



Contribution ID: 37

Type: Talk

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

*Wednesday, 23 May 2018 14:30 (30 minutes)*

Two important goals of the Beam Energy Scan program 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 CME affects the dynamic critical phenomena in QCD. Moreover, it is also a nontrivial question whether the CME coefficient is exactly fixed by the anomaly coefficient in the presence of the massless chiral order parameter. To address these questions, we study the critical dynamics near the chiral phase transition in massless two-flavor QCD under an external magnetic field. We find that a new dynamic critical phenomenon appears: the speed of the CMW tends to zero when the second-order chiral phase transition is approached. We also show that the CME coefficient is not renormalized by the critical fluctuations of the order parameter.

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**Session Classification:** Contributed Talks