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Global characteristics, long-range correlations, ridge and femptoscopic radii in pp-collisions at LHC

Multiplicity, rapidity and transverse momentum distributions of hadrons produced in inelastic and non-diffractive pp - collisions at energies from 200 GeV to 14 TeV are described within Quark Gluon String Model. Good agreement with the available experimental data, including the LHC data at $\sqrt{s}$ = 7 TeV, is obtained and predictions are made for the collisions at top LHC energy $\sqrt{s}$ = 14 TeV [1]. It is shown that within the examined energy range one cannot distinguish between the "standard" logarithmic dependence ($\propto \ln^2 s$) and novel power-law approximation ($\propto E^{\lambda}$), employed for particle densities and for their mean p_T in Regge theory and in theory of Color Glass Condensate, respectively. The model indicates that Feynman scaling and extended longitudinal scaling remain valid in the fragmentation regions, whereas strong violation of Feynman scaling is observed at midrapidity. The KNO scaling in multiplicity distributions is violated at LHC also. The origin of both maintenance and violation of the scaling trends is traced to short range correlations of particles in the strings and interplay between the multi-string processes at ultra-relativistic energies.
Long-range correlations between charged particles emitted in forward (F) and backward (B) hemispheres are studied also, good agreement with data at 546 GeV and 900 GeV is observed. The dependence looks pretty linear and its slope increases with rising energy $\sqrt{s}$ [2].
The model is able to reproduce the effect of long-range near side correlations, colloquially known as ridge [3]. In contrast to the F-B correlations this effect is attributed to hard Pomeron exchange and cannot be reproduced within the approach where only soft Pomerons are taken into account. The experimental femtoscopic radii dependences are well reproduced within Quark Gluon String Model.

[1] J.Bleibel, L.Bravina, A.Kaidalov, E.Zabrodin, arXiv:1011.2703[hep-ph]

[2] L.Bravina et al., Int. J. Mod. Phys. E (in press)

[3] L.Bravina et al., (to be submitted)

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