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Particle production mechanisms studied via angular correlations of pions, kaons, protons, and lambdas in pp collisions at 7 TeV with ALICE

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Two-particle correlations as a function of pseudorapidity difference, $\Delta\eta$, and azimuthal angle difference, $\Delta\varphi$, are used to study a wide range of physical phenomena and provide access to the underlying physics mechanisms of particle production in collisions of both protons and heavy ions. Examples include the collective behaviour of the QGP medium, jets, quantum statistics or Coulomb effects, conservation laws, and resonance decays.

In this contribution, we report measurements of the correlations of identified particles and their antiparticles (π, K, p, Λ) in pp collisions at $\sqrt{s}$ = 7 TeV for momenta up to 2.5 GeV/c. The analysis reveals significant differences in particle production between mesons and baryons. The correlation functions for mesons exhibit the expected peak dominated by effects of mini-jet fragmentation and are well reproduced by general purpose Monte Carlo generators. This is not the case for baryon pairs; results for baryons present a challenge to the contemporary models (PYTHIA, PHOJET) with simulations showing significant differences in respect to experimental data. Moreover, when both particles have the same baryon number (pp, $\bar{p}\bar{p}$, pΛ, $\bar{p}\bar{\Lambda}$, $\Lambda\Lambda$, $\bar{\Lambda}\bar{\Lambda}$) a near-side anti-correlation structure is observed instead of a peak. This unexpected observation is further interpreted in the context of baryon production mechanisms in the fragmentation process.

Content type

Experiment

Collaboration

ALICE

Centralised submission by Collaboration

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