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Initial energy density scaling and transverse momentum spectra and elliptic flow of charged particles in \sqrt{s}=200 GeV Au+Au collisions

Content :

In an ideal hydrodynamic model, we have simulated \sqrt{s}=200 GeV Au+Au collisions. Initial QGP fluid, thermalised at the time scale \tau_{i}=0.6 fm, evolve under the influence of a lattice+HRG equation of state, where confinement-deconfinement transition is a cross-over at Tc=196 MeV. We have considered two initial conditions, initial energy density scaling (i) with the binary collision numbers and (ii) with participant numbers [1]. For both the initial conditions, initial energy density was adjusted to fit PHENIX data on charged particles pT spectra in 0-10% collisions. Charged particles pT spectra and elliptic flow in 0-10% collisions are best explained if initial energy density scales with binary collision numbers. More peripheral collisions prefer participant number scaling. The result may have implication on the dynamics of the pre-equilibrium stage. The fluid produced in Au+Au collisions evolve through a pre-equilibrium stage to equilibration. At present, we have limited knowledge about the pre-equilibrium stage. Present results suggests that in 0-10% Au+Au collisions, pre-equilibrium stage is dominated by binary collisions, but in a less central collision, pre-equilibrium stage is dominated by the 'wounded' nucleons.

[1]Victor Roy and A. K. Chaudhuri, Phys.Rev.C81, 067901, 2010.

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