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Fluctuation Evolution in Au+Au Collisions at FAIR energy

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Event by event fluctuations of particle multiplicities and their ratios are considered to be sensitive probes to the exotic phenomena in high energy heavy ion collisions like phase transtion or the occurence of critical point. These phenomena might take place at different time after the collision based on fulfilling the required conditions at a particular time. Fluctuations are therefore expected to show non-monotonic behaviour at the of time of occurence of these phenomena. Experimentally, fluctuations are measured at freezeout. In this work, using the hybrid version of the UrQMD event generator, we have investigated the propagation of fluctuations of particle multiplicities, their ratios and the ratio of total positive and negative charges in AuAu collisions at $E_{lab} < 90$ AGeV. Two commonly used experimental measures i.e., σ^2/mean and ν_{dyn} have been used in the analysis in a given acceptance. The hybrid model, i.e., UrQMD with hydrodynamic evolution has been used to study the effect of hydrodynamic evolution on these conventional fluctuation measures. It is observed that the fluctuations as measured by σ^2/mean and ν_{dyn} gets reduced considerably at freezeout. The dominat structures present at the initial stage of the evolution get smoothen out. However, the energy dependence of the fluctuations remain preserved till the freezeout. The hydrodynamic evolution of the model with chiral equation of state shows considerably higher fluctuation at lower collision energy as compared to pure hadronic transport version or the hybrid version with hadronic equation of state. The time evolution of the higher order moments of net-proton distributios for particles in a specified coverage showed similar behaviour.

Primary author: AHMAD, Shabir (University of Kashmir, Srinagar J&K India)

Co-authors: Ms JAHAN, Hushnud (Aligarh Muslim University, Aligarh India); Dr FAROOQ, M. (University of Kashmir, Hazratbal J&K india); Dr CHATTOPADHYAY, Subhasis (Variable Energy Cyclotron Center, Kolkata India); Ms BASHIR, Suraya (University of Kashmir, Hazratbal Srinagar India)

Presenter: AHMAD, Shabir (University of Kashmir, Srinagar J&K India)

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