Contribution ID: **46** Type: **Oral Presentation**

Unified description from small to large colliding systems within dynamical core–corona initialization

Wednesday 6 November 2019 15:20 (20 minutes)

We investigate whether the quark gluon plasma (QGP) is created in small colliding systems through the analysis of strangeness enhancement using the dynamical core–corona initialization model [1].

The yield ratios of (multi-)strange hadrons to charged pions in various colliding systems exhibit monotonic increase and scale with multiplicity at the LHC energies [2]. Motivated by these data, we develop a unified and a phenomenological description of the QGP formation based on the dynamical initialization model [3].

First we obtain the initially produced partons using PYTHIA8 on an event-by-event basis. From these initial partons, we generate initial conditions of QGP fluids as a dynamical process. Here we assume the core–corona picture: Local equilibrium is likely to be achieved among highly populated partons
due to multi-secondary scatterings, while partons tend to traverse without being QGP components when these are in low density regions.
Next we separate dynamically initial partons into QGP fluids (core: dense/soft components) and surviving partons (corona: dilute/hard components) under this assumption. After hydrodynamic evolution, the QGP fluids (the core) are particlized in the decoupling hypersurface, while surviving partons (the corona) are hadronized through string fragmentation in PYTHIA. The final hadron spectra is a sum of both contributions from the core and the corona in this model.

We show the (multi-)strangeness yield ratios monotonically increase with multiplicity due to the competition between core and corona components and successfully reproduce the tendency of experimental data [2]. We also find that the ratios scale with multiplicity regardless of collision energies or system size, which is consistent with experimental findings [2]. Moreover, we calculate the fraction of fluidized energy as a function of multiplicity from small to large systems and find that initial partons are almost fluidized in mid-rapidity even in $\langle dN/d\eta \rangle >\sim 10$.

[1] Y.Kanakubo, M.Okai, Y.Tachibana and T.Hirano, Progress of Theoretical and Experimental Physics 2018, no.12, 121D01 (2018).

[2] J.Adam et al. [ALICE Collaboration], Nature Phys. 13, 535 (2017).

[3] M.Okai, K.Kawaguchi, Y.Tachibana and T.Hirano, Phys.Rev.C 95, no. 5, 054914 (2017).

Primary author: KANAKUBO, Yuuka (Sophia Univ.)

Co-authors: TACHIBANA, Yasuki (Wayne State University); HIRANO, Tetsufumi (Sophia Univ)

Presenter: KANAKUBO, Yuuka (Sophia Univ.)

Session Classification: Parallel Session - Small systems IV

Track Classification: Small systems