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Examination of heavy-ion collisions using EPOS model

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Collisions of heavy-ions are major method used to study properties of matter. Such studies are performed with comparison of experimental data and model simulations.

One of theoretical description is Parton-Based Gribov-Regge theory included in the phenomenological model EPOS. It was originally created to explain the processes at the highest energies obtained with LHC complex. EPOS gives possibility to study different observables what helps to understand better processes present during not only as proton-proton collisions but also as during much more complex reactions with heavy-ions. Various collision energy scans are considered as well.

So far the EPOS model have been used to describe higher collision energies obtained with RHIC complexes and LHC data. However, there is another interesting program currently under investigation at RHIC: Beam Energy Scan (BES), conducted at Brookhaven National Laboratory. Main goals of this project are to examine the Phase Diagram, study the characteristics of the first-order phase transition between Hadron Gas and Quark Gluon Plasma phases of nuclear matter. The search of Critical Point between first-order phase transition and transition of “cross-over” is another absorbing topic. RHIC, one of the biggest accelerators in the world, collides beams of Au nuclei at selected energies as: $\sqrt{s_{NN}} = 7.7, 11.5, 19.6, 27, 39,$ and 62.4 GeV. The variety of initial conditions provides covering as widest part of Phase Diagram of nuclear matter as possible.

Simulated with EPOS data will be verified using two-particles femtoscopic correlations, which allow one to measure the size of sources determined by newly created particles. The studies of elliptic flow will be performed as well.

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