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Diffusion coefficient of heavy quark from classical lattice: A non-static case

The propagation of heavy quarks in the thermal medium closely resembles a Brownian motion characterized by the transport coefficients. In the leading order expansion of inverse mass, these transport coefficients, in particular momentum diffusion, are obtained from the correlators of chromo-electric (E) and chromo-magnetic (B) fields. We investigate longitudinal and transverse diffusion coefficients for a non-static heavy quark in the medium. While the longitudinal diffusion coefficient ($\kappa_L(p)$) is related to the EE correlator, the transverse momentum diffusion coefficient ($\kappa_T(p)$) is controlled by both BB and EB correlators. We show that in the perturbative limit, $O(v^2)$ correction to the leading order in both κ_L and κ_T are purely given by the electric field correlators. In the strong coupling limit, we estimate these field correlators (EE, BB, EB) and hence diffusion coefficients within the classical lattice Yang-Mills theory.

Primary author: Dr SINGH, BALBEER (Tata Institute of Fundamental Research)

Co-author: Dr DATTA, Saumen (Tata Institute of Fundamental Research)

Presenter: Dr SINGH, BALBEER (Tata Institute of Fundamental Research)

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