

The 119th HENPIC seminar by Dr. Kaijia Sun (Texas A&M University), Aug. 27th, 2020, Thursday, 10:30 am (UTC+8)

Talk title: QCD criticality on light nuclei production in heavy-ion collisions

Speaker : Dr. Kaijia Sun (Texas A&M University)

Abstract: Locating the possible critical (end-)point (CEP), characterized by a diverging density-density correlation length, in the phase diagram of Quantum Chromodynamics (QCD) through the Beam Energy Scan (BES) program at RHIC is one of the main goals in high-energy nuclear physics. Since the proposal of using the non-Gaussian fluctuations (PRL 102,032301(2009)) in the net-proton multiplicity distribution as the probe to the CEP almost one decade ago, little progress has been made in identifying other observables that are sensitive to the CEP. In this talk, I show, for the first time, that the yield ratios of light nuclei, such as $N_t N_p / N_d^2$, $N_\alpha N_p / (N_{He} N_d)$, and $N_\alpha N_t N_p^2 / (N_{He} N_d^3)$, increase monotonically as a function of the correlation length. This novel phenomenon of criticality allows us to locate the QCD critical point through the collision energy dependence of the yield ratio $N_t N_p / N_d^2$ in relativistic heavy-ion collisions.

Self-introduction: Kai-Jia Sun, currently a postdoc of the Cyclotron institute in Texas A&M University (TAMU). He was awarded Ph. D. in physics at Shanghai Jiao Tong University (SJTU) in 2017 and then went to TAMU as a postdoctoral fellow. His main research interest is in high-energy nuclear physics, especially in the search for the QCD critical point in relativistic heavy-ion collisions.