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Effects of sub-nucleonic fluctuations on the longitudinal structure of heavy-ion collisions

Subnuclear fluctuations in the initial state of heavy-ion collisions impact not only transverse long-range correlations of small systems, but also the creation of longitudinal structures, measured in longitudinal decorrelation observables [1]. In this work, we study the emergence of long-range rapidity correlations in nuclear collisions due to the inclusion of event-by-event subnuclear fluctuations in the initial state, by using the 3D resolved McDIPPER for the initial state of ultra-relativistic heavy-ion collisions [2], and for the first time, we connect it to 3D phenomenology by evolving through a full hybrid evolution, including a pre-equilibrium stage, using the novel KøMPøST with charges [3], 3+1D viscous hydrodynamical evolution [4], and hadronic rescattering [5]. We present new results, focusing on the effect of sub-nuclear hotspots and (sub) nuclear thickness fluctuations on the longitudinal structure of observables, such as the flow decorrelations and directed flow. We include phenomenological results for large systems (Pb-Pb at $\sqrt{s_{\rm NN}} = 5.02$ TeV) as well as predictions for the upcoming O+O and Ne+Ne runs ($\sqrt{s_{\rm NN}} = 6.8$ TeV) at the LHC.

References

[1] U. Heinz and R. Snellings. Ann.
Rev. Nucl. Part. Sci., pp. 123–151, 2013, 1301.2826;ATLAS collaboration, Eur. Phys. J. C 78, 142 (2018)
[2] O. Garcia-Montero, H. Elfner and S. Schlichting, Phys.Rev.C 109 (2024) 4, 044916; O. Garcia-Montero, S. Schlichting and J. Zhu, *in preparation*
[3] T. Dore, X. Du, S. Schlichting, EPJ Web Conf. 296 (2024) 10003
[4] X.-Y. Wu, G.-Y. Qin, L.-G. Pang, and X.-N. Wang,
Phys. Rev. C 105, 034909 (2022)
[5] Weil *et al*, Phys.Rev.C 94 (2016) 5, 054905

Category

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