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Charm quark dynamics in the QGP

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We study the in- and out-off equilibrium dynamics of heavy quarks in the strongly interacting partonic and hadronic medium within the Parton-Hadron-String Dynamics (PHSD) transport approach [1] which incorporates explicit partonic degrees-of-freedom in terms of strongly interacting quasi-particles (quarks and gluons) in line with an equation of state from lattice QCD as well as the dynamical hadronization and hadronic collision dynamics in the final reaction phase. The off-shell properties of quasi-particles- masses and widths - are described within the Dynamical Quasi-Particle Model (DQPM) and strongly depend on the temperature.

We calculate the different cross sections for perturbative partons (massless on-shell particles in the vacuum) and for dynamical quasi-particles (off-shell particles in the QGP medium as described by the DQPM) using the leading order Born diagrams [2]. We find that the finite width of the quasi-particles in the DQPM-which encodes the multiple partonic scattering - has little influence on the cross section for qQ ->qQ as well as gQ ->gQ scattering except close to thresholds. Thus when studying the dynamics of energetic heavy quarks in a QGP medium the spectral width of the charm quarks may be discarded.

Using the obtained on- and off-shell cross sections we have calculated the transport properties of the charm quarks in an equilibrated QGP such as the relaxation time [3], dynamical collisional energy loss, drag and diffusion coefficients, longitudinal and transverse momentum fluctuations, etc.

Finally we incorporate the charm scattering processes in the PHSD transport approach and study the dynamics of heavy quarks in realistic heavy-ion collisions addressing observables such as the elliptic flow v_2 and R_AA.

[1] W. Cassing, and E. L. Bratkovskaya, Nucl.Phys. A831 (2009) 215-242.
[2] H. Berrehrah, E. Bratkovskaya, W. Cassing, P.B. Gossiaux, J. Aichelin, and M. Bleicher, arXiv:1308.5148.
[3] H. Berrehrah, E. Bratkovskaya, W. Cassing, P.B. Gossiaux and J. Aichelin, arXiv:1311.0736.

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