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The in-medium heavy-quark potential from quenched and dynamical lattice QCD

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Heavy Quarkonium provides a unique opportunity to investigate the physics of the quark-gluon plasma created in relativistic heavy-ion collisions. From the measured suppression patterns in nucleus-nucleus collisions relative to the yields in proton-proton collisions, we ultimately aim at extracting the properties of the bulk matter created in the collision center.

Hence a thorough understanding of the real-time evolution of in-medium heavy quarkonium is called for. Due to the inherent separation of scales between the heavy quark rest mass and the surrounding energy densities it can actually be described in terms of a Schroedinger equation with interaction potential, based on non-relativistic effective field theories such as NRQCD. Here we report on the current status of extracting the in general complex values of the potential from first principles lattice QCD simulations.

The real and imaginary part of this real-time potential is obtained from the position and width of the lowest lying peak in the Coulomb gauge Wilson line correlator spectral function. We extract spectral information from Euclidean time data using a novel Bayesian approach different from the Maximum Entropy Method. We find that Re[V] lies close to the color singlet free energies, while Im[V] is of the same order as the predictions from resummed perturbation theory (HTL) already close above the critical temperature.

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