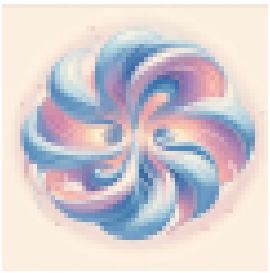

Contribution ID: **34** Type: **Talk**

Non-relativistic transport from frame-indifferent kinetic theory

Friday, July 26, 2024 2:30 PM (30 minutes)

I will present the application of Newton-Cartan geometry to the kinetic theory of gases in gravitational fields. Starting with an introduction to the basics of Newton-Cartan geometry, I will examine the motion of point particles within this framework, leading to a detailed analysis of kinetic theory and the derivation of conservation equations. The equilibrium distribution function will explored, culminating in a practical example involving a rotating gas in a gravitational field. Further, we will develop covariant hydrodynamics equations and extend our analysis through a gradient expansion approach to assess first-order constitutive relations. This allows us to derive the viscous transport for rotating gases in a consistent way. Finally, we will address the frame-dependence paradox, presenting a novel resolution that explains apparent discrepancies in the literature. Our construction resolves a fifty-year-old debate about the frame-indifferent formulation of kinetic theory.

Author: SURÓWKA, Piotr

Co-authors: Dr PEÑA-BENITEZ, Francisco; Mr MATUS, Paweł; Mr BISWAS, Rajesh

Presenter: SURÓWKA, Piotr

Session Classification: Hydrodynamics