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Lattice NRQCD study of quarkonium at non-zero temperature

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To study the in-medium modification of quarkonium properties, charmonium correlators at $140.4(\beta = 6.664) \leq T \leq 221(\beta = 7.280)$ (MeV) are calculated using the NRQCD formalism on $48^3 \times 12$ gauge configurations with dynamical $N_f = 2 + 1$ flavors of Highly Improved Staggered Quarks (HISQ). To determine the “zero energy shift” for these lattices, we perform a fine zero temperature scan ($\beta = 6.664, 6.740, 6.800, 6.880, 6.950, 7.030, 7.150$ and 7.280). In addition, we investigate the influence of statistical errors on the reconstruction of spectral functions by varying the number of correlators in the study. We find that the temperature dependence of charmonium correlators is stronger than the temperature dependence of bottomonium correlators in a given channel. This fits into the expected pattern of sequential quarkonium melting.

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