Beitrag ID: **68** Typ: **Talk**

Charged-particle production in different collision systems up to very high transverse momentum measured with ALICE

Dienstag, 28. März 2023 09:20 (20 Minuten)

The ALICE experiment at the Large Hadron Collider (LHC) is designed to investigate the properties of the quark-gluon plasma created in high-energy heavy-ion collisions. During the successful data-taking campaigns of LHC Run 1 and Run 2 (2009 - 2018), it recorded data for a variety of collision systems and different center-of-mass energies. As particle production at the LHC is driven by a complex interplay of soft and hard QCD processes, finding a consistent model description for all collision systems is challenging. The study of charged-particle production as a function of multiplicity plays a key role in understanding the properties of the matter created in small (pp, p-Pb) and large (AA) collision systems. The precise tracking capabilities from low to high transverse momentum of the ALICE apparatus give the unique opportunity to measure the evolution of multiplicity-dependent spectral shapes across collision system sizes and energies.

In this contribution, a comprehensive overview of charged-particle production measurements in pp, p-Pb, and AA collisions up to high transverse momentum will be presented. It is obtained by means of a two-dimensional unfolding approach that allows for a detailed correction of detector resolution effects and yields the spectral properties in high-granular multiplicity intervals, maximizing the measurement precision. The results will then be tested against the main theoretical models implemented in commonly used Monte Carlo event generators.

Experiment/Theory

ALICE

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Sitzung Einordnung: Parallel: High-Momentum Hadrons & Correlations

Track Klassifizierung: High momentum hadrons and correlations