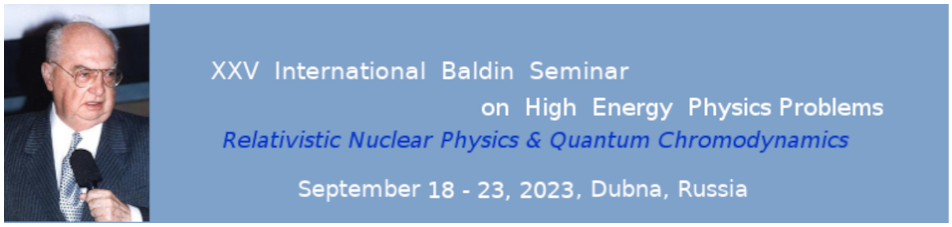

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EMISSION OF CUMULATIVE PROTONS, PIONS, KAONS AND ANTIPROTONS IN COLLISIONS OF HEAVY IONS OF INTERMEDIATE ENERGIES BASED ON THE NON-EQUILIBRIUM HYDRODYNAMIC APPROACH

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A.T. D'yachenko[1,2]

[1] Emperor Alexander I Petersburg State Transport University, St. Petersburg, 190031, Russia;
[2] B.P. Konstantinov Petersburg Nuclear Physics Institute National Research Center "Kurchatov Institute", Gatchina, 188300, Russia

E-mail: dyachenko_a@mail.ru;

In the development of the nonequilibrium hydrodynamic approach [1, 2], we managed to completely describe the spectra of cumulative protons, pions and photons for the collision of carbon nuclei with a beryllium target in the energy range of 0.3-3.2 GeV per nucleon, obtained in the ITEP(Moscow) experiments. . When describing these spectra, the correction for the microcanonical distribution [1, 2] was taken into account, and the contribution of the fragmentation process was also taken into account for the proton yields [2]. Our description of the experimental data is better than the cascade models and the quantum molecular dynamics (QMD) model built into the GEANT4 package. In the present work, we have successfully described the double differential cross sections for the production of cumulative protons, pions, kaons, and antiprotons emitted at an angle of 0^0 for the collision of carbon nuclei in the $^{12}C + {}^{12}C$ reaction at an energy of 19.6 GeV per nucleon on a fixed target, obtained at the U-70 accelerator at IHEP (Serpukhov) [3]. A comparison with other theoretical approaches is given. A connection between the equations of quantum hydrodynamics and the Klein-Gordon equation [4] is established, and approximate solutions of the equations of hydrodynamics are found using solitons in the one-dimensional and two-dimensional cases. Our approach is applicable to collisions of both light and heavy nuclei, which can be seen from a comparison with experimental data and other theoretical approaches based on solving the Boltzmann equation, the quantum molecular dynamics model, and etc. This can be extended to the energy range of the accusatory complex NICA located at JINR (Dubna).

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Primary author: D'YACHENKO, Alexander (Petersburg State Transport University)

Presenter: D'YACHENKO, Alexander (Petersburg State Transport University)

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