The scattering properties of exocometary dust: from observations to interpretations with lab experiments

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Abstract:

The advent of optical/near-infrared high-contrast imagers such as VLT/SPHERE opened up the perspective to extract the scattering phase function and polarisation fraction from observations of debris disks. Scattered light observations are sensitive to the micron-sized dust particles produced by collisions between planetesimals in those belts. Under favourable inclination, the phase function can be extracted over a wide range of scattering angles, providing powerful diagnostics on the size distribution, shape and composition of the dust particles [1].
This requires however high-quality and high signal-to-noise observations, therefore few phase functions or polarisation measurements are currently available. We will here review the progress done in this field by comparing the scattering properties already extracted on debris disks, and we will present the phase functions of two new debris disks. We will highlight the limitations of the Mie theory to reconcile the scattering properties with the other constraints on the dust, especially the spectral energy distribution. To progress in this area, we initiated a collaboration funded by the PNP between observers of disks, solar system objects and experimentalists to share our knowledge and tools. We propose here to show the first outcomes of this collaboration, to compare the scattering properties with solar system dust particles (zodiacal cloud, comets and asteroids) [2] and present our project to measure experimental phase function of cometary analogs with various facilities: PROGRA2 [3], SHADOWS [4] and microwave analogies [5].

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