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QCD mesonic screening masses using Gribov quantization

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Chiral symmetry is lost at low temperatures, and pions are massless in the chiral limit; there is no longer any screening mass. The screening mass of mesons approaches the standard value of $2\pi T$ at high temperatures. The screening masses of mesons provide a gauge invariant and definite order parameter of chiral symmetry restoration. Different mesonic correlation lengths for flavor non-singlets, at least up to NLO, are well-defined gauge invariant physical quantities calculated earlier using the perturbative resummation techniques. It was found that these NLO corrections are small and come with a positive sign. The lattice simulation results match the existing perturbative results only in the high-temperature regime. There needs to be more clarity between the lattice results and the theoretical calculations at low temperatures, as the perturbative expansion fails at low temperatures. One of the ways to probe the low-temperature region is by using the non-perturbative Gribov resummation. We have studied the spatial correlation lengths ζ of various mesonic observables using the Gribov action in quenched QCD and for $(2 + 1)$ flavor QCD. In particular, we have calculated the non-perturbative NLO correction to the meson screening mass using the Gribov propagator. This correction has been calculated by following the analogies with the NRQCD effective theory, a well-known theory for studying heavy quarkonia at zero temperature.

Category

Theory

Collaboration (if applicable)

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