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Dual QCD Formulation at Finite Temperature and Chemical Potential

In terms of dual gauge potentials, a Dual QCD formulation for the SU(3) colour gauge has been established, which takes into account the dynamics of the colour gauge group's topological and local structure. The dynamical configuration of the resulting dual QCD vacuum and its flux tube configuration have been studied in order to investigate the nonperturbative properties of QCD. In order to study the kinetics of the quark-hadron phase transition at finite chemical potential, the thermal behaviour of the nonperturbative QCD vacuum has been examined. The dual QCD-based hadronic bag, which ensures the necessary parameters and related critical points for quark-hadron phase transition, has also been used to explore related thermodynamic quantities and the equation of state (EoS) to characterise quark matter. It is anticipated that these thermodynamic values will be crucial in determining the order of quark-hadron phase transitions and will probably be able to forecast the characteristics of a first-order quark-hadron phase transition for limiting chemical Furthermore, by building the free energy change and the corresponding surface tension for the quark-hadron phase transition, we have examined the bulk properties of quark matter. We also compared our results with known lattice QCD results and the most recent three-loop Hard Thermal Loop perturbative results for consistency and compatibility checks, and we found that they were reasonable agreements.

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