Contribution ID: **6** Type: **not specified**

The overview of the ATLAS experiment results on azimuthal anisotropy in high energy nuclear collisions

Saturday, 17 January 2015 12:10 (25 minutes)

The results from the detailed measurements of the azimuthal anisotropy of charged particles in lead-lead collisions at $\sqrt{s_{NN}} = 2.76$ TeV and proton-lead collisions at $\sqrt{s_{NN}} = 5.02$ TeV are presented. Various experimental methods were used to analyze high statistics data set collected by ATLAS experiment. Multi-particle cumulants provide a measurement of v_n harmonics free from contributions not related to the initial geometry and give an estimate of event-by-event fluctuations of the flow harmonics. In lead-lead collisions second Fourier harmonic, v_2, was measured with two-, four-, six- and eight-particle correlation while v_3 and v_4 were extracted with four-particle cumulants. The distributions of event-by-event harmonic flow coefficients v_n for n=2-4 were also measured in lead-lead collisions. Both approaches provides independent estimate of the event-by-event fluctuations of the flow harmonics and agrees well. Finally the collective behaviour of charged particles produced in the proton-lead collisions was studied by the measurements of v_n harmonics associated with the azimuthal modulation of two-particle correlation structures and also extracted with four-particle cumulant method. These measurements give insight into the nature of fluctuations in the initial geometry and the role of hydrodynamic response to the fluctuations.

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Session Classification: Recent news from LHC