

Study on peculiarities of multiparticle production via event-by-event analysis in asymmetric nucleus-nucleus interactions

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The detailed event-by-event analysis, taking into account possible kinematic distinctions, can provide more information on dynamics of process of nucleus-nucleus interactions [1].

Analyzing in details of the characteristic of each individual event, it is probably directly to separate the background fluctuations caused by usual processes of strong interaction, from the experimental peculiarities which must be taking into account for the description of development of cascade process on the basis of interaction models.

In this work the search of peculiarities of the multiparticle production in a wide interval of change of energy and in a wide interval of change of the sizes of interaction system, is performed. At that, the essential attention was given to interactions of asymmetric nuclei for search of unusual features of such interactions.

The study on peculiarities of multiparticle production was carried out on the basis of interaction of lead nuclei at energy of 158 AGeV with photoemulsion nuclei ($Pb+Em$ of 158 AGeV), nuclei of gold at 10.7 AGeV with photoemulsion nuclei ($Au+Em$ of 10.7 AGeV) and sulfur nuclei of $S+Em$ at 200 AGeV and $S+Em$ 3.7 AGeV [2].

In addition to the analysis of standard distributions (multiplicity, pseudorapidity, etc.) existence of the correlated groups of secondary particles and their dislocation in pseudorapidity distributions, was analyzed.

For separation of the correlated groups, Hurst's method was used. In work [3] it is shown that use of this method allows to estimate "force" and "length" of multiparticle correlations in pseudorapidity distributions of secondary particles, to distinguish fluctuations of dynamically correlated distributions of secondary particles from stochastic, connected with the statistical reasons.

Preliminary separation of events was carried out on the basis of average value of Hurst index in individual event. Events with high values of average pseudorapidity, are discovered. These events are characterized by high values of Hurst index. In such events except the "usual" secondary particles, which are produced around average pseudorapidity distribution, quite large group of the secondary particles flying under small corners (with large value of pseudorapidity), is observed. In some events, the quantity of such particles is even more than "usual" one. On graphics of pseudorapidity distribution it seems so a two-picks picture.

These peculiarities reveal itself most brightly in interactions of gold nuclei with photoemulsion nuclei at energy of 10.7 AGeV. There are essentially more poorly in interactions of heavy nuclei of the lead, which have close mass to gold, but with essentially higher energy. In $S+Em$ interactions irrespective of energy the peculiarity practically, is not observed.

References

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