

Three-particle correlations in a multiphase transport model

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Using the AMPT model [1] with parameters for the Lund string fragmentation and parton scattering taken from Ref.[2], we have calculated the centrality dependence of three-particle correlations mixed harmonic correlations in relativistic heavy ion collisions by considering the observable $C_{m,n,m+n} = \langle\langle \cos(m\phi_1 + n\phi_2 - (m+n)\phi_3) \rangle\rangle$, where $\phi_{1,2,3}$ are azimuthal angles of all particle triplets, in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV [3]. We have found that our results for C_{112} , C_{224} and C_{235} generally agree with experimental data both in their magnitude and dependence on the participant number of collisions as shown in the left window of Fig. 1. In particular, our results for C_{224} agree very well with the data, although our results for the elliptic and quadrupolar flows differ slightly from the data. For C_{123} , our results show that for mid-central collisions there is a weaker correlation between the angles of the reaction plane for the directed, elliptic and triangular flows for mid-central collisions in AMPT model than in the experimental data. We have further studied the dependence of three-particle correlations on the relative pseudorapidity $|\eta_1 - \eta_2|$ and $|\eta_1 - \eta_3|$ between first and second particles as well as between first and third particles. Our results, shown in the right window of Fig.1, are seen to agree with experimental data for C_{123} and C_{224} , and indicate that the boost invariance is weakly broken in the angles of the reaction planes for the elliptic and quadrupolar flows but strongly broken in those for the directed and triangular flows. These results have led us to conclude that the AMPT model with its fluctuating initial conditions and strong partonic scatterings can capture the essential collision dynamics of relativistic heavy ion collisions as revealed in the measured anisotropic flows and three-particles correlations.

[1] Z.-W. Lin, C.M. Ko, B.-A. Li, B. Zhang, and S. Pal, Phys. Rev. C **72**, 064901 (2005).

[2] J. Xu and C.M. Ko, Phys. Rev. C **84**, 014903 (2011).

[3] Y. Sun and C.M. Ko, Phys. Lett. B **769**, 219 (2017).

[4] L. Adamczyk *et al.* (STAR Collaboration), arXiv:1701.06497 [nucl-ex].

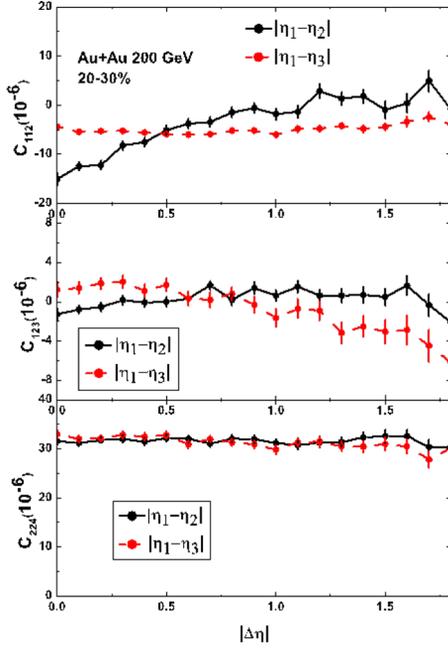
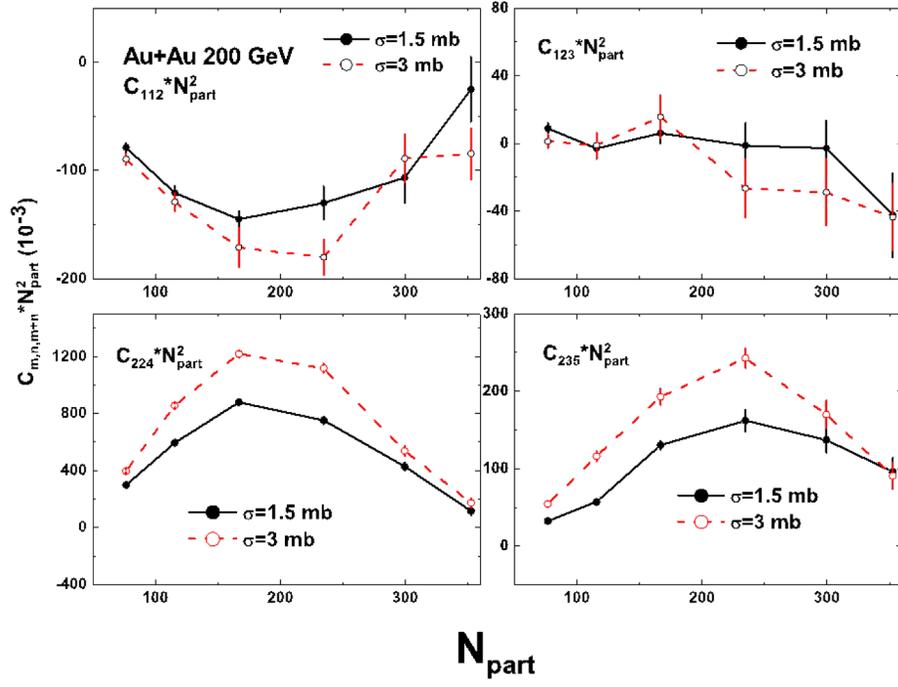


FIG. 1. Centrality (left window) and relative pseudorapidity $|\Delta\eta|$ (right window) dependence of $C_{m,n,m+n}N_{\text{part}}$ for mid-pseudorapidity ($|\eta|<1$) charged particles of transverse momentum $p_T>0.2$ GeV/ c in Au+Au collisions at $s_{\text{NN}} = 200$ GeV. Open circles are experimental data from [3].