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Thermal field fluctuations in a chiral lagrangian with broken scale invariance

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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, where the dynamics of the gluon condensate, expressed in terms of a dilaton lagrangian, is dominated below the critical phase transition temperature, while at greater temperatures the condensate evaporates in the form of quasi-free gluons [1]. In this context, we study the role of the inclusion of thermal fluctuations of the dilaton field and compare our results with the lattice QCD data. Moreover, we take into account of the meson sector at zero chemical potential by means of an effective lagrangian which incorporates broken scale in addition to spontaneously broken chiral symmetry [2]. Beyond the mean-field approximation, the relevance of the thermal fluctuations of the scalar glueball, other than the contribution of the σ and π meson fields, is considered following the general technique proposed in Ref. [3]. In this framework, we investigate the thermodynamic nature of the phase transition, in presence and in absence of explicit chiral symmetry breaking.
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