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# Quarkonium transport in weakly and strongly coupled plasmas

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Suppression of open heavy flavors and quarkonia in heavy-ion collisions is among the most informative probes of the quark-gluon plasma (QGP). Interpreting the full wealth of data obtained from the collision events requires a precise understanding of the evolution of heavy quarks and quarkonia as they propagate through the nearly thermal and strongly coupled plasma. Only in the past few years, systematic theoretical studies of quarkonium time evolution in the QGP have been carried out in the regime where the temperature of the QGP is much smaller than the inverse of quarkonium size.

Such calculations require the evaluation of a gauge-invariant correlator of chromoelectric fields dressed with Wilson lines, which is similar to, but different from, the correlation used to define the well-known [1] heavy quark diffusion coefficient. In this talk, we will describe its calculation at weak coupling in QCD up to next-to-leading order [2] and at strong coupling in N=4 Yang-Mills theory using the AdS/CFT correspondence [3]. While it resembles the open heavy quark case, it has some crucial differences that highlight the relevance of quantum color correlations. Crucial insights are obtained by studying them in temporal axial gauge, where these correlators would naively be equal [4]. Furthermore, we will discuss the necessary setup to evaluate the quarkonium transport coefficients from lattice QCD, which, at present, is the only tool we have to study QCD in the non-perturbative regime. Finally, we will discuss the phenomenological implications that can be extracted from this correlator, with emphasis on the implications of the novel N=4 SYM results at strong coupling.

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[1] Casalderrey-Solana, Teaney, arXiv:hep-ph/0605199
[2] Binder, Mukaida, Scheihing-Hitschfeld, Yao, arXiv:2107.03945
[3] Nijs, Scheihing-Hitschfeld, Yao, arXiv:2304.03298
[4] Scheihing-Hitschfeld, Yao, arXiv:2205.04477

## Category

Theory

## Collaboration (if applicable)

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