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Recent ATLAS measurements of correlations from small to large collision systems

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Measurements of two-particle correlations in pp collisions show features that are strikingly similar to those seen in heavy-ion collisions, suggesting that a tiny droplet of the QGP is produced even in such collisions. In the pp collisions models that attribute the correlations to semi-hard processes can also qualitatively reproduce the measurements. In this talk, we report on a series of ATLAS measurements exploring detailed properties of flow in small, medium, and large collision systems.

New ATLAS measurements of two-particle correlations with active selection on particles associated with jets from the event are performed to elucidate the origin of the long-range correlations. If the correlations are indeed generated by semi-hard processes, then the long-range correlations between particles associated with jets would be stronger than the inclusive hadron correlations, while removing jet-associated particles would weaken the correlations.

Additionally, measurements of the azimuthal anisotropy in p+Pb collisions reaching the transverse momentum of charged particles up to 50 GeV, in minimum-bias and jet-triggered events are presented. In the jet-triggered events, v_2 is non-zero over the entire kinematic range of the measurement, and is $\approx$ 2-3% at $p_{\mathrm{T}} \approx 50$ GeV.

In large collision systems, we focus on understanding the longitudinal structure of the initial-state in heavy-ion collisions as a key for modeling the early-time dynamics. This talk presents results of flow decorrelations in Xe+Xe and Pb+Pb collisions.

In AA collisions, the decorrelations for v_2 show a strong centrality and p_{T} dependence, while no such dependencies are observed for v_3 and v_4 decorrelations. Decorrelations in Xe+Xe collisions, when compared to Pb+Pb collisions, are found to be larger for v_2, but smaller for v_3. These system-dependent trends are not reproduced in current initial-state models when coupled with hydrodynamic evolution.

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