Contribution ID: **56** Type: **Talk**

Multi-fluid Radiation Hydrodynamics of Protoplanets

Tuesday, 7 June 2022 16:10 (20 minutes)

The coupling between multi-species dust dynamics and radiative transfer is crucial for the realistic modeling of cold astrophysical environments such as star-forming regions, protoplanetary disks, and exoplanets atmospheres. At low temperatures, dust distribution plays a primordial role in shaping gas opacity, even when the dust mass fraction is negligible. Thus, in this talk, I will present a framework to perform 3D radiation hydrodynamics simulations with opacity based on self-consistent dust dynamics, in local and non-local thermal equilibrium. I will focus on planet formation and introduce recent 3D numerical simulations performed with the multi-fluid code FARGO3D. In particular, I will showcase the regimes where the opacity of the planet envelope deviates from spherical symmetry. Therefore, the envelope thermodynamics may not be trivially cast in 1D models. This is critical to assess the scope of core accretion theory and explain exoplanet demographics.

Primary author: KRAPP, Leonardo (Niels Bohr Institute)

Presenter: KRAPP, Leonardo (Niels Bohr Institute)

Session Classification: Protoplanetary Disks

Track Classification: Protoplanetary Disks