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Long-range Collectivity in Small Collision Systems with Two- and Four-particle Correlations at STAR

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Recently, near-side azimuthal angular correlations across a large pseudorapidity gap, commonly called as long-range ridge-like correlations, have been observed in small collision systems. It opens up opportunities to explore the multiparton dynamics of QCD and the limitation of fluid dynamics description of the matter created in these collisions. We report the STAR measurement of azimuthal harmonics v_2 and v_3 in the p+Au and d+Au data collected in various energies such as 19.6, 39, 62.4 and 200 GeV. The non-flow contributions, which are suppressed by requiring a large $\Delta\eta$ gap, are estimated in most peripheral collisions and subtracted. After non-flow subtraction at each beam energy, v_2 and v_3 are obtained as a function of centrality and transverse momentum. The v_2 signals are also extracted using four-particle azimuthal correlations, where the influence of non-flow is quantified by comparing to the standard cumulant method, as well as the two-subevent and three-subevent cumulant methods. It is found that both the influence of non-flow and the strength of the long-range v_2 and v_3 have a strong beam energy dependence. The results are compared to similar studies in peripheral Au+Au collisions and calculations from different models. This measurement provides new constraints on theoretical models of long-range collectivity and its energy dependence in small collision systems.

Content type

Experiment

Collaboration

STAR

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