

Search for collective phenomena in high multiplicity events at Nuclotron and U-70

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More than ten-year experimental search for high multiplicity phenomena is carried out at Laboratory of high-energy physics (JINR). We present main results, which have been received at U-70 accelerator (IHEP, Protvino) in proton collisions and at Nuclotron (JINR, Dubna) in nuclear interactions. For pp interactions, the topological cross sections have been gone three orders down and achieved of KNO-scaling variable (n/\sqrt{n}) 4.5 for the total acceptance. Probably, the tail of high multiplicity distribution is stipulated of gluon splitting. In region of high multiplicity, the formation of pions is predominant. Some collective phenomena is predicted in this region. Using charged multiplicity data, we could restore total (sum of charged and neutral particles) multiplicity and realized unique research of fluctuations of the neutral particle number at given total multiplicity. Revealed growth of a scaled variance may indicate the pion (Bose-Einstein) condensate formation. The excess of soft photon yield at interactions of Nuclotron's beams (d, Li and C) with a carbon target has been confirmed. This can be connected with a pion condensate formation. At present, we prepare our two-shoulder electromagnetic calorimeter to carry out experimental studies at BM@N setup and take part into new experiments on heavy ion collisions at Nuclotron.

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