Statistical properties of cold cores from the Galactic Cold Cores programme

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The Galactic Cold Cores project [1] aims at investigating the connections between star formation and the physical properties of a population of cold interstellar clumps first identified with the Planck satellite, and further observed in the far infrared domain with the Herschel Space Observatory (with PACS and SPIRE instruments, from 100 to 500 microns). As many as 112 different fields were observed so far, enabling to compare core properties as a function of numerous parameters including for example the field morphology or total mass.

We extracted the compact sources from SPIRE images using the multi-scale, multiwavelength source-finding algorithm GETSOURCES [2], and determined their main physical properties (elongation, mass, peak column density, dust temperature, ...). The large amount of extracted sources (>~1000) enables the analysis of the statistical distributions of these quantities. I will discuss some correlations between these quantities as well as with the properties of the fields that host the sources.

Additional information concerning the star formation activity of each field was derived using complementary data at shorter wavelengths. Images from the Wide-field Infrared Survey Explorer (WISE) at 22 microns were combined with PACS 100 microns maps to build a catalog of potential young stellar objects (YSOs) and classify the cold cores detected at longer wavelength as starless or protostellar cores.

The field distance is a crucial quantity as the most relevant physical characteristics of cores depend on it. I will therefore also discuss the method we used in Helsinki to provide new distance estimates for a large fraction of the fields. In addition, the effect of distance on this study, from the source extraction reliability, to the uncertainty on the physical quantities, to the biases on the statistical distributions, is overwhelming. We addressed these aspects using artificial maps to which we apply the same analysis tools that we used for Herschel maps. I will present the insights that one can obtain from such a study and critically discuss the statistical results derived from observations.

[1] M. Juvela, I. Ristorcelli, L. Pagani, *et al.*, *Astronomy and Astrophysics* **2012**, in press.
[2] A. Men'shchikov, Ph. André, P. Didelon, *et al.*, *Astronomy and Astrophysics* **2012**, in press.