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Monte-Carlo study of long-range correlations of average transverse momentum and multiplicity for strange particles in pp-collisions at the LHC energies.

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One of the main directions of modern high-energy physics research is the study of quark-gluon plasma (QGP) – a super-hot and super-dense state of strongly interacting matter that could be formed in the collisions of relativistic heavy nuclei. Recently some signals of the QGP formation were obtained in high-energy pp-collisions at the Large Hadron Collider (LHC) [1], so the interest in the processes occurring in these collisions has increased.

One of the new instruments to study the high-energy particle collisions at the LHC was proposed in [2] to measure the long-range correlations (LRC) between quantities observed in different (pseudo)rapidity intervals – so-called "forward" and "backward" windows, separated by some gap. The appearance of non-negligible values of LRC coefficients might bring important information on the role of the initial stages of hadron-hadron collisions preceding the formation of the QGP. We present in this report the MC-based study of long-range correlations between average transverse momentum $\langle p_T \rangle$ and multiplicity n for particles containing strange quarks. The analysis of LRC in production of K-mesons and Lambda-hyperons in pp-collisions at $\sqrt{s} = 7$ TeV is done in the framework of PYTHIA 8 event generator [3]. The collectivity effects in pp-collisions are taken into account in these MC studies by formation of a so-called "flavour rope", which is hadronized with a larger, effective string tension [4, 5], providing the increase of strangeness yield.

The dependencies of correlation coefficients b_{n-n}, b_{p_T-n} and $b_{p_T-p_T}$ on the gap between forward and backward pseudorapidity windows and on the width of the forward pseudorapidity window are studied. The behavior of correlation coefficients for strange particles is compared with the behavior of correlation coefficients for charged particles. It is demonstrated that for all studied types of particles positive n-n, p_T-n and p_T-p_T correlations are observed. The correlation coefficients of strange particles in each of the considered cases are noticeably less than for charged particles. The difference of the behavior of the correlation coefficients of charged particles and strange particles is discussed. The obtained results do not contradict the model of color string formation and fusion that might occur at the initial stage of pp-collision.

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