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Measurement of long-range azimuthal anisotropies and of forward-backward multiplicity correlations and longitudinal flow with the ATLAS detector

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ATLAS measurements of correlations between particle pairs in relative azimuthal angle ($\Delta\phi$) and pseudorapidity separation ($\Delta\eta$), in pp collisions at $\sqrt{s}=2.76, 5.02$ and 13 TeV, and in p +Pb collisions at $\sqrt{s_{NN}}=5.02$ TeV are presented. Prior measurements have shown that in pp collisions with a large multiplicity of produced particles, a long-range structure, commonly called the “ridge”, develops along $\Delta\eta$ at $\Delta\phi \sim 0$. However, due to the presence of the large away-side jet, the full $\Delta\phi$ dependence of the long-range correlation could not be studied previously. In this analysis, a template fitting procedure is implemented to determine the contributions from dijets to the correlations, using low-multiplicity events, and extract the genuine long-range correlation. The long-range correlations are shown to be present even in events with a small multiplicity of produced particles, implying that the long-range correlations are not unique to rare high multiplicity events. The properties of the correlation are shown to be remarkably similar to that observed in p +Pb collisions. Study of these long range correlations using multi-particle cumulants are also presented. New results on how the long-range correlations are affected by the presence or absence of hard processes in the pp collision are presented.

Summary

Presentation type

Oral

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