

Poster: Hybrid Radiative Transfer Method for Prestellar Isolated Core Collapse

- Raphaël Mignon-Risse

In the context of numerical simulations of massive star formation, the treatment of radiative transfer has a non-negligible impact on the launching of outflows, on the accretion and hence on the final mass of the star. In particular, as a consequence of grey radiative transfer (opacities averaged over the whole frequency domain), the opacity corresponds to frequencies related to the disk blackbody temperature despite the fact that some photons were emitted at the star temperature and therefore at a different frequency. This can imply a radiative force underestimated by a factor of a few hundreds, in the case of an isolated star irradiating a disk. We investigate the consequences of a frequency-dependent radiative transfer method. We take advantage of the multigroup approach added to the magneto-hydrodynamical code, RAMSES (Teyssier 2002, Gonzalez et al 2015), and we develop a method based on a specific treatment of stellar irradiation. The first group is made of stellar photons and the second group is made of the rest of the photons. The purpose is to mimic the UV-like stellar radiation and the infrared-like disk radiation. After comparing this method to static benchmark tests of a disk irradiated by a star (Pascucci et al 2004, Pinte et al 2009, Kuiper et al 2010, Kuiper & Klessen 2013), we apply it to prestellar core collapse simulations. We investigate the differences in the disk and outflows characteristics and the final mass of the star.

Cores and embedded objects