Contribution ID: **64** Type: **Oral**

Study of the Deconfinement Phase Transition under real rotation with Matrix model

Monday, 27 October 2025 09:00 (20 minutes)

We constructed the matrix model under real rotation ω in a cylinder of radius R, with $R\omega < 1$ to preserve causality, by using the background field effective theory. Based on this new matrix model, we investigated the confinement/deconfinement phase transition in $SU(3)$ and $SU(2)$ gauge theories. Our results indicate that a phase transition can occur as long as the non-perturbative contribution of the matrix model is taken into account. The rotating gluon plasma transforms into an inhomogeneous medium, and the phase transition temperature T_c decreases as the distance from the rotation axis increases; T_c remains almost unaffected by ω around the rotation axis particular for $SU(3)$. On the other hand, T_c first increases and then decreases with increasing ω when considering the schematic rotation-dependent coupling constant, which is due to the competition between the coupling constant and the semi-classical gluon vacuum and Gaussian fluctuations induced by rotation. In addition, our results show that phase transition always remains first-order for $SU(N)$ theory with $N \geq 3$, and second-order for $SU(2)$ theory.

Primary author: DU, Qianqian (Guangxi Normal University)

Co-authors: Prof. GUO, Yun (Guangxi Normal University); Prof. HUANG, Mei (University of Chinese Academy of Sciences); Prof. JIANG, Yin (Beihang University)

Presenter: DU, Qianqian (Guangxi Normal University)

Session Classification: Parallel I

Track Classification: QCD 相变与状态方程 (QCD phase transition and equation of state)