

The Polyakov loop and correlator in perturbation theory

The Polyakov loop is related to the free energy of a static quark in thermal QCD and therefore an important theoretical tool for the study of the quark-gluon-plasma. The Polyakov loop correlator accordingly is related to the free energy of a static quark-antiquark pair in thermal QCD, and it is a very interesting quantity to investigate the interactions of static quarks and their modifications through the medium. We study both quantities in perturbation theory through direct calculations and effective field theories, presenting a new determination of the Polyakov loop at next-to-next-to-leading order. This new term of the Polyakov loop is sufficient to obtain one higher perturbative order of the Polyakov loop correlator, for which we will also discuss the decomposition in terms of color singlet and octet contributions. Finally, a comparison to lattice results will be given.

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