

Search for critical parton density fluctuations through baryon clustering

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Phase transitions and/or critical phenomena are known to lead to local density fluctuations. In the coalescence mechanism of particle production, the baryon formation probability can be influenced by these local parton density fluctuations, thereby leading to clusters and voids in the phase-space distribution of hadrons. In order to probe the density fluctuation in heavy ion collisions, we study the angular distribution of a self-normalized distribution of the produced particles. We expect the shape of the distribution to be sensitive to clustering in phase space.\

We study the effect of clustering of produced particles by employing a simple Monte-Carlo model assuming a Poisson distribution of protons for reference. We also introduce elliptic flow in the model and study its effects. We compare our model results with the STAR Beam Energy Scan data to understand the quantitative sensitivity of our observable and probe baryon density fluctuations.

Primary authors: ESHA, Roli (University of California - Los Angeles); FOR THE STAR COLLABORATION

Presenter: ESHA, Roli (University of California - Los Angeles)

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