



Contribution ID: 59

Type: **Contributed Talk**

Recent ATLAS measurements of correlations in Pb+Pb and Xe+Xe collisions

Thursday, March 26, 2020 9:44 AM (22 minutes)

ATLAS measurements of flow harmonics (v_n) and their fluctuations in Pb+Pb and Xe+Xe collisions covering a wide range of transverse momenta, pseudorapidity and collision centrality are presented. The measurements are performed using data from Xe+Xe collisions at 5.44 TeV and Pb+Pb collisions at 2.76 and 5.02 TeV. The v_n are measured up to $n = 6$ using the two-particle correlations, multi-particle cumulants, and scalar product methods. The v_n measurements are also performed using a non-flow subtraction technique that was developed for flow measurements in pp and $p+Pb$ collisions. This non-flow subtraction is found to have a significant effect on the measured v_n at high- p_T and in peripheral collisions. A universal scaling in the p_T dependence of the v_n is observed for both systems. Measurements of correlations between the v_n for different order n , studied with three- and four-particle mixed-harmonic cumulants, are also presented, and contributions to these correlations from “centrality fluctuations” are also discussed.

Measurements of longitudinal flow decorrelations involving two- and four-particle correlations for v_2 and v_3 in Xe+Xe and Pb+Pb collisions are also presented and compared with predictions from theoretical calculations. The four-particle decorrelation is found to not factorize as a product of two-particle decorrelations. The ability of such measurements to distinguish between different models of initial geometry and to reduce the uncertainty in determining the effective shear-viscosity to entropy-density ratio of the QGP is demonstrated.

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Session Classification: QCD with Heavy Flavors and Hadronic Final States

Track Classification: QCD with Heavy Flavors and Hadronic Final States