Planet formation with the ELT : detection of embedded planets

In the context of the forthcoming giant telescopes, accessible probed resolutions will soon be greatly upgraded, unveiling the very inner separations of stellar systems. It is reasonable to wonder to what extent the science in young stellar systems will benefit from these revolutionizing facilities, particularly regarding the detection of forming exoplanets or the characterization of their host disks.

To adress this question, I performed full radiative transfer simulations of a typical young stellar system using the MCFOST code. The model consists in a young Sun-like star surrounded by a face-on disk in which a gap is carved by a planet. I built realistic synthetic observations of this model using coronagraphic image sequences of the instruments HARMONI and MICADO/MORFEO. I simulated the available RDI/ADI modes of these instruments in the Near-InfraRed bands.

From there, I derived detection limits of the ELT instruments as a function of the planet parameters luminosity and separation. I showed that the environing disk material significantly complicates the detection of embedded planets. Knowing the optical depth is a function of the disk inclination, I finally scaled the previous results to any inclined system.