



# Report from the event supported by RadioNet

**TITLE** *GALACTIC COLD CORES MEETING*

**DATE:** *4-7 JUNE 2018*

**LOCATION:** *OBSERVATORY OF BESANÇON, BESANÇON, FRANCE*

**MEETING WEBPAGE:** [HTTP://WWW.INTERSTELLARMEDIUM.ORG/BESANCON2018/](http://www.interstellarmedium.org/besancon2018/)

**HOST INSTITUTE:** *INSTITUT UTINAM AND OSU THETA*

**RADIONET  
BENEFICIARY / NO:** *OSO / 7*

# Report:

## 1. SCIENTIFIC SUMMARY

This Galactic Cold Cores (GCC) meeting aimed at gathering the members of the GCC collaboration to share their recent results and on-going projects, and discuss the future projects to be developed together by members of the collaboration. A special focus on the capabilities of some RadioNet facilities was enabled by the **invitation of the IRAM experts Jérôme Pety and Charlotte Vastel**, thanks to the RadioNet financial support, and the **participation of the Effelsberg expert Viktor Toth**.

The GCC collaboration investigates the early phases of star formation, addressing the respective roles of gravity, dynamics, turbulence, magnetic field and chemistry, as well as the impact of environment on their interplay.

The role of magnetic fields was discussed during the first session about polarisation through eight normal and remote presentations. On-going case studies and statistical studies were presented based on Planck, PILOT, and SCUBA-2 data. One important result obtained on cloud and clump scales is the trend of the magnetic field to be parallel to low-density structures, but perpendicular to dense ones. On smaller, core scales, it was shown by stacking core polarisation maps that polarization decreases about the centre of the cores, as expected from simulations of starless cores. However the expected increase in polarisation at the very centre of protostellar cores could not be evidenced from the present data set. The session lead to shaping a **proposal for NIKA2 observations at the IRAM 30m telescope** to pursue these studies.

The second session was about the dynamics of star forming clouds where magneto-hydrodynamics (MHD) simulations and millimetre observations were presented. **Jérôme Pety presented the main results of the Orion B large programme at the IRAM 30m telescope**, providing a valuable reference for the GCC millimetre studies in terms of filament characterization and for the choice of molecular tracers to best probe the density structure. Case studies of selected GCC targets **based on the IRAM 30m, the Effelsberg 100m**, and Nobeyama 45m telescopes were presented on candidate colliding filaments and a double core. It was noted that the next steps need (i) to increase the statistics of dynamical studies by adding new targets in our sample and (ii) to further investigate the impact of the environment on the cloud dynamics by enlarging the spatial coverage of observations.

The third session was dedicated to presenting results of the TOP-SCOPE collaboration, which includes many GCC members, and shares common interests with the GCC collaboration. The collaboration was particularly interested in statistical studies including **NH<sub>3</sub> observations at the Effelsberg 100m telescope** which revealed the low temperature, high density, and stability of the cores studied.

The forth session was fully dedicated to the future follow-up projects. The discussion was fed by three opening presentations: (i) Jérôme Pety informed us about the recent and upcoming **developments of IRAM facilities**; (ii) Charlotte Vastel introduced us to the questions on complex organic molecules and how **IRAM facilities** and the cloud sample of the GCC collaboration could be used to address those questions; (iii) Viktor Toth emphasized the importance of a good characterization of Galactic foreground for extragalactic studies, and how useful for star formation studies can be such a characterization.

Large scale modeling of the Milky Way was discussed in the fifth and last session, as an opening to the study of the impact of Galactic environment on star formation.

The meeting was successful to diffuse the information about IRAM present and future capabilities within the GCC collaboration, including members who were not yet familiar with these facilities. Several young researchers, including PHD students from France, Hungary, and Finland, as well as Dana Alina, a post-doc from Kazakhstan, were introduced to IRAM capabilities and will be involved and/or lead proposals shaped during the meeting. This includes one proposal for NIKA2 observations on the IRAM 30m telescope by Dana Alina, and one proposal by Rebeka Bögner (PHD cotutelle between Hungary and France) for EMIR, in preparation for the upcoming multi-beam receiver on the 30m telescope.

The event webpage: <http://www.interstellarmedium.org/Besancon2018/>

## 2. AGENDA OF THE EVENT

### Monday 4th of June

09:00-09:30		Welcome
	<b>Polarisation</b>	
09:30-10:00	Mika Juvela / University of Helsinki, department of Physics / Finland	Polarisation towards the massive filament G35.39-0.33
10:00-10:30	Isabelle Ristorcelli / IRAP / France	Planck polarization properties of PGCCs : statistical analysis of the polarization fraction
10:30-10:50	Vincent Guillet (remote) / IAS / France	Methodology for polarization data analysis learnt from Planck: Bias, depolarization, background contamination
10:50-11:20	☕	Coffee break
11:20-11:50	Dana Alina (remote) / Nazarbayev University, Department of Physics / Kazakhstan	<a href="#">Statistical analysis of the interplay between magnetic fields and filaments hosting PGCCs</a>
11:50-12:20	Ludovic Montier and Jean-Sébastien Carrière (remote) / IRAP / France	<a href="#">Optimization of the SUPRHT method for the Planck-Herschel analysis of the interplay between filamentary structures and magnetic field</a>
12:20-14:00	🍽️	Lunch
14:00-14:30	Jean-Philippe Bernard / IRAP / France	<a href="#">PILOT</a>
14:30-15:00	Veli-Matti Pelkonen / University of Helsinki, department of Physics / Finland	<a href="#">Polarization simulations of cloud cores</a>
15:00-15:30	Elisabetta Micelotta / University of Helsinki, department of Physics / Finland	<a href="#">Polarization studies on MHD simulations of molecular clouds - comparison between different approaches</a>
15:30-16:00	☕	Coffee break
16:00-16:30	Sandor Pinter / Eötvös Lorand University / Hungary	The Herschel-SPIRE Point Source Catalog -- photometry, pointing and validation
16:30-	David Cornu / UTINAM and CNES	<a href="#">Classification using Machine Learning</a>

17:00 / France  
**Dynamics**  
 Paolo Padoan / University of  
 17:00- Barcelona, department of  
 17:30 astronomy and meteorology /  
 Spain

[Origin of massive stars](#)

## Tuesday 5th of June

### Dynamics (continued)

09:00- Jerome Pety (invited) / IRAM /  
 10:00 France  
 10:00- Mika Saajasto / University of  
 10:30 Helsinki, department of Physics /  
 Finland  
 10:30- ☕  
 11:00 Daniel Molnar / University of  
 11:30 Sussex / England  
 11:30- Julien Montillaud / UTINAM /  
 12:00 France  
 12:00- 🍽️  
 14:00

The Orion B project

[A stellar cluster in formation - filamentary inflow induced by colliding filaments](#)

Coffee break

[Double core of G163.82-8.44](#)

[The dynamics of the Mon OB1 star forming region](#)

Lunch

### PGCC follow-ups

14:00- Tie Liu / KASI / South Korea  
 14:30 Ken'ishi Tatematsu (remote) /  
 14:30 National Astronomical Observatory  
 15:00 of Japan and Nobeyama Radio  
 Observatory / Japan  
 15:00- David Eden (remote) / Liverpool  
 15:30 John Moores University,  
 Astrophysics Research Institute /  
 England  
 15:30- ☕  
 16:00 Orsolya Feher / Eötvös Lorand  
 16:30 University / Hungary  
 16:30- Rebeka Bogner / Eötvös Lorand  
 17:00 University / Hungary  
 17:00- Mate Krezinger / Eötvös Lorand  
 17:30 University / Hungary  
 19:30- 🍽️🍽️🍽️

The TOP-SCOPE survey and other follow-up observations of Planck Galactic Cold Clumps

[Nobeyama 45 m Telescope Follow-up to the SCOPE Survey](#)

[SCOPE: A JCMT survey of PGCCs](#)

Coffee break

[NH3 follow-up observations of PGCCs - a diverse sample of 100 dense cores](#)

[The TOP200 sources](#)

CO survey and estimating the external pressure of Planck Cold Cores

Dinner: [Café Café](#), 36 Rue Claude Pouillet

## Wednesday 6th of June

### Towards future follow-ups


09:00- Jerome Pety (invited) / IRAM / France  
 09:30  
 09:30- Charlotte Vastel (invited) / IRAP /  
 10:30 France  
 10:30- ☕  
 11:00  
 11:00- Viktor Toth / Eötvös Lorand University

[Last news from IRAM](#)

[Prestellar cores: what can be learned from spectral surveys](#)

Coffee break

[Resolving the fine structure of the Galactic interstellar](#)

11:30	/ Hungary	<a href="#">medium with ATCA HI 21cm measurements</a>
11:30-12:00	Discussion	
12:00-14:00		Lunch
14:00-16:30	Small group discussions...	... or free time

### Thursday 7th of June

#### The Galaxy

09:00-10:00	Annie Robin (invited) / UTINAM / France	<a href="#">The Besançon Galaxy model</a>
10:00-10:30	Douglas Marshall / CEA and University Paris Diderot / France	Using extinction to map the Milky Way in 3D
10:30-11:00	Julien Montillaud / UTINAM / France	Modelling the dust emission of the Milky Way

### 3. PARTICIPANTS

The 20 participants came mostly from France, Hungary and Finland, but a few also came from England, Spain and South Korea. Thanks to visioconference we also worked with remote participants from France, Hungary, England, Kazakhstan, and Japan. Nine (9) young researchers participated to the meeting, including 2 master students and 5 PHD students. There was 8 women, corresponding to 40% of the participants. The invited experts were:

- Charlotte Vastel (IRAP, France, RadioNet support), expert in astrochemical observations using the IRAM facilities;
- Jérôme Pety (IRAM, France, RadioNet support), expert in characterization of interstellar clouds using the IRAM facilities;
- Annie Robin (UTINAM, France), expert in modeling the Milky Way.





#### 4. RADIONET FINANCIAL CONTRIBUTION

- *Please describe the how the financial support from RadioNet was used and provide a list of the supported participants (including their nationality).*

The financial support was used to provide food and drinks for lunch (491,70 €) and coffee breaks (141,73 €), and to support the invitation of Jérôme Pety (IRAM, France), and Charlotte Vastel (IRAP, France).

#### 5. PUBLICATIONS

- *In case of future publication - please provide additional information: place & date. Remember to insert the acknowledgment of the RadioNet support:*

*The project leading to this publication has received funding from the European Union's Horizon*

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