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Event-shape, multiplicity-, and energy-dependent production of (un)identified particles in pp collisions with ALICE at the LHC

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The multiplicity dependent results of identified particle production allowed the discovery of collective-like behavior in pp collisions at the LHC. Good understanding of the effects attributed to well-understood physics, like multiple hard scatterings, is required to establish the origin of the new phenomena. Experimentally, those effects can be controlled using event shapes, like transverse spherocity or directivity, which allows the classification of the pp collisions either as jetty-like or isotropic events. The transverse momentum (p_{T}) spectra of light-flavor hadrons in pp collisions measured over a broad p_{T} range provide important input to study particle production mechanisms in the soft and hard scattering regime of QCD. In this work, they are used to perform a comprehensive study as a function of the event multiplicity, collision energy, and event shapes.

We will present the inclusive charged particle transverse momentum distributions for pp collisions at different center-of-mass energies. The multiplicity and energy dependencies of the particle production at high transverse momentum are studied with the exponent of the power law function which describes the p_{T} spectra. For pp collisions at
$\sqrt{s} = 13$ TeV and for a fixed multiplicity interval, the parameters obtained from the blast wave analysis of the p_{T} spectra are used to characterize the evolution of the spectral shapes for different event topologies. The multiplicity and spherocity dependencies of the average transverse momenta and integrated yields as a function of charged-particle multiplicity are discussed. The proton-to-pion and kaon-to-pion particle ratios as a function of p_{T} are also reported. Comparisons between data and QCD-inspired models will be shown.

Content type

Experiment

Collaboration

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