

## Yield of particles in the cumulative region at central rapidities and large transverse momenta at the NICA collider

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We estimate the yields of particles at central rapidities and large transverse momenta in the region outside NN-kinematics (the so-called cumulative region) in AuAu collisions, which in principle may be observed by MPD and SPD detectors at the NICA collider facility. We suppose that particles in this kinematical region are produced due to scattering from the clusters of cold dense quark-gluon matter presented inside nuclei - the nuclear "fluctons".

To obtain the input information for the calculations of these processes we use the results of the well-known cumulative experiments investigating the fragmentation of the various nuclear targets in the backward hemisphere under the influence of a proton beam. Basing on the flucton mechanism of particle production we choose as basic variables the so-called cumulative number and the transverse momentum of the particle. The parameterization of the dependence of cumulative particle yields on the transverse momentum at fixed value of cumulative number is not yet well established, so along with the one commonly used in works we perform the new parameterization of this dependence to trace its influence on the obtained results.

As expected, the existing experimental uncertainties in the type of the dependence of the particle yields on the transverse momentum at a fixed cumulative number result in our predictions obtained for the cross sections of particle yields in the new cumulative region of central rapidities and large transverse momenta in AuAu collisions due to the nucleon-flucton interaction production mechanism. Nevertheless, even despite these uncertainties, an interesting result was obtained. It is found that the relation between the yield of protons and pions in a new cumulative region of mid rapidities and large transverse momenta is completely different, compared to the previously studied nucleus fragmentation region. If in the region of nucleus fragmentation the experiment yield of cumulative protons is considerably dominant over pions, then, according to the estimates obtained, the situation radically changes in this new cumulative region where the yield of cumulative pions starts to dominate over protons.

This effect is caused by a stronger dependence of the cumulative proton yield on the transverse momentum compared to pions. Theoretically, it can be explained by different mechanisms of the formation of these cumulative particles - the coherent coalescence (recombination) of three flucton quarks for a proton and the fragmentation of one flucton quark for a pion. Observation of this effect in the production of cumulative particles with large transverse momenta at mid rapidities with the MPD and SPD detectors at NICA would allow to verify these theoretical ideas about the mechanisms of particle formation in the cumulative region. The research was supported by the Russian Foundation for Basic Research grant (No. 18-02-40075) and the St. Petersburg State University grant for outgoing academic activity (Id: 41159705).

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