Simulation studies of $R_2(\Delta\eta, \Delta\varphi)$ and $P_2(\Delta\eta, \Delta\varphi)$ correlation functions in pp collisions with the PYTHIA and HERWIG models

We report studies of charge-independent (CI) and charge-dependent (CD) two-particle differential number correlation functions, $R_2(\Delta\eta, \Delta\varphi)$, and transverse momentum correlation functions, $P_2(\Delta\eta, \Delta\varphi)$, of charged particles produced in pp collisions at the LHC centre-of-mass energy $\sqrt{s}$ = 2.76 TeV with the PYTHIA and HERWIG models. Model predictions for R_2 and P_2 correlation functions are presented for inclusive charged hadrons ($h^{\pm}$), as well as pions ($\pi^{\pm}$), kaons ($K^{\pm}$), and protons/anti-protons ($p/\bar{p}$) in the transverse momentum ranges $0.2 < p_{\mathrm{T}} \leq 2.0 \; GeV/c$, $2.0 < p_{\mathrm{T}} \leq 5.0 \; GeV/c$ and $5.0 < p_{\mathrm{T}} \leq 30.0 \; GeV/c$, and with full azimuthal coverage in the pseudorapidity range $|\eta| < 1.0$. We compare the two model predictions for the strength, shape, particularly the width of the R_2 and P_2 correlation functions as these pertain to recent measurements of such correlations by the ALICE collaboration. Our analysis indicate that comparative studies of R_2 and P_2 correlation functions provide valuable insight towards the understanding of particle production in pp collisions, and by extension, should also be useful in studies of heavy-ion collisions at high energy.

Summary

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