



Contribution ID: 467

Type: Poster

Hydrodynamic approach to heavy-quark diffusion in the quark-gluon plasma

Friday 8 April 2022 14:44 (4 minutes)

Exciting experimental results on the flow of charmonia and bottomonia with an unprecedented level of precision pose the important physics question about the possible heavy-quark thermalization in the quark-gluon plasma (QGP). In this work, a new hydrodynamic approach to the transport of heavy quarks in the QGP is presented. We exploit the conservation of the number of heavy quark-antiquark pairs within the evolution of the QGP to construct causal second-order hydrodynamic equations of motion. The hydrodynamic transport coefficients associated with the heavy-quark diffusion current are then compared with the momentum-diffusion coefficients obtained in transport theory (Fokker-Planck equation). We provide new insights concerning the level of local thermalization of charm and beauty quarks inside the expanding QGP by investigating the relation between the two approaches. Our results show that a fluid dynamic description of diffusion is feasible for charm quarks. In particular, in Bjorken flow the hydrodynamization time of charm quarks is in general short compared to the typical expansion time of the QGP, justifying a fluid description of charm diffusion. Analogous considerations for beauty quarks are presented.

Based on: F. Capellino, A. Beraudo, A. Dubla, S. Floerchinger, S. Masiocchi, J. M. Pawłowski, I. Selyuzhenkov, in preparation. This work is funded via the DFG ISOQUANT Collaborative Research Center (SFB 1225).

Primary authors: BERAUDO, Andrea (INFN, sezione di Torino (IT)); DUBLA, Andrea (GSI); CAPELLINO, Federica (Ruprecht Karls Universitaet Heidelberg (DE)); SELYUZHENKOV, Ilya (GSI, Darmstadt); PAWLOWSKI, Jan M.; MASCIOCCHI, Silvia (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); FLOERCHINGER, Stefan (Heidelberg University)

Presenter: CAPELLINO, Federica (Ruprecht Karls Universitaet Heidelberg (DE))

Session Classification: Poster Session 3 T11_3

Track Classification: Heavy flavors, quarkonia, and strangeness production