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NON-PERTURBATIVE HEAVY QUARK DIFFUSION IN A WEAKLY MAGNETIZED THERMAL QCD MEDIUM

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Heavy quarks (HQ) are considered to be excellent probes of the hot QCD matter produced in the high-energy heavy-ion collisions. HQ diffusion coefficient is one of the fundamental transport properties of the hot QCD matter. In this work, we have calculated the HQ momentum (κ) as well as spatial (D_s) diffusion coefficients in an ambient background weak magnetic field via evaluating the scattering rate of HQ's with light thermal partons. To that end, we calculate the HQ self-energy in the presence of a weak magnetic field by using the HQ potential as a proxy for the resummed gluon propagator. The information about the magnetic field comes in via the HQ potential, wherein, the light thermal partons are assumed to occupy all Landau levels. In this potential formulation, one can consider a non-perturbative ansatz for the gluon propagator which produces a string-like confining effect in coordinate space, thus allowing for the calculation of non-perturbative contribution to the HQ transport coefficients. We have computed the heavy quark diffusion coefficients at both zero and finite momentum, observing that non-perturbative effects play a dominant role at low momentum and low temperature. Our spatial diffusion coefficient, $2\pi TD_s$, shows good agreement with recent LQCD results. These findings can be used to calculate the heavy quark directed flow at RHIC and LHC energies.

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