Dust properties in Galactic Cold Cores: intensity and polarization

I.Ristorcelli[1], M.Juvela[2] on behalf of
the *Galactic cold cores* collaboration

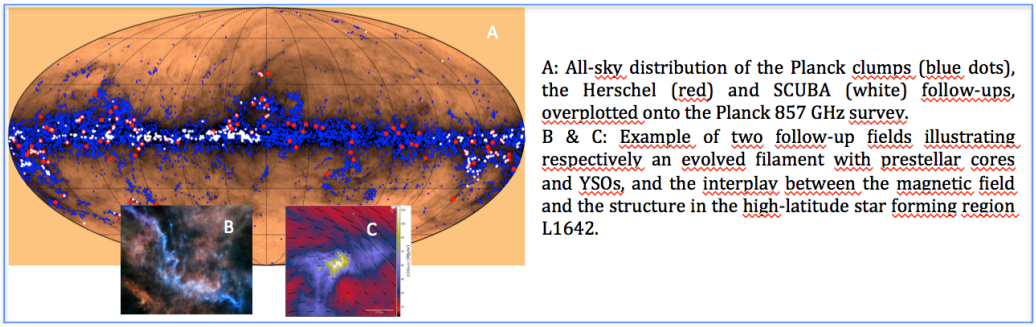
[1] *IRAP, Université de Toulouse, CNRS, UPS, CNES, Toulouse, France*

[2] *University of Helsinki, Department of Physics, Finland*

The Planck satellite provided the first all-sky survey of the interstellar medium with a sensitivity, wavelength coverage and resolution well suited to detect cold clumps at arc minute scales. This survey allowed us to build a catalogue of more than 13000 sources [1], covering a wide range of Galactic environments and physical conditions, and making this sample unique for statistical investigation of star formation in the Milky Way. In the Galactic Cold cores program, the properties of the Planck clumps are being investigated with data from various follow-up surveys, including higher angular resolution continuum data (Herschel key programme, SCUBA-2 legacy program, NIKA) and molecular spectroscopy of dense-gas tracers (IRAM, Effelsberg, TRAO, etc.).

We have investigated the dust emissivity variations indicative of processes like grain growth [2,3,4], the filament characteristics with links to the environment [4,5], and the physical clumps and cores properties (morphology, mass, size, temperatures, evolutionary stage) [6, 7]. In parallel, the Planck dust polarized emission has allowed us to analyse the magnetic field morphology in the clump environment and to study its interplay with structures such as filaments and striations [8,9]. We also have performed a statistical study of the polarization fraction variations and their column-density dependence, discussing their origin in terms of magnetic field geometry and grain alignment efficiency [10].

I will review the main results of these analyses, focusing on dust properties in intensity and polarization, and present our perspectives for future studies.



A: All-sky distribution of the Planck clumps (blue dots), the Herschel (red) and SCUBA (white) follow-ups, overplotted onto the Planck 857 GHz survey.
B & C: Example of two follow-up fields illustrating respectively an evolved filament with prestellar cores and YSOs, and the interplay between the magnetic field and the structure in the high-latitude star forming region L1642.

References

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