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Initial State fluctuations in ultra-central collisions in an event-by-event transport approach

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We discuss the generation of anisotropic flows v_n for a fluid at fixed $\eta/s(T)$ by means of an event-by-event transport approach. Such an approach, as shown in [1], recovers the universal features of the ideal hydrodynamics showing an agreement with the recent analitical solutions.
We discuss the effect of the η/s and its temperature dependence on the build up of the $v_n(p_T)$ revealing that only in ultra-central collisions $(0-0.2\%)$ the $v_n(p_T)$ have a stronger sensitivity to the T dependence of η/s in the QGP phase and this sensitivity increases with the order of the harmonic n.
Moreover, the study of the correlations between the initial spatial anisotropies ϵ_n and the final flow coefficients v_n shows that at LHC energies there is more correlation than at RHIC energies. The degree of correlation increases from peripheral to central collisions, but only in ultra-central collisions at LHC, we find that the linear correlation coefficent $C(n,n) \approx 1$ for $n = 2, 3, 4$ and 5. This suggests that the final correlations in the (v_n,v_m) space reflect the initial correlations in the (ϵ_n,ϵ_m) space.
Moreover the recent event shape engineering (ESE) [4] tecnique allows to have a new insight into the initial state fluctuations and ϵ_n correlations [5].
Finally, we discuss in ultra-central collisions the structure of the integrated (v_n, n) plot and its relation with the kinetic freeze out dynamics.

[1] S. Plumari, G. L. Guardo, V. Greco and J.-Y. Ollitrault, Nucl.Phys. A 941 (2015) 87.

[2] S. Plumari, G. L. Guardo, A. Puglisi, F. Scardina and V. Greco, J.Phys.Conf.Ser. 535 (2014) 012013.

[3] S. Plumari, A. Puglisi, F. Scardina and V. Greco, Phys.Rev. C86 (2012) 054902.

[4] J. Schukraft, A. Timmins and S. A. Voloshin, Phys. Lett. B 719 (2013) 394.

[5] S. Plumari, F. Scardina and V. Greco, to be submitted.

On behalf of collaboration:

NONE

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