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Heavy quarkonium suppression beyond the adiabatic limit

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Many prior studies of in-medium quarkonium suppression have implicitly made use of an adiabatic approximation in which it was assumed that the heavy quark potential is a slowly varying function of time. In the adiabatic limit, one can separately determine the in-medium breakup rate and the medium time evolution, folding these together only at the end of the calculation. In this paper, we relax this assumption by solving the 3d Schrodinger equation in real-time in order to compute quarkonium suppression dynamically. We compare results obtained using the adiabatic approximation with real-time calculations for both harmonic oscillator and realistic complex heavy quark potentials. Using the latter, we find that, for the $\Upsilon(1s)$, the difference between the adiabatic approximation and full real-time evolution is at the few percent level, however, for the $\Upsilon(2s)$, we find that the correction can be as large as 18% in low temperature regions. For the J/Ψ, we find a larger difference between the dynamical evolution and the adiabatic approximation, with the error reaching approximately 36%.

Collaboration (if applicable)

Track

Heavy Flavor and Quarkonia

Contribution type

Contributed Talk

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