An Effective Formulation on Quantum Hadrodynamics at Finite Temperatures and Densities

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Abstract: According to Wick's theorem, the second order self-energy corrections of hadrons in the hot and dense nuclear matter are calculated. Furthermore, the Feynman rules are summarized, and an effective formulation on quantum hadrodynamics at finite temperatures and densities is evaluated. As the strong couplings between nucleons are considered, the self-consistency of this method is discussed in the framework of relativistic mean-field approximation. Debye screening masses of the scalar and vector mesons in the hot and dense nuclear matter are calculated with this method in the relativistic mean-field approximation. The results are different from those of thermofield dynamics and Brown-Rho conjecture. Moreover, the effective masses of the photon and the nucleon in the hot and dense nuclear matter are discussed.

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