

Measurement of the longitudinal decorrelation of event-plane angle and flow magnitudes in 2.76 and 5.02 TeV Pb+Pb collisions with the ATLAS detector

Longitudinal dynamics has recently become a topic of great interest in the study of ultra-relativistic heavy ion collisions. Measurement of the longitudinal fluctuations of the flow harmonic coefficients v_n and event-plane angles Ψ_n can provide a more complete picture of space-time evolution of the hot, dense medium formed in heavy ion collisions. Longitudinal flow decorrelations can be modeled with two contributions: magnitude fluctuations and event plane twist. However, existing observables do not separate these two effects. In this analysis, a new 4-particle correlator is used to separate the event-plane twist from magnitude fluctuations in 2.76 and 5.02 Pb+Pb collisions. Results show both effects have a linear dependence on pseudorapidity separation for $v_{\{2-5\}}$, and show a small but measurable variation with collision energy. The correlation of Ψ_n of different order are also expected to have longitudinal fluctuations due to the non-linear mixing effects between lower and higher order flow harmonics. First measurement of such non-linear mode-mixing effects as a function of pseudorapidity is also presented. These results will help to constrain initial conditions along longitudinal direction and also help understand the longitudinal evolution of the fireball.

Preferred Track

Collective Dynamics

Collaboration

ATLAS

Primary author: HYO, Peng (State University of New York (US))

Co-author: COLLABORATION, ATLAS (CERN)

Presenter: HYO, Peng (State University of New York (US))

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