

## Field redefinition and its impact in relativistic hydrodynamics

*Thursday, January 23, 2025 12:35 PM (25 minutes)*

In this talk, I will explore the impact of field redefinition on the spectrum of linearized perturbations in relativistic hydrodynamics. I show that the spectrum of hydrodynamics modes is never affected by the local field redefinition, however, the spectrum of the non-hydrodynamic modes is affected. Through an appropriate all-order redefinition, non-hydrodynamic modes can be eliminated, leading to a new frame where the spectrum contains only hydrodynamic modes. We also show that the resulting stress-energy tensor may have an infinite series in momentum space, with a convergence radius linked to the eliminated non-hydrodynamic mode. In certain special cases, higher-order terms in the stress-energy tensor under field redefinition may cancel, indicating that non-hydrodynamic modes are mere artefacts of the fluid variable choice and hold no physical significance, even if they appear to violate physical constraints. Using a special toy example, I will give a criterion to distinguish between physical and unphysical non-hydrodynamic modes.

**Primary author:** Dr SINGH, Rajeev (West University of Timisoara, Romania)

**Presenter:** Dr SINGH, Rajeev (West University of Timisoara, Romania)