Study of fluctuations in secondary particles distributions in interactions of nuclei of different energies and asymmetry degree

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According to the present-day conceptions, the hadron substance transits within the interactions of the nuclei, at the high energies, into a state of the quark-gluon plasma (QGP), in which the quarks and gluons stay in a quasi-free state; that is, the process of deconfinement is observed [1].

Experimentally, a deconfinement process (a process of transition of the hadronic matter into a state of the quark-gluon plasma) may be registered by analysis of the essential fluctuations within the distributions of the secondary particles.

In this work a classification of typical fluctuations in distributions of secondary particles and fragments in interactions of various nuclei (*S, Au, Pb*) with photoemulsion nuclei (*Em*) in dependence of energy and asymmetry degree of interaction nuclei, is carried out.

Experimental data of EMU01-collaboration [2], including interactions *of S+Em* 200 AGeV, *S+Em* 3.7 AGeV, *Pb+Em* 158, *Au+Em* 10.7 AGeV, were used.

For *S+Em* 200 AGeV interactions the essential number of events with large values of the nucleons, which are participants of the interaction, of a projectile nuclei, $n_{g'}$, is discovered. This peculiarity is absent in events of *S+Em* 3.7 AGeV. Thus, appearance of events with a large $n_{g'}$ essentially depends on energy of projectile nucleus.

For comparison the $n_{g'}$ distributions for interactions of *Au* nuclei at 10.7 AGeV and *Pb* nuclei at 158 AGeV with photoemulsion nuclei, are presented.

The growth of number of events with great values of $n_{g'}$, is not found as for *Au+Em* interactions at 10.7 AGeV and for *Pb+Em* 158 AGeV. Thus, appearance of events with a large $n_{g'}$ depends not only on energy of projectile nucleus, but also, probably, on type of nuclear interaction.

To estimate of probability of appearance of events with great values *of* $n_{g'}$ in various types of nuclear interactions, events with various number of fragments of a target nuclei, N_h, are analysed.

It is revealed, that the $n_{g'}$ distribution in interactions of *S+Em* 200 AGeV has essential peak at great values of $n_{g'}$ only in interactions with heavy nuclei of a photoemulsion ($N_h > 8$). The behavior of $n_{g'}$ distribution in events with $N_h < 8$, is not discovered.

Thus, appearance of events with a large number of nucleons of projectile nucleus, which are participants of the interaction, essentially depends both on energy and on asymmetry degree of interaction nuclei.

References

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