System size dependence of two-particle correlations in p+p, d+Au, Cu+Cu and Au+Au

Wei Li[a] for the PHOBOS Collaboration

[a]Department of Physics, Massachusetts Institute of Technology
Cambridge, MA 02139, USA, *davidlw@mit.edu*

The study of two-particle correlations has proven to be a powerful tool in exploring the underlying mechanisms of inclusive multi-particle production in high energy hadronic collisions. With a uniquely large angular coverage for inclusive charged particles, the PHOBOS detector at RHIC is able to systematically probe the correlations between particles at both short and long range pseudorapidity scales in heavy ion collisions.

A complex two-dimensional correlation structure has emerged from measurements [1], [2] in p+p and Cu+Cu collisions, which have been interpreted in the context of a cluster model [3]. In particular, the extracted cluster size and its decay width from the two-particle pseudorapidity correlation function showed a non-trivial centrality dependence in Cu+Cu collisions, with a cluster size comparable to p+p in central collisions and increasing significantly in peripheral events.

New results on two-particle angular correlations in Au+Au collisions will be presented and compared with p+p, d+Au and Cu+Cu collisions at $\sqrt{s_{NN}}$=200 GeV over a broad range of (η,ϕ). A significant centrality dependence of the cluster-like correlations is also observed in Au+Au collisions. Combining data for Cu+Cu and Au+Au yields correlations at the same overall collision volume but with different collision geometries. This comparison tests whether two-particle correlations are primarily sensitive to short range aspects of hadronization. Furthermore, the observed cluster correlations give useful information needed for other physics studies such as elliptic flow fluctuations, where the assumed contribution from"non-flow" effects can be directly estimated from the two-particle azimuthal correlation data.

References

[1] B. Alver *et al.* [PHOBOS Collaboration], *Phys. Rev. C*, **75**, (2007) 054913.
[2] B. Alver *et al.* [PHOBOS Collaboration], *J. Phys. G*, **34**, (2007) S1005.
[3] E. L. Berger, *Nucl. Phys. B*, **85**, (1975) 61.