Contribution ID: **3** Type: **talk**

Rotating gluodynamics and QCD: sign problem, mixed inhomogeneous phase and moment of inertia

Tuesday 21 January 2025 17:00 (45 minutes)

This report is devoted to the lattice study of rotating gluodynamics and QCD properties. The lattice simulation is conducted in a co-rotating reference frame, where the rotation is reduced to the effects of curved space-time. Unfortunately, a direct simulation of this system is hampered by the sign problem, which arises both in gluonic and fermionic sectors. To overcome the sign problem, we perform the simulation for imaginary angular velocities, and then analytically continue the results to the region of real rotation. We found a new spatially inhomogeneous phase in a rotating system. This mixed phase simultaneously possesses both confining and deconfining phases in thermal equilibrium. The position of the boundary between phases is determined by the local critical temperature, which increases with the radius for real angular velocity. In addition, the results for the equation of state of rotating (quark-)gluon plasma are presented. We found that the moment of inertia unexpectedly takes a negative value in the "supervortical"range of temperatures near the phase transition. We suppose that these results indicate the possible negative spin-vortical coupling for gluons resulting in a negative Barnett effect.
It is shown, that the peculiar properties of rotating QCD arise from quadratic in angular velocity terms of the action, i.e. from chromomagnetic components of the gluon fields. In contrast, the linear terms, which are responsible for the sign problem, play only a sub-leading role.

Authors: BRAGUTA, Victor (JINR); Dr CHERNODUB, Maxim ((i) Institut Denis Poisson, Tours, France and (ii) West University of Timișoara, Romania); KOTOV, Andrey; ROENKO, Artem (JINR)

Presenter: ROENKO, Artem (JINR)

Session Classification: Tuesday afternoon