Infrared absorption of dust of meteorites from the Atacama Desert

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Dust particles are the dominant source of opacity at infrared and (sub)millimeter wavelengths. While accurate dust opacities are crucial for modeling disks properties, their estimation is highly uncertain in this regime: dust opacities values used in models are mostly extrapolations in wavelength and grain sizes. In order to tackle this problem and resolve these caveats to help the astronomical community to make the most of the revolutionary JWST and ALMA observations, we have established the UDP Cosmic Dust Laboratory, the first one of its kind in Chile and Latin-America. We have started operations working on infrared measurements of meteorites from the Atacama Desert, planning to extend our opacity measurements to the submillimeter regime.

Meteorites are the best analogs of the type of dust expected in protoplanetary and debris disks, and the most accessible samples from the Earth to study in the laboratory. The semiarid to hyper arid climates of deserts allows preservation and accumulation of meteorites. Being the driest desert in the world, the Atacama Desert shows an exceptional meteorite concentration per km^2 that has remained hyper-arid for several Myr and has preserved meteorites for a long time with a very low erosion rate and slow chemical weathering.

In this first study, we present the measurements of absorbance spectra and dust opacities of 23 meteorites, 3 carbonaceous and 20 ordinary chondrites (types H, L and LL) from the Atacama Desert. We correlated their infrared spectra (2-23 microns) with chemical composition and the grain size distribution (Batalla-Falcon et al., to be submitted to Icarus).