

Cornwall-Jackiw-Tomboulis Effective Potential for Quark Propagator in Real-Time Thermal Field Theory and Landau Gauge

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Abstract: We complete the derivation of the Cornwall-Jackiw-Tomboulis effective potential for quark propagator at finite temperature and finite quark chemical potential in the real-time formalism of thermal field theory and in Landau gauge. In the approximation that the function  $A(p^2)$  in inverse quark propagator is replaced by unity, by means of the running gauge coupling and the quark mass function invariant under the renormalization group in zero temperature Quantum Chromodynamics (QCD), we obtain a calculable expression for the thermal effective potential, which will be a useful means to research chiral phase transition in QCD in the real-time formalism.

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Key words: CJT effective potential, real-time thermal field theory, QCD, quark propagator, Landau gauge

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