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Analysis of average pseudorapidity distributions of secondary particles formed in interactions of Au 10.7 AGeV and Pb 158 AGeV with emulsion nuclei.

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A comparison is made of the average pseudorapidity distributions <η> of secondary particles produced in interactions of 197Au gold nuclei with an energy of 10.7 A GeV and 208Pb 158 A GeV lead nuclei with emulsion nuclei Em for events of different types.

To understand the mechanism of formation of the final states of secondary particles, the parameters of interaction fragmentation were analyzed. All events were divided into 3 types. The first type includes events with one multi-charged fragment of projectile nucleus. Most often, such events are called cascade-evaporation ones. They are characterized by weak multi-particle correlations in the pseudorapidity distribution of secondary particles.

The second type corresponds to explosive processes occurring with the destruction of the projectile nucleus into several multi-charged fragments. Most of these events are characterized by strong multi-particle correlations in the pseudorapidity distribution of secondary particles.

The third type corresponds to the complete destruction of the projectile nucleus, i.e. a state with a complete absence of multi-charged fragments. In such events a huge nucleus of gold or lead is completely destroyed after interaction with a much smaller nucleus of the emulsion. The dynamics of these processes, as well as studies of events of the second type, attract the greatest attention of experimenters and theorists, primarily from the point of view of the search and study of quark-gluon plasma and mixed phase nuclear matter.

Analysis of the results allows us to conclude that there is a significant difference in the development of the dynamics of a multi-particle process with a change in the interaction energy of nuclei.

The nuclei of gold and lead have approximately the same mass, but differ in energy by almost 15 times. However, the relative number of explosive events is almost the same. In Au + Em interactions, 64.7% of explosive events are observed. Moreover, 8.1% of interactions are events of complete destruction, in which there are no fragments of the target nucleus. The Pb + Em interactions account for 59.7% of explosive events and 8.9% of total destruction events. However, the number of events with large values of the average distribution of pseudorapidity <η> differs significantly. In Au + Em interactions, 35.6% of events are explosive events with large values of <η>. There are only 8.4% of such events in Pb + Em.

Thus, the relative number of events of complete destruction of the target nucleus practically does not depend on the energy of the primary nucleus. The number of events with the destruction of the projectile nucleus into several multi-charged fragments is significantly more at 10.7 A GeV than for 158 AGeV.

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Primary author: FEDOSIMOVA, Anastasia

Co-author: Dr LEBEDEV, Igor (Institute of Physics and Technology, Almaty, Kazakhstan)

Presenter: FEDOSIMOVA, Anastasia

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