

Hydrodynamic fluctuations in Pb+Pb collisions at LHC

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Fluctuations have been playing an important role in understanding observables in high-energy nuclear collisions.

It is well known that

higher harmonics of azimuthal angle distribution, for example, can be attributed to initial fluctuations of transverse profile from event to event.

In this presentation, we focus on thermal fluctuations during hydrodynamic evolution of the system in the intermediate stage of the reactions.

These fluctuations are also known as hydrodynamic fluctuations and are indispensable for the system to be stabilized in a thermodynamic sense through fluctuation-dissipation theorem [1].

We employ a cutting-edge integrated dynamical model [2,3] which combines fully (3+1)-dimensional relativistic fluctuating hydrodynamics with Monte-Carlo version of the Glauber model as an event-by-event initialization model of the hydrodynamic fields and the hadronic cascade model in the late stage.

By using this model, we first adjust initial parameters and transport coefficients to reproduce $dN_{ch}/d\eta$ and centrality dependence of integrated v_2 in Pb+Pb collisions at the LHC energy.

We then analyze the event-plane correlations between two different rapidity regions $r_n(\eta^a, \eta^b)$ and between two different p_T regions $r_n(p_T^a, p_T^b)$.

By switching on and off hydrodynamic fluctuations, we quantify the effect of them on these observables.

References

- [1] K.Murase and T.Hirano, "Relativistic fluctuating hydrodynamics with memory functions and colored noises," arXiv:1304.3243 [nucl-th].
- [2] Koichi Murase, "Causal hydrodynamic fluctuations and their effects on high-energy nuclear collisions", Ph.-D thesis, the University of Tokyo (2015).
- [3] K.Murase and T.Hirano, "Hydrodynamic fluctuations and dissipation in an integrated dynamical model", arXiv: 1601.02260 [nucl-th].

Preferred Track

Correlations and Fluctuations

Collaboration

Not applicable

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