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PHENIX results on collectivity tests in high-multiplicity $p+p$ and $p+Au$ collisions

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Observations of possible collective effects in high-multiplicity $p+p$ collisions at the LHC and in $p+Pb$ and $d+Au$ collisions at the LHC and RHIC challenge our understanding of the requirements for quark-gluon plasma formation. To further investigate this, PHENIX recorded high statistics $p+p$ and $p+Au$ data sets in 2015. In both cases, high-multiplicity triggers were implemented using the forward silicon detector (FVTX) and the beam-beam counter (BBC) covering pseudorapidity $1.0 < |\eta| < 3.0$ and $3.1 < |\eta| < 3.9$, respectively. The large high-multiplicity event samples enable highly differential analyses to look for collective effects. We report results on large pseudo-rapidity-separation correlations investigating whether the near-side ridge is seen in high-multiplicity $p+p$ events at RHIC. We also report the extraction of flow coefficients from azimuthal anisotropies in $p+Au$ and compare the results with theoretical expectations, including viscous hydrodynamics where the elliptic flow strength is expected to be substantially smaller than in $d+Au$ and ^3He+Au at the same energy.

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