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Lattice QCD results for the heavy quark diffusion coefficient

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We present a novel approach to nonperturbatively estimate the heavy quark momentum diffusion coefficient, which is a key input for the theoretical description of heavy quarkonium production in heavy ion collisions, and is important for the understanding of the elliptic flow and nuclear suppression factor of heavy flavor hadrons. In the heavy quark limit, this coefficient is encoded in the spectral functions of color-electric and color-magnetic correlators that we calculate on the lattice to high precision by applying gradient flow. The color-magnetic correlator, which encodes the mass-suppressed contribution to the diffusion coefficient, is calculated for the first time on the lattice. In our study we consider quenched QCD at $1.5T_c$, where we perform a detailed study of the lattice spacing and flow time dependence of color-electric and color-magnetic correlators, and, using theoretically well-established model fits for the spectral reconstruction, we estimate the heavy quark diffusion coefficient. Equipped with the experience obtained in quenched QCD, we estimate the heavy quark diffusion coefficient from 2+1 flavor QCD ensembles at small but finite lattice spacing.

Present via

Online

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