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Charged particle's pT spectra and elliptic flow in $\sqrt{s}=200$ GeV Au+Au collisions: QGP vs. hadronic resonance gas.

Content :

Unambiguous identification of the matter produced in $\sqrt{s}=200$ GeV Au+Au collisions require complete elimination of the possibility of a hot, hadronic resonance gas (HRG) production in initial collisions. Present lattice simulations for the confinement-deconfinement cross-over transition is uncertain, $T_c=170-200$ MeV[1,2]. Additionally, transition temperature can be up by 30 MeV due to unrealistic boundary conditions in lattice simulations. We have shown [3] that if HRG, with viscosity to entropy ratio $\eta/s=0.24$, is physical at temperature $T=220$ MeV, charged particles pT spectra and elliptic flow in Au+Au collisions at RHIC, over a wide range of collision centrality do not distinguish between initial QGP fluid and initial hadronic resonance gas. Unambiguous identification of bulk of the matter produced in Au+Au collisions require clear demonstration that HRG is unphysical at temperature $T \leq 200$ MeV. It calls for precise lattice simulations with realistic boundary conditions.

[1]M.Cheng et al, Phys.Rev.D74,054507(2006), ibid,77,014511(2008)

[2]Y. Aoki et al, JHEP 0906,088(2009),Phys.Lett.B643,46(2006)

[3]A. K. Chaudhuri, Victor Roy, arXiv:1009.5223.

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