CENTRALITY DEPENDENCE OF PSEUDORAPIDITY SPECTRA OF CHARGED PARTICLES PRODUCED IN THE NUCLEUS–NUCLEUS COLLISIONS AT HIGH ENERGIES

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We have analyzed the pseudorapidity spectra of charged relativistic particles with $\beta < 0.7$ produced in Pb + Em (at energy 158 A GeV) reactions as a function of centrality. The relativistic nucleus beams were obtained from SPS machine. The number of g-particles (particles with $0.23 \leq \beta \leq 0.7$) has been used to fix the centrality. We used maximum entropy method for analysis of experimental data of ^{208}Pb + Em at 158 A GeV/c (628 events) [1-3]. The data were analyzed in the following steps: The pseudo rapidity spectrum for s-particles (at different values of g-particles (Ng) too) was created using experimental data and data coming from the Cascade model [4]; The MEM [5] was applied to define structure of the spectrum. The methods could extract some peaks in the spectrum; the observed peaks were fitted using MATLAB.

Our special analyses as shown in Fig.1 demonstrate that the peak is not reasonable. So we can say that IV peak exists only for experimental Pb + Em reactions at 158 A GeV and connects with events with Ng = 15-20, most central events. The result is strange because of the peak observed at $\eta_c \sim 6.5$—forward particles area. We think that this result can be explained using some collective nucleon effect in the most central events. It may be a signal on coherent prompt particle production in heavy ion collisions at relativistic energies. The four-peak structure behavior can be explained in the framework of two-cylinder model [5] as a contribution of a new source connected with collective effects or shifts of different sources on centrality and energy. The two-cylinder model is now renamed to the multisource thermal model [6-8]. In the model, there are four sources, namely target cylinder, projectile cylinder, leading target nucleons, and leading projectile nucleons, which appear as four peaks in the pseudorapidity distribution.

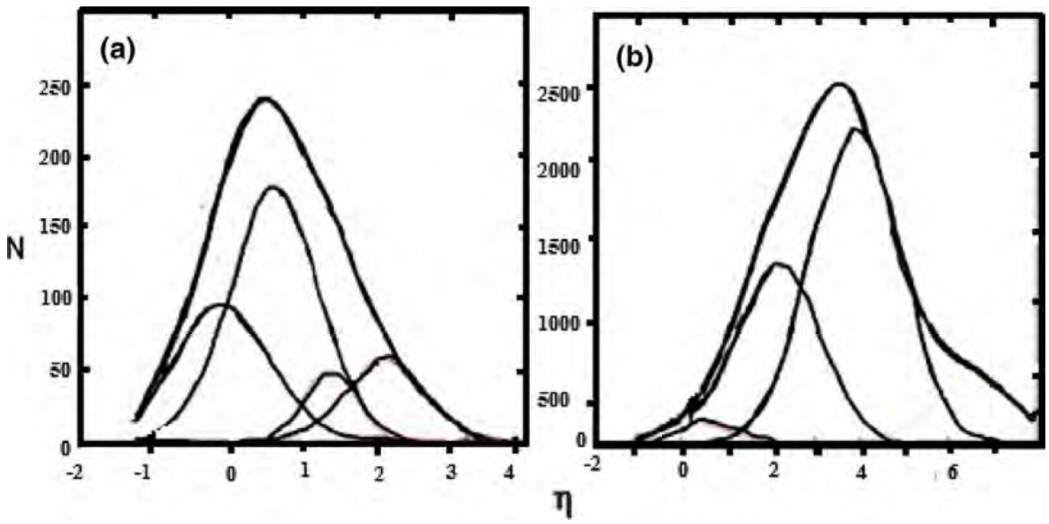

Fig. 1 *(a) The fitting results for the cases which contain the fourth peaks: PbEm (at 158 A GeV) for experimental events with a number of g-particles Ng = 15–20 (right panel); (b) PbEm (at 158 A GeV) for simulated events with a number of g particles Ng>20 (left panel)*

References

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