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## Quarkonium transport in weakly and strongly coupled plasmas

Suppression of open heavy flavors and quarkonia in heavy-ion collisions is among the most informative probes of the quark-gluon plasma. 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 SYM 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]. We will also discuss the results for the quarkonium transport coefficients obtained from the analogous correlator in N=4 SYM, thereby establishing the first analytic results at strong coupling in this context.

[1] J. Casalderrey-Solana and D. Teaney, "Heavy quark diffusion in strongly coupled N=4 Yang-Mills theory," *Phys. Rev. D* 74 (2006) 085012;

[2] T. Binder, K. Mukaida, B. ScheiHING-Hitschfeld, X. Yao, "Non-Abelian Electric Field Correlator at NLO for Dark Matter Relic Abundance and Quarkonium Transport," *JHEP* 01 (2022) 137;

[3] G. Nijs, B. ScheiHING-Hitschfeld, X. Yao, "Electric field correlator for quarkonium transport in strongly coupled N=4 Yang-Mills theory," in preparation;

[4] B. ScheiHING-Hitschfeld, X. Yao, "Gauge Invariance of Non-Abelian Field Strength Correlators: the Axial Gauge Puzzle," *Phys. Rev. Lett.* 130 (2023) 052302;

### What kind of work does this abstract pertain to?

Theoretical

### Which experiment is this abstract related to?

Other

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