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Multi-particle correlations and collectivity in small systems from the initial state

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We report on recent progress in understanding multi-particle correlations in small systems from the initial state using the Color Glass Condensate Effective Field Theory (CGC EFT). Working in the dilute-dense limit, applicable for asymmetric collision systems, we first study the Fourier harmonics v_2 and v_3 for the the systems p/d/^{3}He+Au. This semi-analytic framework, when paired with realistic modeling of nuclei, allows for a first quantitive calculation of these quantities from the initial state. We will then compare our results to recent PHENIX measurements and discuss possible sources of systematic uncertainties. Novel features of our calculation will be further elucidated by comparison to a simple parton model for multi-particle correlations. Additionally, we will discuss how this framework permits a simple power-counting argument for the multiplicity scaling of integrated Fourier harmonics v_n, which we will then compare to recent ATLAS data. Lastly, we give an outlook to future studies of correlations from the initial-state using our framework.

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Summary

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