



Contribution ID: 201

Type: oral

# One fluid might not rule them all

*Wednesday, January 13, 2021 6:10 PM (20 minutes)*

In this talk, we present our recent investigations on hydrodynamic collectivity in high-multiplicity proton–proton collisions at 13 TeV using the VISHNU hybrid model with different initial condition models, called HIJING, super-MC and TRENTo. We find that with carefully tuned parameters, hydrodynamic simulations can give reasonable descriptions of the measured two-particle correlations. However, multi-particle single and mixed harmonics cumulants can not be described by hydrodynamics with these three initial conditions, even for the signs in a few cases. Further studies show that the non-linear response plays an important role in the hydrodynamic expansion of the p–p systems. Such an effect can change  $c_2\{4\}$  from a negative value in the initial state to a positive value in the final state. The failure of the hydrodynamic description of multi-particle cumulant triggers the questions on whether the hydrodynamics can rule all collision systems, including p–p collisions at the LHC.

**Primary author:** SONG, Huichao

**Presenter:** SONG, Huichao

**Session Classification:** CD

**Track Classification:** Collective dynamics from small to large systems