Contribution ID: **144** Type: **bullet talk (poster)**

Properties of the strongly intensve observable Σ in high energy pp collisions in a string fusion model

Wednesday 13 January 2021 19:45 (1h 30m)

The properties of the strongly intensive variable Σ [1] characterizing correlations between the number of particles produced in two observation windows separated by a rapidity interval in pp interactions at LHC energies are studied in the framework of the string fusion approach [2,3]. The analytical calculations are supplemented by the MC simulations permitting to take into account the experimental conditions of pp collisions at LHC energies. We perform the MC simulations of string distributions in the impact parameter plane and take into account the string fusion processes, leading to the formation of string clusters, using a finite lattice (a grid) in the impact parameter plane [4].
As a result, the dependences of this variable both on the width of the observation windows and on the value of the gap between them were calculated for several initial energies. Analyzing these dependencies we see that in pp collisions at LHC energies the string fusion effects have a significant impact on the behavior of this observable and their role is increasing with the initial energy and centrality of collisions. We show that in the case with different emitting string clusters this observable loses its strongly intensive nature. It becomes equal to the combination of the ones for different clusters with the weights depending on details of the collision - its energy and centrality.
Nevertheless the analysis of these dependencies of the Σ enables to extract the important information on the characteristics of string clusters and on this base to explain the Σ behavior. In particular, we found that the increase of this variable with initial energy and collision centrality takes place due to the growth of the portion of the dense string clusters in string configurations arising in pp interactions.

This research was funded by the Russian Foundation for Basic Research, project number 18-02-40075.

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Session Classification: Poster

Track Classification: Collective dynamics from small to large systems