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Lattice NRQCD study on the in-medium modification of Bottomonium spectra using a novel Bayesian reconstruction

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We present the results of a recent study on the in-medium modification of the spectral properties of Bottomonium S-wave (Υ) and P-wave (χ_{b1}) states. The light degrees of freedom of the surrounding medium are represented by $48^3 \times 12$ HotQCD lattices with $N_f=2+1$ HISQ flavors, which span the temperature range $140.40(\text{MeV})(= 0.911T_C) < T < 248.63(\text{MeV})(= 1.614T_C)$. The heavy quarks on the other hand are treated as probes, evolving in the background of the medium fields according to non-relativistic QCD (NRQCD).

Spectral functions are extracted from the NRQCD propagators using a novel Bayesian approach, which is contrasted to the standard Maximum Entropy method. We confirm the finding of previous studies that Υ retains a well defined peak structure even at $1.6T_C$. Inspection of its mass reveal that medium effects only begin to play a role above $T \sim 175\text{MeV}$, while its width appears to grow monotonously. For χ_{b1} we find that with the new Bayesian method, it is possible to resolve a ground state peak also up to $T=248.6\text{MeV}$, contrary to the MEM, which suggests ground state melting already at $T>205\text{MeV}$.

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