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Heavy quark diffusion from 2+1 flavor lattice QCD

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Heavy quarks are produced in the early stages of the ultra-relativistic heavy-ion collisions and probe the produced hot medium created in these collisions through its entire evolution. The kinetic thermalization of heavy quarks can be characterized by the heavy quark diffusion coefficient. In this talk we report the first determination of the heavy diffusion coefficient in 2+1 flavor lattice QCD in temperature range 195 <T< 352 MeV using the heavy quark effective theory approach combined with novel gradient flow technique. We found that our full QCD determinations are significantly smaller than the quenched lattice QCD determinations and recent phenomenological estimates, implying a very fast kinetic thermalization the heavy quarks. Within this approach we also estimate the first mass suppressed correction to the diffusion coefficient for the first time in 2+1 flavor QCD for the above temperature range.

Category

Theory

Collaboration (if applicable)

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