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Thermal field fluctuations in a chiral lagrangian with broken scale invariance

We study the finite temperature equation of state by using an effective lagrangian in which a dilaton field reproduces the breaking of scale symmetry in QCD.
We start by extending a previous investigation in the pure gauge sector $SU(3)_c$ [1], where the dynamics of the gluon condensate, expressed in terms of a dilaton lagrangian, is dominated below the critical phase transition temperature by the dilaton field, while at greater temperatures the condensate evaporates in the form of quasi-free gluons.
In this context, we study the role of the thermal fluctuations of the dilaton field, through the technique proposed in Ref.s [2,3]. This approach enables the reproduction of the lattice QCD results for the thermodynamic quantities such as pressure and energy [4].
Moreover, we have extended the study to the equation of state with additional degrees of freedom, namely the σ, π, ω and ρ mesons and nucleons, at finite chemical potential by means of an effective lagrangian which incorporates broken scale in addition to explicitly broken chiral symmetry [5,6].
Beyond the mean-field approximation, we study the relevance of the thermal fluctuations of the scalar glueball, other than the contribution of the σ and π meson fields, and investigate the thermodynamic nature of the phase transition.

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Category

Theory

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