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Fluid dynamics of charm and beauty quarks from large to small systems

Heavy quarks (i.e. charm and beauty) 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 the anisotropic flow of charmed hadrons pose the question regarding the possible thermalization of heavy quarks in the medium. By exploiting a mapping between transport theory and hydrodynamics [1], we developed a fluid-dynamic description of heavy-quark diffusion in the QCD plasma. We will present results for transverse momentum distributions and integrated yields of charm and beauty hadrons obtained with a fluid-dynamic code coupled with the conservation of a heavy-quark - antiquark current in the QGP. We will show that our calculations are in agreement with the experimental measurements in Pb-Pb collisions [2,3] and provide new predictions for Ne-Ne and O-O collisions.

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[1] Phys.Rev.D 106 (2022) 3, 034021

[2] Phys.Rev.D 108 (2023) 11, 116011

[3] Capellino, Dubla, Facen, Floerchinger, Grossi, Kirchner, Masciocchi, in preparation

Category

Theory

Collaboration (if applicable)

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