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ATLAS measurement of mean momentum fluctuations and correlations with the flow in pp, Xe-Xe, and Pb-Pb

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The thermal fluctuations in the QGP medium formed in heavy ion collisions present themselves as event-wise $[p_T]$ fluctuations in the final state. Recent studies have shown that in ultra-central collisions, fluctuations are sensitive to radial flow, random thermal motion, and nuclear deformation. They can provide constraints on the extent of thermalization of the QGP droplet. Also of interest recently are correlations of $[p_T]$ with v_n which were found to be sensitive primarily to the initial state fluctuations. Correlations of $[p_T]$ with v_n recently came into the focus of discussion in the community and in pp collisions, they were suggested as a probe of saturation effects. This talk presents precise measurements of up to 3rd order $[p_T]$ cumulants as a function of multiplicity, and centrality with an emphasis on ultra-central collisions. These results have strong implications for understanding the impacts of the initial condition, medium thermalization, and medium properties on final state $[p_T]$ fluctuations.

Category

Experiment

Collaboration (if applicable)

ATLAS Collaboration

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