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MULTIPLICITY DISTRIBUTIONS AND COMBINANTS IN MULTI-POMERON EXCHANGE MODEL

Wednesday, 13 July 2022 18:30 (20 minutes)

In the framework of the multi-pomeron exchange model (MPEM) with string fusion [1,2] we study the multiplicity distributions of charged particles and their combinants in pp collisions at LHC energies and compare the results with the data obtained by ALICE [3] and CMS [4] collaborations at CERN. We use the standard distribution in number of cut pomerons in pp collisions [5]. In this model, each cut pomeron corresponds to the formation of a pair of quark-gluon strings. An increase in the multiplicity density with initial energy in pp collisions is explained by an increase in the mean number of cut pomerons and a growth of the average multiplicity from a single string. The last effectively takes into account the string fusion processes.

We show that the initial version of the MPEM with the Poisson distribution of particles from a single pomeron can not explain the experimental data. We replace the Poisson distribution by a Gaussian distribution with the scaled variance $\omega > 1$, corresponding to the NBD at high multiplicities. We found that the value of ω increases with the width of observation window in pseudorapidity. This is in correspondence with the result obtained in [6-8] that the $\omega - 1$ is proportional to the width of the observation window and the integrated two-particle correlation function of a single source (string). As a result we obtain a satisfactory description of the ALICE and CMS experimental data on the multiplicity distribution of charged particles in pp collisions for observation windows of various width in energy range from 0.9-7 TeV.

Using the calculated multiplicity distribution we also found their combinants. We see that these quantities really are very sensitive to the form of the multiplicity distribution spectra, as it was pointed out in [9]. Even minor deviations of the ALICE and CMS data, within the error, lead to considerable changes in combinants. However, our results of calculating combinants in the framework of the MPEM manage to reproduce the general behavior of combinants with their number, in particular, their oscillations. The research was supported by St. Petersburg State University (project No. 93025435).

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The speaker is a student or young scientist

No

Section

1. Intermediate and high energies, heavy ion collisions

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