

Event-by-event fluctuation analyses in view of the ALICE TPC Upgrade

Friday, 16 June 2017 12:00 (25 minutes)

By measuring event-by-event fluctuations over an ensemble of events via cumulants or moments of particle multiplicity distributions, one can study the freeze-out conditions in heavy-ion collisions and clarify their relation to the QCD phase transition. Higher order cumulants of fluctuations of conserved quantities like electric charge and baryon number are related to thermodynamic susceptibilities, which can be calculated in the Grand Canonical Ensemble formulation of thermodynamics such as Lattice QCD or statistical models. Cumulants beyond the second order are more sensitive to the underlying physics but require large statistics.

The data collected by ALICE during RUN1 and RUN2 allows for the analysis of the cumulants up to 4th order. In the current detector configuration, the main limitation on the data collection rate is the readout rate of the Time Projection Chamber (TPC), which is the main tracking and PID detector of ALICE. Currently the TPC is equipped with a gating grid that prevents ions from the amplification stage from entering the drift region. This imposes a maximum rate limit of 3.5 kHz. For the upgrade of the TPC the present MWPC-based readout chambers will be replaced by stacks of four Gas Electron Multipliers (GEMs), which allows for continuous read-out and thus an increase by about a factor of 100 in the data collection rate. This will make it possible to extend the measurements of cumulants up to 6th and 8th order, where recent theory calculations predict a rapid change in the net baryon number fluctuations in the crossover region of QCD phase diagram.

List of tracks

New methods and facilities

Primary author: ARSLANDOK, Mesut (Ruprecht-Karls-Universitaet Heidelberg (DE))

Presenter: ARSLANDOK, Mesut (Ruprecht-Karls-Universitaet Heidelberg (DE))

Session Classification: New methods and facilities