Event-by-event fluctuations in hydrodynamical description of heavy-ion collisions

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Abstract

Effects caused by the event-by-event fluctuations of the initial conditions in hydrodynamical description of high-energy heavy-ion collisions are investigated, by using the smoothed-particle hydrodynamics (SPH) approach [1], connected to NeXus event generator [2].

Non-negligible effects appear for several observable quantities, such as elliptic flow parameter $< v_2 >$, even for a fixed impact parameter $\vec{b}$. The observable fluctuations are sensitive to the equation of state, so that their study is an important probe for the state of the matter formed in these collisions. The width of the observable fluctuations tend to be smaller in the case QGP phase appears at the beginning of hydrodynamic evolution as compared with the case when the fluid remains hadron gas from during whole the evolution.

(1) See *Smoothed Particle Hydrodynamics for Ultrarelativistic Heavy Ion Collisons*, C.E. Aguiar, T. Kodama, T. Osada and Y. Hama, hep-ph/0006239, and references therein.

(2) H.J. Drescher, M. Hladik, S. Ostrapchenko, T. Pierog and K. Werner, *J.Phys.* **G25** (1999) L91; *Nucl.Phys.* **A661** (1999) 604.
