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Nonperturbative Approach to Open Heavy Flavor in Relativistic Heavy Ion Collisions

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We evaluate open heavy-flavor (HF) transport in relativistic heavy-ion collisions utilizing a strong-coupling treatment for both macro- and micro-dynamics of the problem [1]. The former is realized through a hydrodynamic evolution quantitatively constrained by bulk-hadron spectra and elliptic flow. The HF transport is based on non-perturbative T-matrix calculations of heavy-light parton scattering in the Quark-Gluon Plasma (QGP) [2], yielding a diffusion coefficient consistent with lattice QCD, and on effective interactions of D-mesons with light hadrons in hadronic matter [3]. The T-matrix interactions in the QGP lead to resonance formation close to T_c which are implemented as a hadronization (recombination) mechanism on a hydrodynamic hypersurface, providing a seamless treatment of HF interactions throughout the bulk-medium evolution. We deploy this framework for a comprehensive study of open HF observables from 62-2760 GeV [4,5,6]. A fair description of current experimental data for the nuclear modification factor and elliptic flow of D, D_s, B mesons and HF leptons emerges at low and intermediate transverse momenta p_T. Discrepancies arise toward high p_T, indicating the onset of radiative energy loss that we also address via a preliminary nonperturbative bremsstrahlung calculation.

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Summary

Open heavy flavor transport in hot QCD matter via non-perturbative computations.

Presentation type

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