

Mapping the evolution of dust particles in the Cold ISM

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The evolution of dust particles in the Cold ISM (CISM), from diffuse interstellar clouds ($A_V < 0.1$) to dense molecular cores ($A_V > 3$) is thought to result from accretion, coagulation and shattering processes. We will review current observations allowing the characterization of these evolutionary processes, essentially from IRAS, COBE, ISO and SPM-PRONAOS data. We will show that, because of the lack of spectral coverage combined with spatial resolution, these observations only give a fragmented description of the major physical processes.

We will discuss the unprecedented mapping capabilities of the two instruments PACS and SPIRE which will offer an unique opportunity to study the evolution of the dust particles in the CISM. Moreover the combination with SIRTf data (more than 50 square degrees will be mapped in the CISM, from 3.6 to 160 microns) will constitute an unique database in terms of the number of resolution elements and wavelength coverage. For the first time, the Spectral Energy Distribution from 3.6 to 600 microns will be measured in individual structures of the CISM. It will give strong constraints on the size distribution of small dust particles and the emission properties of the large grains in thermal equilibrium with the radiation field.