Circumstellar Disk Evolution, Clump Formation, and its Effects on Planet Formation

Shantanu Basu (UWO), Eduard I. Vorobyov (Vienna)

I review several published works on the self-consistent formation and evolution of circumstellar disks, resulting from the collapse of a prestellar core. Our models reveal a scenario in which recurrent gravitational instability (driven by accretion from the core envelope) leads to clump formation, inward migration, and a series of luminosity bursts in the early evolution of circumstellar disks. Interestingly, some clumps may clear a gap and settle into a stable orbit, leading to low mass (sub-)stellar or gas giant planet companions. Other clumps may be ejected from the system entirely, and can explain the occurrence of free-floating brown dwarfs. Finally, I discuss the possibility of even terrestrial planet formation within migrating clumps, in a hybrid of the classical core accretion and gravitational instability paradigms.