Centrality Determination for fluctuation measurements in 
\[\sqrt{s_{NN}} = 27 \text{ GeV} \ Au+Au \ Collisions \ at \ RHIC-STAR\]

Experiment

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Event-by-event fluctuations of conserved quantities such as net baryon, net strangeness or net charge is considered to be a powerful tool to find the critical point (CP) on the Quantum Chromodynamics (QCD) phase diagram. To map out the QCD phase diagram, the Beam Energy Scan I (BES-I) program was performed at RHIC and non-monotonic energy dependence of the forth-order net proton fluctuations was found around low collision energy, which could be a signature of the CP.

In order to further investigate the behavior of conserved quantities, BES-II has been carried out since 2019 focusing on lower collision energies. For the experiment, a new detector named Event Plane Detector (EPD) was installed. The EPD is a scintillation detector located in the forward rapidity region and expected to be a new centrality detector with less autocorrelation effect in the fluctuation measurements. In this presentation, results of fluctuation measurements in Au+Au collisions at \[\sqrt{s_{NN}} = 27 \text{ GeV} \] will be shown and new centrality determination with the EPD will be discussed.