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# Heavy flavor kinetics in hot QCD

We investigate the evolution of charm quarks in hot QCD matter within the well-grounded quasiparticle approach [1]. The quark-gluon plasma (QGP) is composed of the quasiparticle excitations with dynamically generated masses that are linked to the lattice QCD equation of state.

Utilizing the kinetic rate equation, we study the thermal production of charm quark pairs $(c\bar{c})$ in hot QCD matter with various quark content and distinct evolution scenarios. The QGP with $N_f = 2 + 1$ quark flavors contains the charm-quark "impurities", while in the $N_f = 2 + 1 + 1$ case, the charm quarks contribute to the QCD equation of state above $T = 300$ MeV.

The expansion of the system with $N_f = 2 + 1$ is described by hydrodynamic simulations of viscous fluid in 2+1 dimensions [2], with temperature-dependent shear viscosity computed in the quasiparticle approach [1]. To illustrate how the kinetics of charm quarks depends on the evolution and transport properties of hot QCD matter, we additionally study the production of the $c\bar{c}$ pairs in perfect fluid propagating longitudinally [3].

Our systematic study reveals that within the statistical errors, the number of the $c\bar{c}$ pairs remains unchanged through the entire evolution of perfect QGP propagating in one dimension. This observation agrees with the prediction of the Statistical Hadronization Model [4]. In viscous QGP expanding in 2+1 dimensions, a slight decrease in the number of charm quarks is observed as the system approaches the pseudocritical temperature. This indicates the influence of the dissipative phenomena on the production of heavy flavors in hot QCD [5].

**References:**

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## Category

Theory

## Collaboration (if applicable)

**Author:** MYKHAYLOVA, Valeriya (Jagiellonian University in Kraków & University of Wrocław)

**Co-authors:** SASAKI, Chihiro; REDLICH, Krzysztof (University of Wroclaw)

**Presenter:** MYKHAYLOVA, Valeriya (Jagiellonian University in Kraków & University of Wrocław)

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