Systematic studies of global observables by PHENIX

Kensuke Homma for the PHENIX collaboration[a]

[a]Physical Science, Graduate School of Science, Hiroshima University,
homma@hepl.hiroshima-u.ac.jp

Systematic studies of global observables such as mean transverse energy $< E_T >$ and charged particle multiplicity in different collision systems are indispensable to map the location of the collision systems on the QCD phase diagram. Furthermore, fluctuations in these quantities can provide fundamental information relevant for the phase transitions. We will present scaling properties of charged particle multiplicity fluctuations in Au+Au collisions at $\sqrt{s_{NN}} = 62.4$ and 200 GeV, and Cu+Cu collisions at $\sqrt{s_{NN}} = 22.5, 62.4,$ and 200 GeV, which will be compared to p+p data. The differential analysis of the multiplicity fluctuations as a function of pseudorapidity interval size will be presented. From these observations, we discuss the susceptibility of the density fluctuations in the longitudinal direction. Non monotonic increases of the susceptibility can be a direct signature of the phase transition based upon the Ginzburg-Landau framework[1]. Our data suggest a possible non monotonic increase of the susceptibility at $\epsilon_{BJ}\tau \sim 2.4$ GeV/(fm^{2}c) with a transverse area size of 60 fm^2 in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV[2]. The product of the energy density ϵ_{BJ} and the proper formation time τ can be deduced from measured $< E_T >$. Comparing to Cu+Cu collisions at the same collision energy and Au+Au collisions at $\sqrt{s_{NN}} = 62.4$ GeV, we discuss the behavior especially focusing on whether the increase can be seen at the similar $\epsilon_{BJ}\tau$ range even in the different collision systems.

please send contribution to: *qm2008@veccal.ernet.in*.

References

[1] K. Homma for the PHENIX collaboration, PoS CPOD2006:007,2006.
[2] PHENIX Collaboration, *Phys. Rev. C*, **76**, (2007) 034903.