Dust grains properties in protoplanetary disks from multi-wavelength observations

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Protoplanetary disks are formed as an outcome of angular momentum conservation during the collapse of molecular cloud cores, and regulate the accretion of material onto the forming star. In the past decade, significant advances have been made in characterizing the dust and molecular gas components of disks, thanks to new observing facilities operating from optical to millimeter range, such as ALMA, VLA, VLT, JWST.
These revealed a variety of structures in the dust and gas emission, in particular rings and gaps, but also spiral arms and clumps, revealing the presence of local processes that are perturbing the disk dynamics already at very early stages (~1 million years).
I will discuss how our view of dust properties and evolution in disks has changed in the last few years thanks to multi-wavelength studies at unprecedented angular resolution, and how these studies have revealed more complex morphologies and mass distribution in disks that previously thought. Also, I will show how the dust emission can help us constraining the dynamical instabilities shaping the disk morphology.
I will focus mainly on radio millimeter observations, and present new observations from the ALMA Large Program DiskStrat, focusing on edge-on disks and the study of disks vertical structure. I will also highlight synergies with infrared and optical studies, as well as laboratory experiments that aim to measure dust optical properties.

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