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Nonperturbative Heavy-Flavor Diffusion and Hadronization in a Hydrodynamic Description of Heavy-Ion Collisions

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We compute open heavy-flavor (HF) transport in relativistic heavy-ion collisions by combining a strong-coupling treatment in both macro- and microscopic dynamics (hydro and nonperturbative diffusion interactions) [1]. The hydrodynamic bulk evolution is quantitatively constrained by bulk and multi-strange hadron spectra and elliptic flow [2]. In the Quark-Gluon Plasma (QGP) phase, heavy-quark diffusion coefficients are taken from a non-perturbative T -matrix approach. The latter leads to resonance formation close to T_c which is implemented as a hadronization (recombination) mechanism on a hydrodynamic hypersurface. In the hadronic phase, the diffusion of HF mesons is obtained from effective hadronic theory [3]. We compute observables at RHIC and LHC for both HF mesons and non-photonic electrons. In particular, we suggest the R_{AA} and v_2 of the D_s mesons as a unique observable due to the coupling of charm to the strangeness enhancement in AA collisions [4], which allows to quantitatively test key components of our approach, including recombination and hadronic diffusion effects.

References:

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- [4] M. He, R. J. Fries and R. Rapp, arXiv:1204.4442 [nucl-th].

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