

Hydrodynamic collectivity in Pb + Pb and proton + proton collisions

In this talk, we study the hydrodynamic collectivity in Pb + Pb collisions at 2.76 TeV and 5.02 TeV and proton + proton collisions at 13 TeV using the iEBE-VISHNU hybrid model. For Pb + Pb collision systems, we use TRENTo and AMPT initial conditions. With properly chosen and turned parameter sets, our model calculations can nicely describe various flow observables in 2.76 TeV and 5.02 TeV Pb + Pb collisions, including 2- and 4- particle cumulant, differential flow, event-by-event distribution, mode-coupling effects. For proton + proton systems, with properly tuned parameters, iEBE-VISHNU hybrid model with HIJING initial condition can describe the measured 2-particle correlations, including integrated and differential elliptic flow and all charged and identified hadrons (K_s^0 , Λ). However, our model calculations shows positive 4-particle cumulant $c_2\{4\}$, and cannot reproduce the negative $c_2\{4\}$ measured in experiment. Further investigations show that to simultaneously describe the 2- and 4- particle cumulant, it is required to have significant improvements on initial condition for p-p collisions.

Summary

Our work focus on the hydrodynamic behavior in proton + proton system, finding the current initial conditions can describe the 4-particle cumulant within the viscous hydro framework, and require to improve the descriptions of the initial state in proton + proton collisions.

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