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Signatures of collectivity and flow of light and heavy quarks in small systems observed by PHENIX

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A wide variety of recent measurements from small systems indicate that there are collective flow phenomena in these systems, which are well described by hydrodynamics. However, it is widely understood that all flow measurements are affected by non-flow correlations. In order to disentangle the genuine hydrodynamical flow from other contributions, we have systematically studied the v_2 as a function of p_T and η in p+Au and d+Au collisions at $\sqrt{s_{NN}} = 200$ GeV with a mixture of different detector combinations and by comparing several non-flow subtraction methods. We have also measured 4-particle cumulants in p+Au and d+Au at $\sqrt{s_{NN}} = 200$ GeV with subevents, which kinematically suppress non-flow via removal of short-range correlations. As found in heavy ion collisions, the quark mass dependence of the flow will further provide an evidence of collective effects. PHENIX has measured v_2 vs p_T of muons at forward rapidity originating from heavy quark decays in d+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. We will show these results and discuss implications for the underlying mechanism that drives both light and heavy quark collectivity.

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