TRACING THE EVOLUTION OF DUST IN PROTOPLANETARY DISKS – THE FIRST STEPS OF PLANET FORMATION. I. Oliveira[1], K. Pontoppidan[2], E. van Dishoeck[3], and B. Merín[4], [1] The University of Texas at Austin (oliveira@astro.as.utexas.edu), [2]Leiden University, [3]STScI, [4]ESAC/ESA.

Introduction: The origin of the Solar System and other planetary systems is in the process of being unveiled due to crescent number of observations of protoplanetary disks (the birthplace of planets), as well as extra-solar planets [1, 2, 3, 6, 7]. While protoplanetary disks are a natural consequence of the formation of stars, the formation of planets within disks is not. How planets form in protoplanetary disks, and which mechanisms play a role in the process are not yet clear. What is clear is that planet formation is a rather common output of the evolution of protoplanetary disks, evidenced by the hundreds of planets already discovered [1, 2, 7].

The last decade has seen an incredible advance in the field of protoplanetary disks and planet formation, aided by new instruments such as the *Spitzer Space Telescope*. Observations have shown disks initially to be good mixtures of dust and gas, flared and extending several hundreds of astronomical units in radius. During its evolution, several physical and chemical processes take place within disks, modifying the dust into possibly complex planetary systems such as our own. Direct observations of protoplanetary disks spanning a wide range in wavelengths (and therefore probing different processes and regions in the disk) and evolutionary stages can shed a light on the progression of planet formation.

Results and discussion: I will present the results from my PhD thesis, which focused on unbiased surveys of low-mass young stars and their dusty disks in nearby star-forming regions using optical/infrared telescopes to probe the evolution of dust in protoplanetary disks. It addresses the full star-disk system: the stellar characteristics and their effect on disk evolution, as well as the changes taking place in the dust itself, by making use of statistically relevant samples [4, 5, 6].

Spitzer IRS mid-infrared (5-35 μm) spectra of a complete flux-limited sample of YSOs selected on the basis of their infrared colors in the young Serpens Molecular Cloud are presented. The presence, strength, and shape of different spectral features are used to infer dust properties and mineralogy for these systems, such as composition, crystallinity and grain size distribution. Additionally, the mid-infrared slope is used as a proxy for the geometry of the protoplanetary disks. The results for the disks in Serpens are compared to those in other star-forming regions with a range in median ages and environments in order to trace the evolution of dust on a bigger scale. These results inform us on the timescales and mechanisms to form giant planets and are ultimately put in context with the characteristics of our own Solar System and the new exoplanetary systems being discovered around other stars.

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