simply explained by the vorticity. Microscopically, a considerable number of soft gluons in the QGP phase or even in the glasma phase as its precursor with overpopulated gluons in the color-glass-condensate effective theory may be delineated by fluctuating chromo-electromagnetic fields (or color fields for short). We will discuss how such color fields may potentially result in the spin alignment through the anisotropic spin correlation of the quark and antiquark forming a vector meson via quark coalescence and we may accordingly utilize the spin transport phenomena to probe the microscopic interaction of QCD matter in relativistic heavy ion collisions. Further studies on the local spin polarization from similar effects may also be mentioned.

Author: YANG, Di-Lun (Academia Sinica)

Presenter: YANG, Di-Lun (Academia Sinica)

Session Classification: Researcher session