TOWARD APPLICATION OF THE HIJING MODEL FOR SIMULATIONS OF NUCLEUS-NUCLEUS INTERACTIONS AT $E_{CMS,NN} \sim 5–15$ GeV

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The Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory is one of the two remaining operating hadron colliders in the world. It is expected that FAIR (GSI, Darmstadt, Germany) and NICA (JINR, Dubna, Russia) facilities will start operations in the nearest future. All of them are aimed to study nucleus-nucleus interactions at nucleon-nucleon center-of-mass energy $E_{CMS,NN} \sim 5–15$ GeV in order to find critical point in the hot nuclear matter equation of state. RHIC is planning to investigate Au + Au interactions at 5–20 GeV (BES-2 project) in 2019–2020. Correct simulation of the interactions in the pointed energy range is very important for design of experimental setups and theoretical analyses of data. RHIC is going to use A Multi-Phase Transport (AMPT) model [1] based on the HIJING model [2] for the aim. FAIR and NICA are mainly using Ultra-relativistic Quantum Molecular Dynamic (UrQMD) model [3].

We have studied application of the HIJING model for the pointed energy range, and started from a description of proton-proton interaction data presented by the NA61/SHINE collaboration [4]. It was found that a satisfactory description of the data can be reached at a change of baryon production model, at an inclusion of multiple processes di-quark → di-quark' + meson, at an increasing of a probability of diffraction dissociation processes, and at an adjustment of hadron transverse mass distributions. Most of the changes have to be done in the string fragmentation code. The changes reflect on calculated properties of hadron-nucleus and nucleus-nucleus interactions.

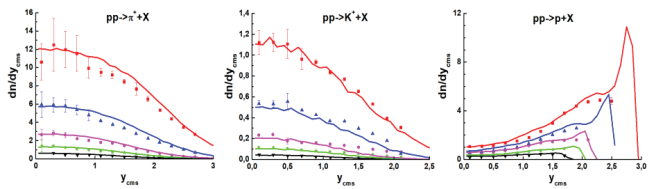

Fig.1. Rapidity distributions of particles in pp interactions at 158, 80, 40, 31, 20 GeV/c (from top to bottom, rescaled by 16, 8, 4, 2, 1). Points are exp. data [4], lines are calculations.

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4. NA61/SHINE Collab. (A.Aduszkiewicz *et al.*) // Eur. Phys. J. C. 2017. V.77. P.671.