Contribution ID: **50** Type: **Oral**

EMISSION OF CUMULATIVE SECONDARY PARTICLES AND FRAGMENTS IN COLLISIONS OF HEAVY IONS OF INTERMEDIATE ENERGIES BASED ON NON-EQUILIBRIUM HYDRODYNAMIC APPROACH

Tuesday 2 July 2024 13:00 (20 minutes)

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In development of the nonequilibrium hydrodynamic approach [1,2], we were able to successfully describe [3] the double differential cross sections for the production of cumulative protons, pions, kaons and antiprotons emitted at an angle of 00 for the collision of carbon nuclein the reaction ^{12}C+^{12}C at an energy of 19.6 GeV per nucleon on fixed target, obtained at the U-70 accelerator of the Institute of High Energy Physics (Serpukhov) [4]. For collisions of the same nuclei at the same energy, a description was obtained of the cross sections for the yield of protons and light fragments of deuterons and tritons emitted at an angle of 400 and studied in another experiment in [5]. These double differential cross sections reveal scaling for the yields of different fragments depending on their energy.

In continuation of the analysis of experiments at ITEP (Moscow) based on collisions of carbon nuclei with a beryllium target at the FRAGM installation, it was possible to obtain a description of the yields of 11Be and 10B fragments [6], emitted at an angle of 3.5^o at an energy of carbon nuclei of 300 MeV per nucleon.
For this description, a nonequilibrium hydrodynamic approach and the Goldhaber statistical model were used. Our description of experimental data appears to be superior to cascade models and the quantum molecular dynamics (QMD) model built into the GEANT4 package. Along with the development of the hydrodynamic approach, the possibility of describing experimental data based on solving of the effective Klein-Gordon equation with dissipation was analyzed [7]. Our approach is applicable to collisions of both light and heavy nuclei, as can be seen from comparisons with experimental data and other theoretical approaches. This can be extended to the energy range of the NICA accelerator complex located at JINR (Dubna).

References

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Section

Heavy ion collisions at Intermediate and high energies

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Session Classification: Heavy ion collisions at Intermediate and high energies