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CHARACTERIZING INTERSTELLAR FILAMENTS AS REVEALED BY THE *HERSCHEL* GOULD BELT SURVEY: INSIGHTS INTO THE INITIAL CONDITIONS FOR STAR FORMATION

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SAp

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Salle Galilée – bât 713

I will present and discuss the implications of the main results obtained during my PhD thesis carried out at CEA/AIM/Saclay and supervised by Ph. André. My work has been focused on characterizing the physical properties of interstellar filaments imaged in nearby molecular clouds with the *Herschel* Space Observatory as part of the Gould Belt survey.

The high quality and high dynamic range of the *Herschel* SPIRE and PACS images, has revealed the ubiquity of filaments in the interstellar medium. The omnipresence of filamentary structures in non-star-forming clouds as well as in active star forming regions indicates that filament formation precedes any star formation activity. Moreover the correlation between the spatial distribution of prestellar cores and the filamentary structures of the clouds suggests that filaments may give the initial conditions for star formation.

In order to get insights into the formation and evolution of interstellar filaments I studied in details the properties of the radial column density profiles of a large sample of filaments detected in several nearby clouds. A surprising result of this analysis is the remarkably uniform central width of ~0.1 pc shared by all the filaments, while they span more than three orders of magnitude in central column density.

This characteristic width of interstellar filaments may originate from their formation process, possibly related to the dissipation of large-scale turbulence in the cold interstellar medium. Follow-up molecular line observations with the IRAM 30m telescope, show an increase in the non-thermal velocity dispersion of the densest filaments as a function of their central column density. This suggests that gravity is a major driver in the subsequent evolution of the dense, self gravitating filaments which grow in mass per unit length by accretion of background material while at the same time fragmenting into star-forming cores.