

Does the chiral magnetic effect affect the dynamic critical phenomena in QCD?

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Two important goals of the relativistic heavy-ion collisions are the searches for the chiral magnetic effect (CME) and the QCD critical point(s). Since dynamic critical phenomena of a system generally depends on low-energy gapless modes, it is a priori nontrivial whether the collective gapless mode called the chiral magnetic wave (CMW) that stems from the CME affects the dynamic critical phenomena in QCD. To address this question, we study the critical dynamics near the chiral phase transition in two-flavor QCD in an external magnetic field. We find that the speed of the CMW critically slows down in analogy to the sound wave of the liquid-gas critical point. We also show that the chiral magnetic conductivity is not renormalized by the critical fluctuations of the order parameters. This is the first study of the interplay between the CME and dynamic critical phenomena in QCD.

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