Quark Matter 2018



Contribution ID: 883

Type: Poster

Probing QCD phase diagram with light nuclei production in relativistic heavy-ion collisions

Tuesday 15 May 2018 19:10 (30 minutes)

Fluctuation signals of phase transitions from quark-gluon plasma (QGP) to hadronic matter can greatly advance our knowledge of the nature of strong interaction. In relativistic heavy-ion collisions, the enhanced density fluctuations due to phase transitions (either first-order or second-order at CEP) can cause large correlations in nucleon densities at final state, which in turn affect the productions of composite particles like light nuclei. The light nuclei (e.g. deuteron) can only be formed within a restricted volume in phase space, therefore, they can probe local density fluctuation.

I will demonstrate the usefulness and advantage of probing the QCD phase diagram with light nuclei in relativistic heavy-ion collisions.

Especially, from recent experimental data in central Pb+Pb collisions at the CERN Super Proton Synchrotron (SPS) energies measured by the NA49 Collaboration, we find significant non-monotonic behaviours of nucleon density correlations and fluctuations. The results indicate that the density fluctuations become the largest in collisions at $\sqrt{s_{NN}} = 8.8$ GeV. With the known chemical freeze-out conditions determined from the statistical model fit to experimental data, we obtain a chemical freeze-out temperature of ~ 144 MeV and baryon chemical potential of ~ 385 MeV at this collision energy, which are close to those predicted by various theoretical studies for the critical endpoint in the QCD phase diagram.

Content type

Theory

Collaboration

This work is done under collaboration with Prof. Lie-Wen Chen, Prof. Che-Ming Ko and Prof. Zhangbu Xu

Centralised submission by Collaboration

Presenter name already specified

Author: Dr KAI-JIA, Sun (Department of Physics and Astronomy and Shanghai Key Laboratory for Particle Physics and Cosmology)

Presenter: Dr KAI-JIA, Sun (Department of Physics and Astronomy and Shanghai Key Laboratory for Particle Physics and Cosmology)

Session Classification: Poster Session

Track Classification: Phase diagram and search for the critical point