

Is Longitudinal scaling of multiparticle production valid at LHC ?

Limiting fragmentation (LF) or the longitudinal scaling is a well-studied phenomenon in multiparticle production processes observed at various heavy-ion collision experiments and in different types of colliding systems like- e^+e^- , $pp(\bar{p})$. It is interesting to verify the validity of this phenomenon at LHC energies. We study this phenomenon using the rapidity spectra of pions starting from AGS to LHC energies. The hard-core radius of baryons at lower collision energies plays an important role in the description of a hadronic system. For an energy dependence study of LF hypothesis, we use an excluded volume statistical hadron gas model (SHGM) with the dynamics encoded in the collective flow in longitudinal as well as in the transverse direction. Our analysis points to the validity of limiting fragmentation in the rapidity spectra of pions at energies from AGS to below top RHIC energy, while its violation at top RHIC and LHC energies. This is in accordance with the basic requirement of the LF hypothesis, which requires a constant inelastic interaction cross-section (σ_{inel}) with collision energy and in turn, the recent ATLAS results show a clear energy dependence of σ_{inel} . Hence a violation of LF hypothesis at higher energies is expected. Our findings go inline with the above expectations. We give prediction for the higher LHC energies, where these studies could be tested. In addition, we give a clear micro and macroscopic description of the LF phenomena.

List of tracks

Fluctuation in initial conditions, collective flow and correlations

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