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Exploring jet quenching effects through di-hadron correlations in 13 and 13.6 TeV proton-proton collisions at the LHC with ALICE

In high-energy collider physics, a key question is whether quark–gluon plasma (QGP) is formed in proton-proton (pp) collisions. Recent observations suggest that collectivity exists in pp collisions, although signatures of jet quenching would provide stronger evidence. This study examines jet quenching in pp collisions at two different beam energies: $\sqrt{s} = 13$ TeV (LHC Run 2) and $\sqrt{s} = 13.6$ TeV (LHC Run 3) using di-hadron correlations. Correlations are measured for various p_{T} intervals as a function of charged-particle multiplicity. High-multiplicity (HM) events show azimuthal narrowing of jets compared to minimum bias (MB) events, though this difference diminishes at higher p_{T}. These findings suggest a potential bias in the commonly used low-multiplicity template method of flow extraction.

The measurements are compared with various model calculations, including PYTHIA8, PYTHIA String shoving, EPOS, AMPT, and JETSCAPE, with jet quenching on and off. This presentation offers final results on jet fragmentation functions in HM and MB events from LHC Run 2 as well as preliminary results from the larger statistics LHC Run 3 pp collisions. The transverse momentum fraction of leading strange hadrons in mini-jets is also measured to investigate hadronization and potential medium effects.

Category

Experiment

Collaboration (if applicable)

ALICE

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