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Proper Heavy-Quark Potential in a Spectral Decomposition from the Thermal Wilson Loop ALEXANDER ROTHKOPF, TETSUO HATSUDA, SHOICHI SASAKI, The University of Tokyo — Experimental findings of $Q\bar{Q}$ suppression urge for a better understanding of the underlying in-medium effects. To this end we propose a non-perturbative definition of the proper Heavy-Quark potential V(R) from the spectral decomposition of the thermal Wilson loop:$\mathcal{W}(\tau, R) \propto_{m\to\infty} \int e^{-\bar{\omega}\tau}\rho(\bar{\omega}, R)d\bar{\omega}$. Re[V(R)] can be extracted using peak positions in $\rho(\bar{\omega}, R)$ at different R, and the imaginary part from the width of the envelope. The use of spectral functions allows to connect imaginary- and real-time quantities such as the forward propagator $D^{>}(t, R)$: $\int d\bar{\omega}e^{-i\bar{\omega}t}\rho(\bar{\omega}, R)d\bar{\omega} = D^{>}(t, R){\sim}_{t\to\infty}e^{-itV(R)}$. This bridges the gap between rigorous results at T=0 and perturbative studies well above the critical temperature. The peak structure of the spectral function also determines when a Schrödinger-equation description of the system is possible, in which this proper potential can be used. First results for the real part in SU(3) gauge theory, using a 3-peak model for the spectral function, reveal that well above the critical temperature the string tension of the heavy $Q\bar{Q}$ system still contributes significantly. Thus, Debye screening is not as pronounced as in the case of the Polyakov loop correlator free energies. These hints toward an increased stability of heavy quarkonia up to $2T_C$ as compared to melting within a free energy potential framework are consistent with both experimental data and lattice studies on the $Q\bar{Q}$ spectrum and its wavefunction.

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