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Longitudinal Decorrelation Measurements from pp to A+A with the ATLAS detector

Tuesday, 5 September 2023 12:40 (20 minutes)

This talk presents a measurement of longitudinal decorrelation in pp collisions with ATLAS. The deposited energy in the transverse (x, y) plane is expected to vary, depending on the longitudinal (z) slice examined, which is correlated with the rapidity of the produced particles. Thus, particles from different rapidity slices will have flow vectors that differ in magnitude and orientation due to the longitudinal variation, longitudinal decorrelation, which grows with increasing particle rapidity separation. For flow harmonic n, such longitudinal decorrelations have been characterized, for large systems, in terms of r_n, the ratio of large-rapidity-gap to small-rapidity-gap correlations. This analysis performs the first measurements of r_n in pp collisions at 5˜TeV and 13˜TeV. The analysis is carried out via a two-particle correlation method, utilizing charged tracks of varying η within $|\eta| < 2.5$ and topo-clusters of $4.0 < |\eta_{\rm ref}| < 4.9$. Because non-flow effects are more significant in pp collisions, non-flow template subtraction procedures are applied. Final results are quoted for r_2 and its slope F_2, over a range of multiplicities. Similar non-flow subtraction techniques are applied to the full multiplicity range of Xe+Xe collision data and the results are compared to the two pp energies at appropriate multiplicities. This gives some of the first detailed information on the correlation between longitudinal and transverse energy deposition in pp collisions.

Category

Experiment

Collaboration (if applicable)

ATLAS

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