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Hydrodynamic simulations in challenging environments¹

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Relativistic viscous hydrodynamics is an effective description of the bulk dynamics of high energy relativistic heavy-ion collisions. Understanding the collective origin in the high multiplicity pp and pA collisions experiments at Relativistic Heavy-Ion Collider (RHIC) and the Large Hadron Collider (LHC) has been pushing the successful fluid paradigm to its limits. In this talk, I will discuss the current theoretical uncertainties in the hydrodynamic modeling of these small collision systems and highlight recent developments to go beyond hydrodynamics. Furthermore, I will also present the theoretical challenge of describing the bulk dynamics of relativistic heavy-ion collisions at lower RHIC Beam Energy Scan (BES). At those collision energies, the overlapping time for the two nuclei to pass each other becomes comparable to the system lifetime.

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