Contribution ID: **433** Type: **Poster Presentation**

Sensitivity analysis of the chiral magnetic effect observables using a multiphase transport model

Monday 4 November 2019 17:40 (20 minutes)

The chiral magnetic effect is a good observable to investigate the topological and electromagnetic properties of the QGP. But the γ correlator, a common observable used to detect the CME, contains both contribution from the CME and its background. This observable can not identify the CME from its background. Recently, a new observable of R_{Ψ_m} has been proposed[1-4], which is expected to distinguish the CME from the background. We apply mixing particles method and shuffling particles method to calculate R_{Ψ_m} using a multiphase transport model without or with a percentage of CME-induced charge separation[5,6]. From the results, we found that the shape of final R_{Ψ_2} distribution is flat for the case without CME[7], but concave for that with some amount of the CME. By comparing the responses of R_{Ψ_2} and γ to the strength of the CME, we found that the CME signal can survive only when the initial charge separation percentage is large enough (more than 5%), which indicates a nonlinear sensitivity of these observables to the CME due to strong final state interactions.

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Session Classification: Poster Session

Track Classification: Quark matter and nuclear astrophysics