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Influence of a realistic medium description including fluctuations on heavy quark observables

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Strong jet quenching and high- p_T hadron suppression as observed in relativistic heavy-ion collisions are striking experimental signatures for the formation of a deconfined QCD plasma, in which partons suffer from medium-induced energy loss. In particular, heavy quarks represent key probes for revealing the properties of the produced matter.

In this talk, we discuss the consequences of a realistic medium description with fluctuating initial conditions on heavy-quark observables. For this purpose, we combine our Monte-Carlo approach to heavy-quark in-medium propagation MC@sHQ [1] with the full 3+1 dimensional fluid dynamic expansion from EPOS [2]. This allows for a consistent treatment of both the heavy-quark production and the collisional and radiative processes leading to the in-medium energy loss of heavy quarks. On an event-by-event basis, we report on RAA and v_2 of D and B mesons for RHIC and LHC energies and confront our results with recent experimental observations. While with a simplified medium description [3] we find a too strong quenching for LHC conditions, the discrepancy can be resolved with a medium with initial fluctuations. Moreover, in EPOS a lattice QCD equation of state is used. This allows us to study the nature of the effective degrees of freedom present in the vicinity of the crossover transition, cf. [4], because a proportion of hadronic degrees of freedom above T_c would reduce the energy loss of heavy quarks.

[1] P. B. Gossiaux and J. Aichelin, Phys. Rev. C 78 (2008) 014904

[2] K. Werner et al., arXiv:1203.5704,

[3] P. F. Kolb and U. W. Heinz, In *Hwa, R.C. (ed.) et al.: Quark gluon plasma* 634-714

[4] C. Ratti et al., Phys. Rev. D 85 (2012) 014004

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