P145a **1: A Fast Accurate Numerical Scheme for Radiation Hydrodynamics: Formation of Low Mass Protostars**

Torsten Stamer, Shu-Ichiro Inutsuka (Nagoya University)

Numerical solutions of the radiation hydrodynamics equations are of great importance in astrophysics. While for extremely optically thin or thick media, approximations such as Newtonian cooling or radiative diffusion can be used, the optically intermediate case remains especially challenging. In this talk, I will present a new method for radiative transfer calculation in spherically symmetric systems. The method is highly accurate in all regimes of optical thickness. Furthermore, we applied our method to the simulation of protostellar collapse. In this scenario, a gravitationally unstable, high-density molecular cloud core collapses under its own gravity, ultimately forming a protostar. This is a case where the optical thickness changes drastically during the course of the simulation. We are especially interested in the formation scenario of Brown Dwarfs. Given their low mass, the molecular cloud cores that ultimately form Brown Dwarfs must have extremely high densities (on the order of $\frac{10^8}{cm^3}$) in order to be Jeans-unstable. Such high-density clouds cannot be observed since there is no tracer molecule with a critical density around this value. This lack of observations makes numerical simulations especially valuable. I will discuss the properties of the objects created in our simulation, and the necessary conditions for their formation.