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How to observe initial state momentum anisotropies in nuclear collisions[1] BJOERN SCHENKE, Brookhaven National Laboratory, GIULIANO GIACALONE, Universit Paris Saclay, CNRS, CEA, CHUN SHEN, Wayne State University, RIKEN BNL Research Center, Brookhaven National Laboratory — We show that the correlation between the elliptic momentum anisotropy, v_2, and average transverse momentum, $[p_T]$, in small system nuclear collisions carries information on the origin of the observed momentum anisotropy. A calculation using a hybrid IP-Glasma+Music+UrQMD model that includes contributions from final state response to the initial geometry as well as initial state momentum anisotropies of the Color Glass Condensate, predicts a characteristic sign change of the correlator $\rho(v_2^2, [p_T])$ as a function of charged particle multiplicity in p+Au and d+Au collisions at $\sqrt{s} = 200\,\mathrm{GeV}$, as well as p+Pb collisions at $\sqrt{s} = 5020\,\mathrm{GeV}$. This sign change is absent in calculations without initial state momentum anisotropies. The model also predicts a clear difference between the centrality dependence of $\rho(v_2^2, [p_T])$ in Au+Au collisions at $\sqrt{s} = 200\,\mathrm{GeV}$ and Pb+Pb collisions at $\sqrt{s} = 5020\,\mathrm{GeV}$, with only the latter showing a sign change in peripheral events. Experimental observation of these distinct qualitative features of $\rho(v_2^2, [p_T])$ in small and large systems would constitute strong evidence for the presence and importance of initial state momentum anisotropies predicted by the Color Glass Condensate.

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