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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, May 15, 2018 3:00 PM (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 η 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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