Contribution ID: **188** Type: **Oral presentation**

Fluid-dynamic approach to heavy-quark diffusion in the quark-gluon plasma

Monday 23 September 2024 17:30 (20 minutes)

Charm and beauty quarks are powerful tools to characterize the quark-gluon plasma (QGP) produced in heavy-ion collisions. Although they are initially produced out of kinetic equilibrium via hard partonic scattering processes, recent measurements of anisotropic flow of charmed hadrons pose the question regarding the degree thermalization of heavy quarks in the medium. Our recent work [1] has provided new insights into the level of thermalization of charm and beauty quarks in the QGP. In particular, by exploiting a mapping between transport theory and fluid dynamics, we have shown how a fluid-dynamic description of charm-quark diffusion in the QCD plasma is feasible at LHC energies. Inspired by recent lattice-QCD calculations, we will show how a partial thermalization within the lifetime of the QGP is expected also for beauty quarks.
We will present results for spectra of charm [2] and beauty hadrons obtained with a fluid-dynamic approach employing the conservation of a heavy-quark - antiquark current in the QGP. By introducing a weight parameter in the Equation of State for the beauty quark density and comparing our results with experimental measurements of open- and hidden-beauty hadron yields, we provide an estimate of the fraction of thermalized beauty quarks in the QGP.
This work is funded via the DFG ISOQUANT Collaborative Research Center (SFB 1225).
[1] Phys.Rev.D 106 3, 034021 (2022)
[2] Phys.Rev.D 108 (2023) 11, 116011

Category

Theory

Collaboration

Primary authors: Dr DUBLA, Andrea (GSI); KIRCHNER, Andreas; GROSSI, Eduardo (Stony Brook University); CAPELLINO, Federica (Heidelberg University (DE)); MASCIOCCHI, Silvia (GSI - Helmholtzzentrum fur Schwerionenforschung GmbH (DE)); FLOERCHINGER, Stefan (University of Jena)

Presenter: CAPELLINO, Federica (Heidelberg University (DE))

Session Classification: Parallel 6: heavy quarks in medium

Track Classification: 3. Heavy quarks and quarkonia