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Exploring origins for correlations between flow harmonics and transverse momentum in small collision systems

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High statistics data sets from experiments at RHIC and the LHC with small and large collision species have enabled a wealth of new flow measurements, including the event-by-event correlation between observables. One exciting such observable $\rho(v_n^2,[p_T])$ gauges the correlation between the mean transverse momentum (p_T) of particles in an event and the various flow coefficients (v_n) in the same event. Recently it has been proposed that very low multiplicity events may be sensitive to initial-state glasma correlations rather than flow-related dynamics. We find utilizing the IP-JAZMA framework that the color domain explanation for the glasma results are incomplete. We then explore predictions from PYTHIA-ANGANTYR having only non-flow correlations and AMPT having both non-flow and flow-type correlations. We find that PYTHIA-ANGANTYR has non-flow contributions to $\rho(v_n^2,[p_T])$ in p+O, p+Pb, O+O collisions that are positive at low multiplicity and comparable to the glasma correlations. It is striking that in PYTHIA-8 in pp collisions there is actually a sign-change from positive to negative $\rho(v_n^2,[p_T])$ as a function of multiplicity. The AMPT results match the experimental data general trends in Pb+Pb collisions at the LHC, except at low multiplicity where AMPT has the opposite sign. In p+Pb collisions, AMPT has the opposite sign from experimental data and we explore this within the context of parton geometry. In this presentation, we will discuss the detailed model study on the v_n-p_T correlation in [Phys. Rev. C 103, 064906 (2021)]

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