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Towards studies of QGP at NICA

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As known, the NICA accelerator facility is creating in Dubna, Russia. Two experiments are planned at NICA - Spin Physics Detector (SPD) and Multi Purposes Detector (MPD). The aim of the SPD experiment is a study of spin effects in polarized proton-proton and deuteron-deuteron collisions at high energies, and an extraction of gluon distribution function of nucleons. The MPD experiment is going to study in details the transition from ordinary matter to the quark-gluon plasma (QGP). It is assumed that the transition can take place at NN center of mass energy about 10 GeV. Studies of collective flow effects, particle composition and so on are foreseen at MPD. But modern experiments performed within the Beam Energy Scan (BES) program of RHIC at low energies do not show bright results. Thus, additional possibilities of experimental studies have to be considered. Recently, we have analyzed experimental data by the NA61/SHINE collaboration on Ar+Sc interactions at 13, 19, 31, 75 and 150 GeV/c on projectile nucleon in the target rest frame within the framework of Geant4 FTF (Fritiof) model. The model does not assume a creation of QGP. The model well describes negative charged pion spectra in Ar+Sc collisions with 0 - 5 % centralities at momenta 13, 19, 31 and 40 GeV/c. At higher momenta, the model underestimates the data leaving a room for QGP. Thus, we conclude that QGP can be appeared at energies larger than 9 GeV. General features of Be-7 + Be-9 interactions studied also by the collaboration are described well by the FTF model at all pointed energies. Though, there is a problem with a reproduction of K⁺ meson spectra. The problem and FTF model results will be presented in our report.

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