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DESCRIPTION OF THE SPECTRA OF CUMULATIVE PROTONS, PIONS AND PHOTONS IN COLLISIONS OF HEAVY IONS WITH INTERMEDIATE ENERGY BASED ON THE HYDRODYNAMIC APPROACH

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On the basis of the hydrodynamic approach with a nonequilibrium equation of state [1-3], collisions with a beryllium target of ^{12}C nuclei at energies of 0.3-3.2 GeV per nucleon, studied at the ITEP accelerator, with the emission of protons [4], pions [5] and photons [6] are considered. Experimental proton spectra contain a high-energy cumulative part, as well as a soft part, to which fragmentation contributes. We were able to describe the cumulative part of the proton spectrum [2] within the framework of the nonequilibrium hydrodynamic approach, taking into account the nuclear viscosity and the correction for the microcanonical distribution [2] and to supplement the calculations with the proton contribution based on the statistical mechanism of fragmentation in the soft region of the spectrum [3]. Distinguishing the compression stage, the expansion stage, and the spread stage with the formation of secondary particles, we described the experimental inclusive double differential cross sections for the emission of pions at an energy of 3.2 GeV per nucleon for carbon nuclei [5], which were presented recently, as well as the emission of hard photons [6], presented earlier.In our approach, the description of the cumulative spectra of secondary particles is achieved due to the isolation and hydrodynamic evolution of local heating - hot spot in the overlap region of colliding heavy ions. We also considered the emission of protons and pions for various nuclei at the energies of the SIS accelerator (GSI). Agreement with the experimental data is achieved without introducing fitting parameters, and can be extended to the energy range of the NICA accelerator complex under construction in Dubna.

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