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Type: Parallel Talk

## Transverse and longitudinal event-by-event flow fluctuations of $v_1 - v_4$ in 2.76 and 5.02 TeV Pb+Pb collisions with the ATLAS detector

*Tuesday 15 May 2018 15:00 (20 minutes)*

Multi-particle flow correlations in Pb+Pb collisions provide unique insight into the nature of event-by-event fluctuations of the initial eccentricity as well as final state dynamics in the transverse and longitudinal directions. This talk presents a detailed study of transverse flow fluctuations using 4 and 6-particle cumulants  $v_n\{4\}$  and  $v_n\{6\}$  for  $n = 1, 2, 3,$  and  $4$ . This includes several new results: the first measurement of a negative dipolar flow  $v_1\{4\}$ ; a high-precision measurement of  $v_4\{4\}$ , changing sign around 20-25% centrality; observation of an intriguing sign-change pattern of  $v_2\{4\}$  and  $v_2\{6\}$  in ultra-central collisions; a detailed study of the cumulant ratio  $v_n\{4\}/v_n\{6\}$  which shows significant deviation of  $v_2$  and  $v_3$  from both Bessel-Gaussian and elliptic-power distributions. The three-subevent cumulant method is used to show that these results are unlikely to be due to non-flow effects. The talk also presents a detailed study of the longitudinal dynamics of harmonic flow using various correlators involving two, four or six particles. The flow decorrelations for  $v_n$  ( $n = 2, 3,$  and  $4$ ), as well as their center-of-mass energy dependence are studied over broad range of pseudorapidity ( $|\eta| < 2.5$ ) and transverse momentum ( $0.5 < p_T < 5$  GeV). The decorrelation signals are decomposed into contributions from the forward-backward twist and asymmetry in the flow angle and magnitude, respectively. Furthermore, the decorrelation between  $v_n$  and  $v_m$  in different  $\eta$  is measured to disentangle the longitudinal dependence of the initial-state linear effects and final-state non-linear mode-mixing effects. These results provide a wealth of differential information on event-by-event fluctuations of harmonic flow in both transverse and longitudinal directions, and they can be used to improve event-by-event 3+1D hydrodynamic models.

### Content type

Experiment

### Collaboration

ATLAS

### Centralised submission by Collaboration

Presenter name already specified

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