Constraining the dust grain size distribution in protoplanetary disks with ALMA and JVLA observations

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Observations at millimetre and submillimetre wavelengths allow us to probe the solids on the disk midplane where the bulk of the material is located and where planets are expected to form. The distribution of dust grain sizes in different regions of a protoplanetary disk is a powerful probe of the physical mechanisms related to grain growth and ultimately on how solids can overcome the various growth barriers on the way to form planetesimals and planetary cores. The upgraded VLA (JVLA) and, especially, the ALMA observatories provide now powerful tools to resolve grain growth in disks, but they also provide huge datasets that require new and more efficient methods of data analysis.

In my contribution, I will present a novel approach that enables to infer the dust properties in protoplanetary disks by fitting (sub-)mm interferometric observations at several different wavelengths. I will discuss the advantages of this “forward-fitting” procedure that allows to constrain simultaneously the properties of both the dust and the disk, i.e. the radial distribution of dust grain sizes and the disk surface density. I will illustrate the results of applying this new method to a sample of young protoplanetary disks and the planned future development of this analysis.