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STRONG FLUCTUATIONS IN INITIAL CONDITIONS FOR INTERACTIONS OF HEAVY AND LIGHT NUCLEI AT JINR-AGS-SPS ENERGIES

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Estimation of fluctuations in initial conditions of nuclei interactions is one of the key problems for heavy ion physics. Right solution can be obtained, using correlations between multiplicity and sum of all, –light and heavy, - fragment-spectators (Fig a). Great significance of heavy fragment analysis has already been pointed out in the works of NA-49 (H. Appelshauer, 1998) and NICA (M. Golubeva, 2013), BNL 2012 RHIC&AGS Annual Users'Meeting "eRHIC –understanding the initial condition of the heavy ion".
In the present work investigation of initial conditions for interactions of light –(C, O, Ne), medium - (Si, S) and heavy –(Au, Pb) nuclei with heavy –(Ag/Br) and light –(C/N/O) nuclei have been analyzed on the data of JINR-AGS-SPS target emulsion experiments with limited statistics. The analysis example for interaction Si (14.7) and S (200) A GeV with (C/N/O) nuclei is presented on fig. Detection of both shower particles and fast fragment-spectators with identical possibilities in this method open the way to the useful study of this problem. The analysis has shown, that nonlinearity in the multiple and fragmentation processes to become stronger with the impact parameter increasing. Physical explanation of the fluctuation growing consists in new effect creation –nonregularity in the production of heavy fragment-spectators with intermittent mass distribution (Fig c, d, top). Fluctuations in this case correspond to the Levy flights, but not small Gaussian variations in a data series around the mean. Integrally the patterns of heavy and light fragmentation are totally different. In the proton fragmentation mass distributions have the most smoothly –Gaussian-like –behavior both in central and peripheral interactions (Fig d, c, d, below). New process, - the strong intermittent behavior in the heavy mass fragment distributions with high probability occur in colliding of light nuclei.
Conclusions can be useful in the understanding processes of heavy ion physics and new experiments designing.

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