

Collective flow in pp collisions at 7 TeV and 13 TeV

Flow measurements in high multiplicity pp collisions at the LHC have indicated the development of collective flow in the small systems created at the LHC energies. Using the event-by-event viscous hydrodynamics+hadronic cascade hybrid model, iEBE-VISHNU, with fluctuating initial conditions, we investigate the azimuthal correlations in pp collisions at $\sqrt{s} = 7$ and 13 TeV with two- and four-particle cumulants. Our calculations of multiplicity dependent second-order azimuthal anisotropy harmonics v_2 are comparable with the recent measurements from CMS. The transition from positive to negative values of $c_2\{4\}$ in high-multiplicity events, which has been taken as an experimental evidence of collectivity, is observed in our hydrodynamic calculations with the same multiplicity cuts and acceptance cuts as the CMS measurements. We further study the mass ordering of anisotropy v_2 among different particle species. The calculated elliptic flow v_2 exhibits a clear mass ordering at transverse momentum p_T below 2.5 GeV/c among π , K, p, and Λ . The comparisons of mass ordering between our model results and measurements from CMS are also presented. At last, we further investigate the effects of multiplicity fluctuations and non-flow on the sign of $c_2\{4\}$.

Preferred Track

QCD in small systems

Collaboration

Not applicable

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