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Typ: Talk

Partonic Critical Opalescence and Its Impact on the Jet Quenching Parameter

Jet quenching parameter \hat{q} is essential for characterizing the interaction strength between jet partons and nuclear matter. Based on the quark-meson (QM) model, we develop a new framework for calculating \hat{q} at finite chemical potentials, in which \hat{q} is related to the spectral function of the chiral order parameter. A perturbative calculation up to the one-loop order indicates that the momentum broadening of jets is enhanced at both the high temperature and high chemical potential, and approximately proportional to the parton number density in the partonic phase. We further investigate the behavior of \hat{q} in the vicinity of the critical endpoint (CEP) by coupling our calculation with a recently developed equation of state that includes a CEP in the universality class of the Ising model, from which we discover the partonic critical opalescence (PCO) – a prominent enhancement of the momentum broadening of jets near CEP, contributed by the scatterings via the σ exchange process. Hence, for the first time, jet quenching is connected with the search of CEP.

Experiment/Theory

Theory/Phenomenology

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