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# Dynamical initialization with core-corona picture in small colliding systems

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We study effects of dynamical initialization with a core-corona picture in hydrodynamic description of small colliding systems at RHIC and the LHC energies. We previously proposed an idea of dynamically initializing hydrodynamic fields by utilizing source terms in hydrodynamic equations [1]: Instead of setting initial conditions at a fixed hydrodynamic initial time, we make initially produced partons propagate and deposit energy and momentum into the bulk matter via the source terms to form the quark gluon plasma (QGP) fluids gradually. Under this idea, not only initial fluctuations of geometry but also those of velocity fields are naturally generated. In the present study, we further introduce the core-corona picture to the idea by considering spatial density of the initially produced partons. Here, partons produced in the dilute region fragment into hadrons separately instead of taking part in the initial QGP fluid formation. This picture strongly affect the fluid profile in small colliding systems and must be taken into account.

To demonstrate the above idea, we employ a QGP fluid + jet model [2] in which the QGP medium evolution is described by (3+1)-D hydrodynamic equations with source terms. As an input, we generate partons by using the latest version of PYTHIA 8.230 which involves heavy-ion collisions. As propagating after the production, these partons deposit energy and momentum into the bulk QGP fluid according to the parton density around them in the core-corona picture. From simulations with this newly developed framework, we calculate hadron spectra including contributions from both the surviving partons in the dilute regions with PYTHIA fragmentation and the fluid part in the dense region and show that the core-corona picture plays a crucial role in small colliding systems.

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

[2] Y.Tachibana, T.Hirano, Phys. Rev. C 90, no. 2, 021902 (2014).

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## Collaboration

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