

Correlation of cumulative particle production with strange and heavy-flavor particle yields in the string fusion model

Thursday 23 September 2021 17:45 (25 minutes)

The possible correlation between the yield of strange and heavy-flavour particles and the emission of particles in the region outside pN-kinematics (the so-called cumulative region) in pA collisions is studied. The particle production in the cumulative area is considered as a trigger, confirming participation in the process of a dense few-nucleon cluster. From the modern point of view this cold dense nuclear matter clusters (fluctons), intrinsically presented in nuclei, could be regarded as multi-quark bags. For the description of particle production from such objects, the scheme based on the evaluation of the diagram near thresholds is applied.

In present work, using the string fusion model, we analyze the fragmentation of the nuclear cluster residue after the emission of a particle in cumulative region. Previous studies show that the diagrams are dominant, in which all rest quarks of the cluster (the donors, compensating the momentum of the fast cumulative quark) must interact with the projectile. At the same time these donor quarks belong to a shrunk configuration in transverse plane of the reaction. As a consequence the strings formed in the interactions of all remnant quarks of the cluster with the projectile occur strongly overlapped in the impact parameter plane, what leads to the enhanced yield of strange and charm particles due to sting fusion processes. Along with the standard Schwinger-based version of a string fragmentation we consider also the modified version characterized by the thermal-like spectra. In this model the additional increase of the strange and heavy-flavour particle production is observed.

Basing on this picture we calculate the strength of the correlation between the yield of particles in the backward cumulative hemisphere and the magnitude of additional forward strange and charm particles production in relativistic pA collisions. The possibility of experimental observation of the given phenomenon in fixed target experiments is also discussed.

The work was supported by the RFBR grant 18-02-40075.

Primary author: VECHERNIN, Vladimir (St Petersburg State University (RU))

Presenter: VECHERNIN, Vladimir (St Petersburg State University (RU))

Session Classification: Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics

Track Classification: Section 4. Relativistic nuclear physics, elementary particle physics and high-energy physics.