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Nonextensive (3+1)-dimensional hydrodynamics for relativistic heavy-ion collisions

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A nonextensive (3+1)-dimensional hydrodynamic model for multiparticle production processes, NEX-CLVisc, is developed in the framework of CLVisc where the viscous corrections are turned off. It assumes that the nonextensive effects consistently exist in the initial conditions set by the optical Glauber model, the equation of state and the hadron kinetic freeze-out procedure. The model is then applied to simulate the pseudorapidity (\eta) distribution, the transverse momentum (pT) spectra and the pT-differential elliptic flow (v2) of charged particles in Pb-Pb collisions at \sqrt{sNN} = 2.76 TeV and 5.02 TeV,respectively. It is found that the model can reasonably well reproduce the experimental data of the \eta distribution and the charged-particle spectra in a pT range up to 6–8 GeV/c. When compared with the ideal hydrodynamic model, the pT-differential v2 of charged particles is suppressed in the NEX-CLVisc model, which is similar to that observed in the hydrodynamic model with a shear viscous correction. Moreover, due to the lack of the viscous corrections and the event-by-event fluctuation, the model can only describe the pT-differential v2 up to 3–4 GeV/c, which is smaller than its applicable range for the particle pT spectra.

Primary author: 石, 佳豪 (华中师范大学物理科学与技术学院)

Co-authors: 江, 泽方 (湖北工程学院); 张, 文超 (陕西师范大学物理学与信息技术学院)

Presenter: 石, 佳豪 (华中师范大学物理科学与技术学院)

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