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Event-by-event cumulants of partonic eccentricity and flow harmonic

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We report a comprehensive study on the initial-state partonic eccentricity fluctuation and final-state anisotropic flow fluctuation in Au + Au collisions at 200 GeV using a multiphase transport model. Event-by-event eccentricity and flow anisotropy are characterized by multi-particle cumulants up to fourth order harmonic. Experimental results of azimuthal anisotropy fluctuation by means of cumulants are well reproduced by our model simulation [1]. Results of initial eccentricity and their fluctuations in terms of second-, fourth- and sixth-order cumulants for different order of harmonics as function of centrality, transverse momentum (p_T) and pseudorapidity (η) are presented. The ratio of the eccentricities $\varepsilon\{4\}/\varepsilon\{2\}$ and $\varepsilon\{6\}/\varepsilon\{4\}$ are shown in comparison with the ratio of the corresponding flow harmonics. The conversion coefficients v_n/ε_n ($n=2,3,4$) are explored based on the cumulant method. We show that higher harmonic v_n/ε_n ($n \geq 3$) show similar trend but exhibit quantitative difference in comparison with v_2/ε_2 [2]. We investigate further the role of partonic and hadronic scatterings in anisotropic flow and flow fluctuation development. We show that collisions between initial active partons are directly responsible for not only the development of anisotropic flow but also flow fluctuation [3]. Relevant physics on the connections between higher-order cumulant eccentricities and flow harmonics is discussed.

References:

- [1] L. Ma , G. L. Ma, and Y. G. Ma, Phys. Rev. C 89, 044907 (2014)
- [2] L. Ma , G. L. Ma, and Y. G. Ma, Phys. Rev. C 94, 044915 (2016)
- [3] L. Ma , G. L. Ma, and Y. G. Ma, in preparation

Content type

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