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Electromagnetic probes for critical fluctuations of phase transitions in dense QCD

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We calculate how the critical fluctuations of the QCD critical point (CP) and the color superconducting (CSC) phase transition affect the dilepton production rate (DPR) and the associated transport coefficients, the electric conductivity and relaxation time. We examine the modification of the photon self-energy by the so-called Aslamazov-Larkin, Maki-Thompson, and Density of States terms on the basis of the two-flavor NJL model. In this presentation, it is shown that the DPR is significantly enhanced in the low invariant mass region around the QCD CP and CSC phase transition, which can be promising observables to reveal the existence of the respective phase transitions by heavy-ion collision experiments. In addition, we show that electric conductivity and relaxation time are divergent at the respective critical temperatures with different exponents and the physical origin of the difference is clarified in terms of the characteristics of the respective fluctuations.

Category

Theory

Collaboration (if applicable)

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