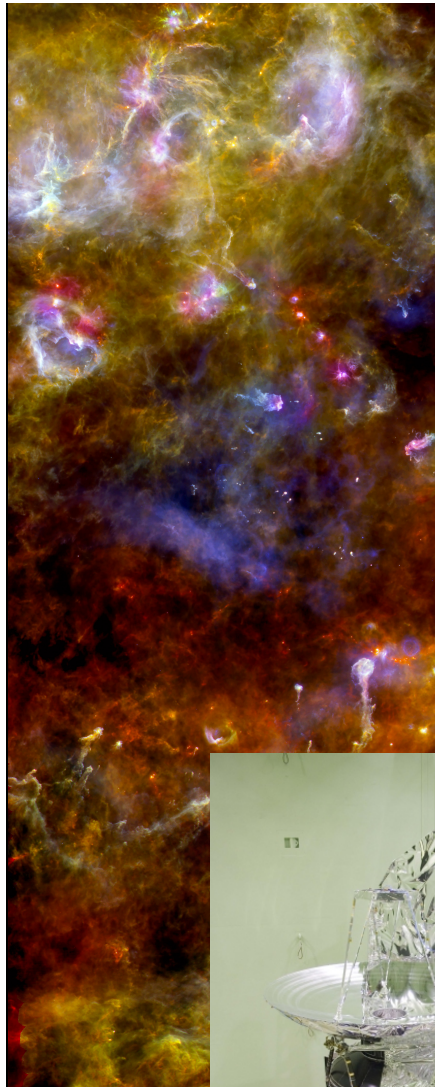


GENESIS* – Origin of dense gas to form stars

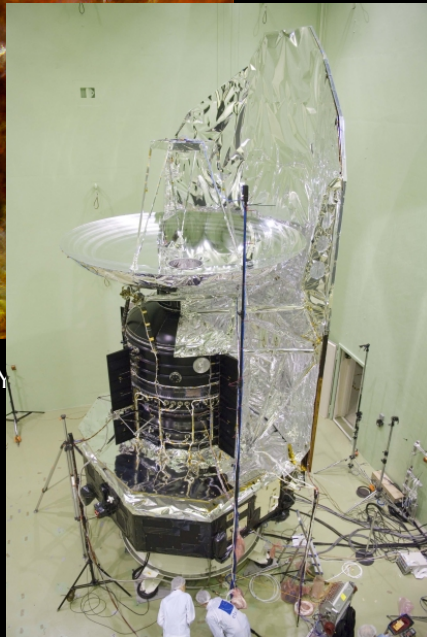
The new frontier for star formation is in understanding not only how the ISM builds up molecular clouds, but also which processes generate star-forming high density regions and what are their properties.

France-Germany / ANR - DFG

*GENeration and Evolution of Structures in the InterStellar medium



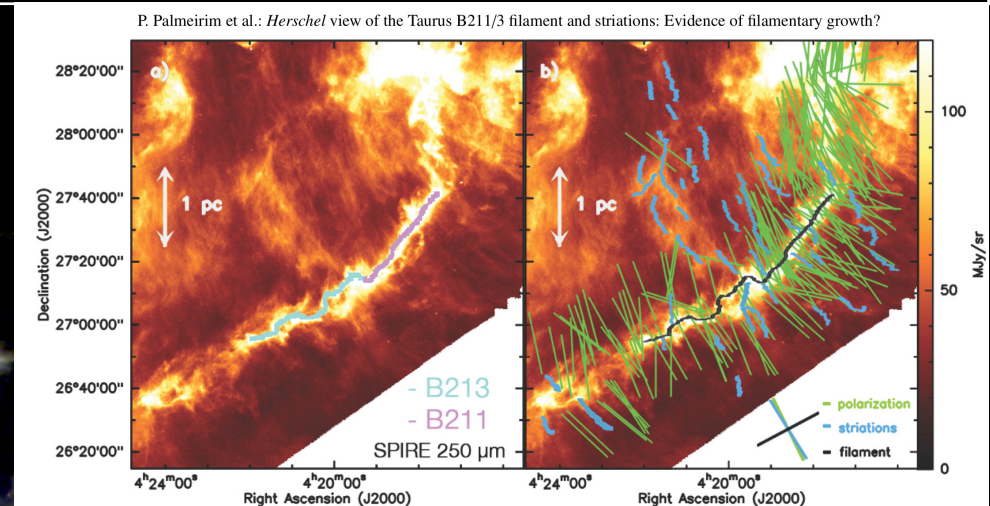
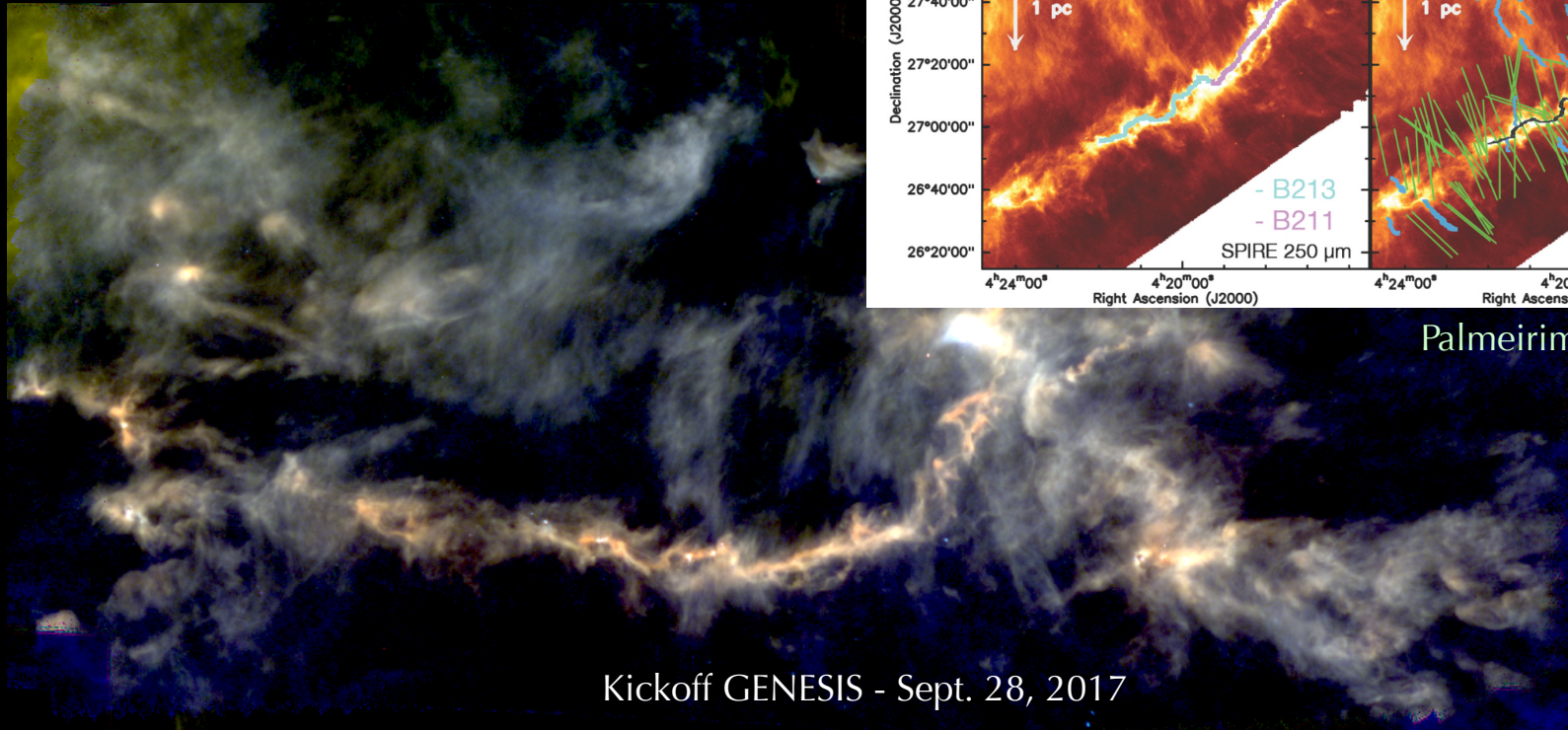
Herschel HOBY
70 - 500 μm



Low-mass stars

The filament paradigm

- Stars form mostly in super-critical filaments.
- Jeans fragmentation in low turbulence gas.

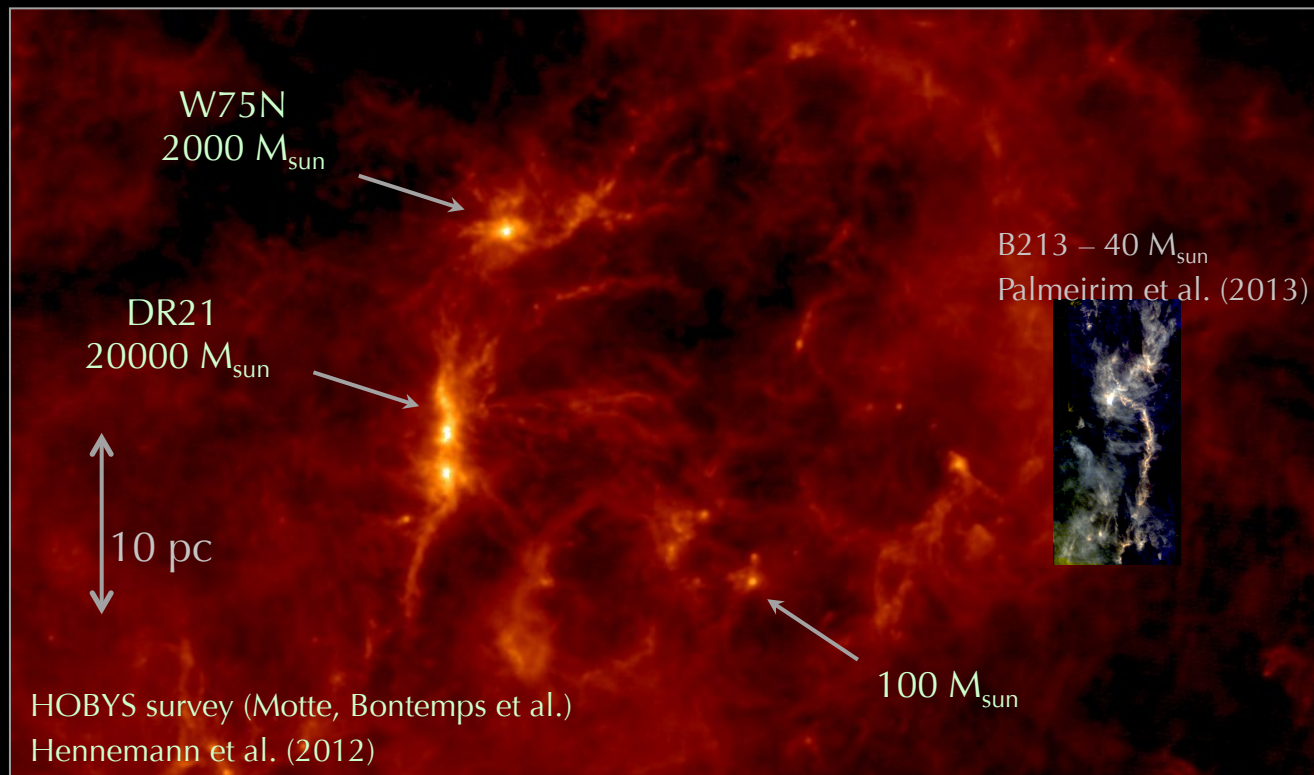


Palmeirim et al. 2013

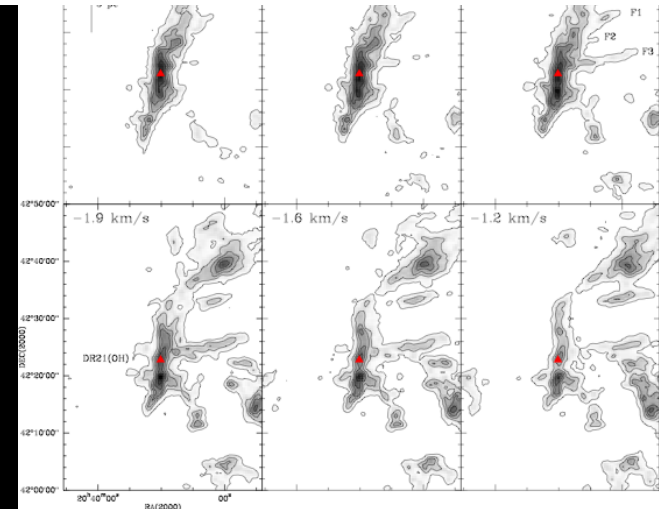
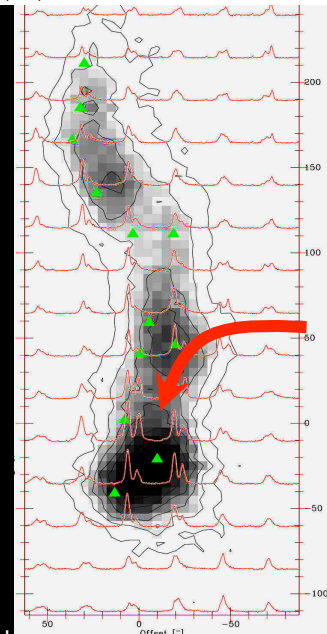
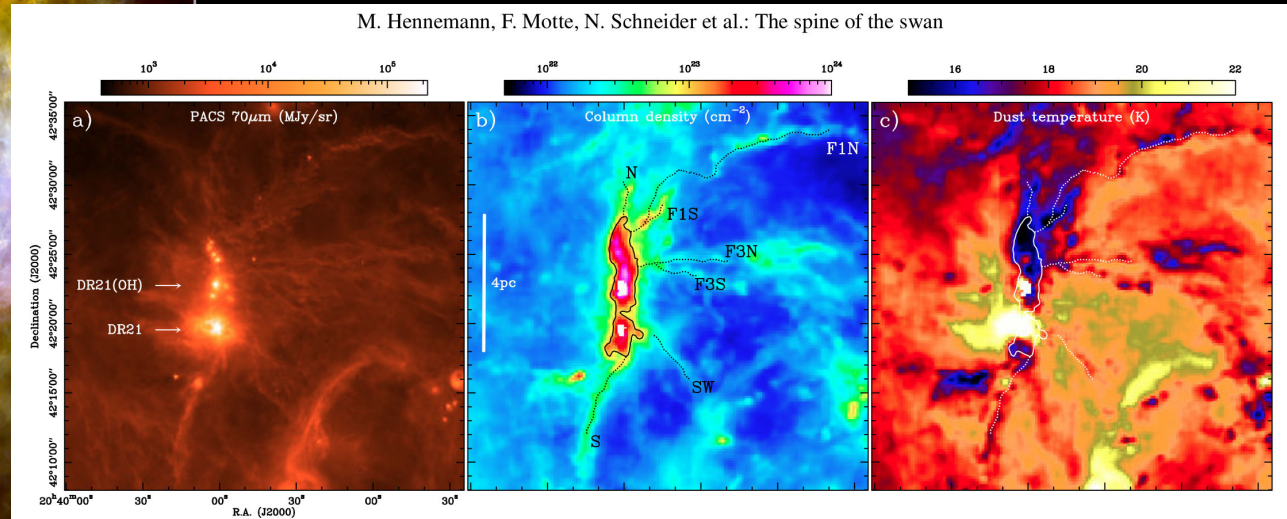
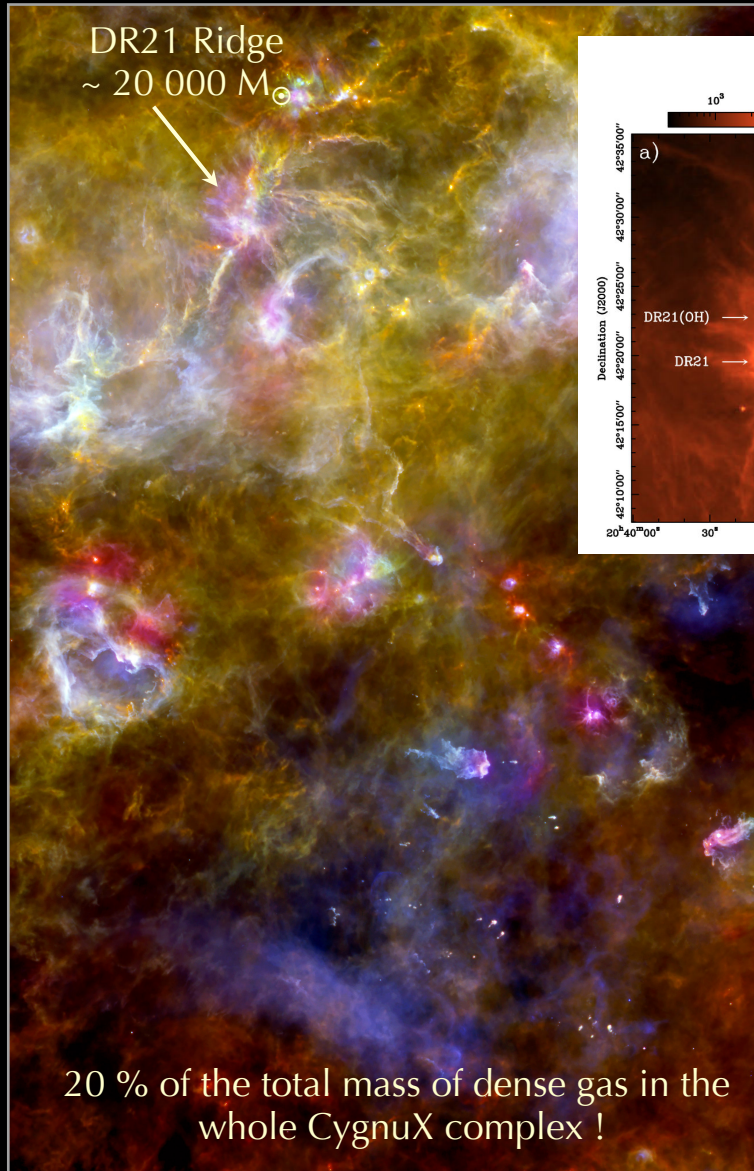
High-mass stars / clusters

Ridges are elongated massive, dense structures

- 2 – 3 orders of magnitude more massive/dense.
- In large-scale collapse?

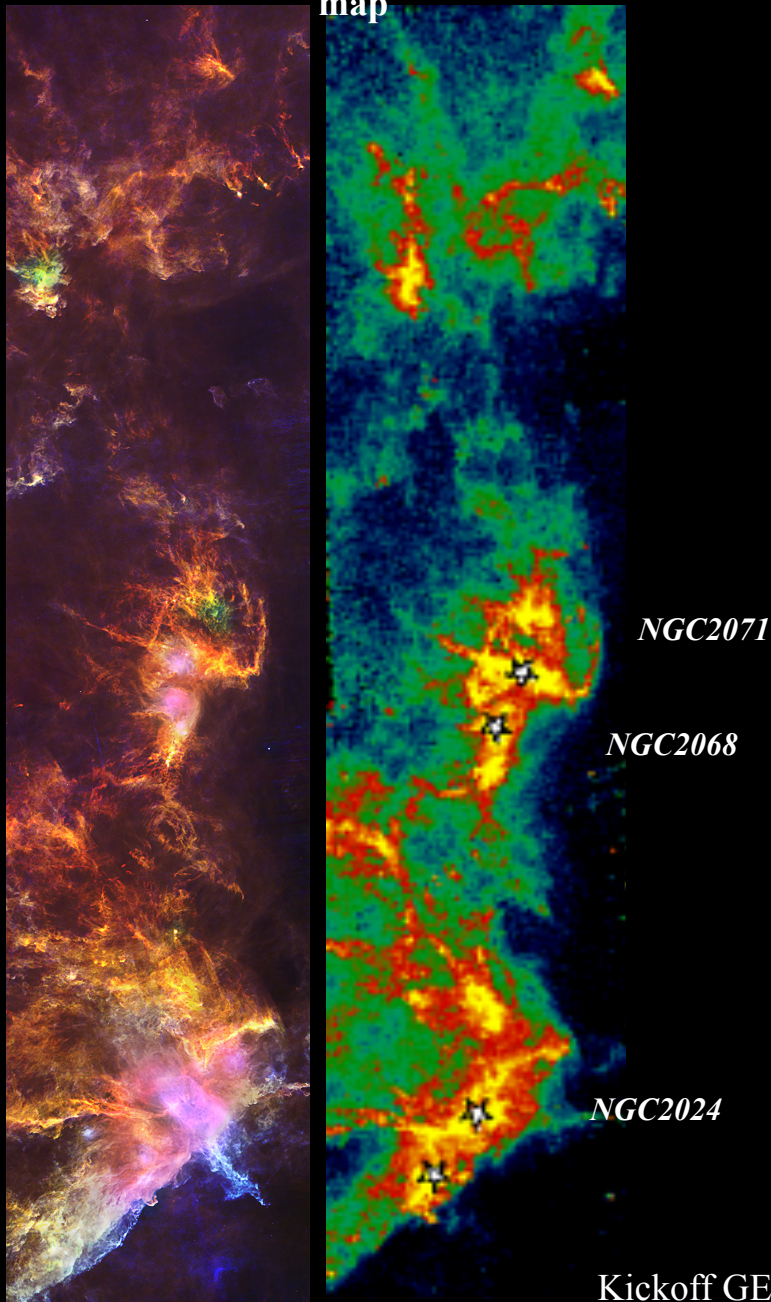


Since 2010: Importance of the dynamics



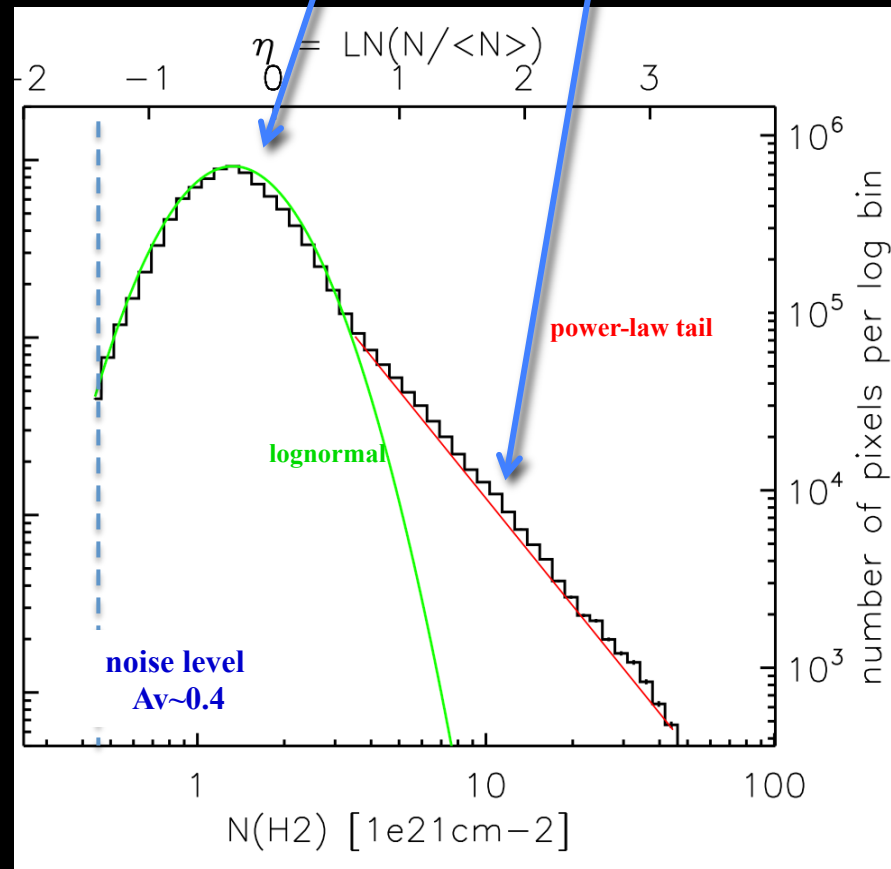
Schneider et al. (2010),
Hennemann et al. (2012).

Herschel 3 color image + column density map



Origin of the structuration

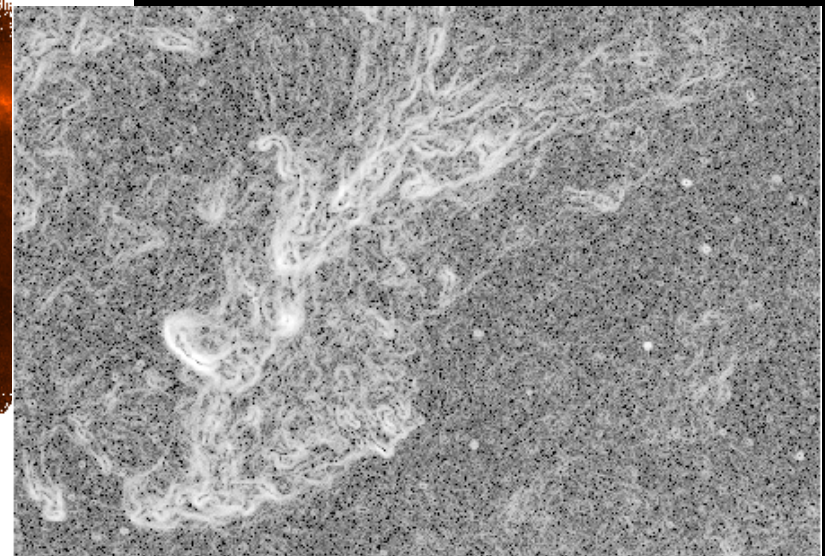
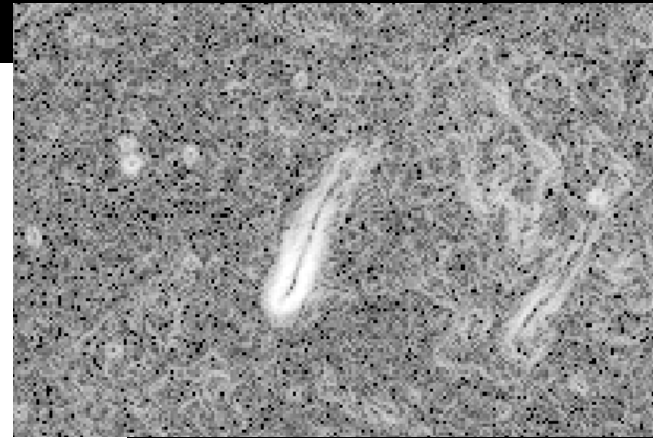
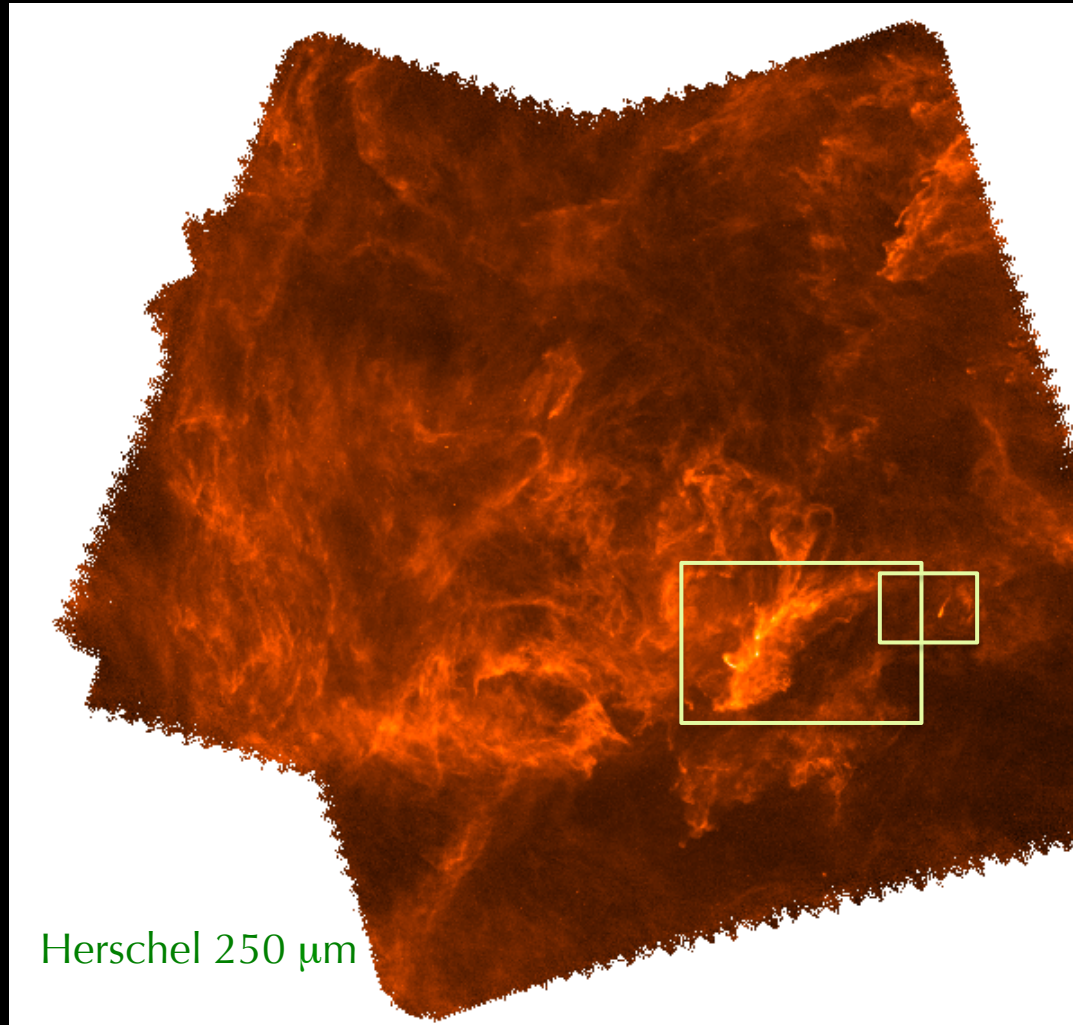
Turbulence + Gravity?



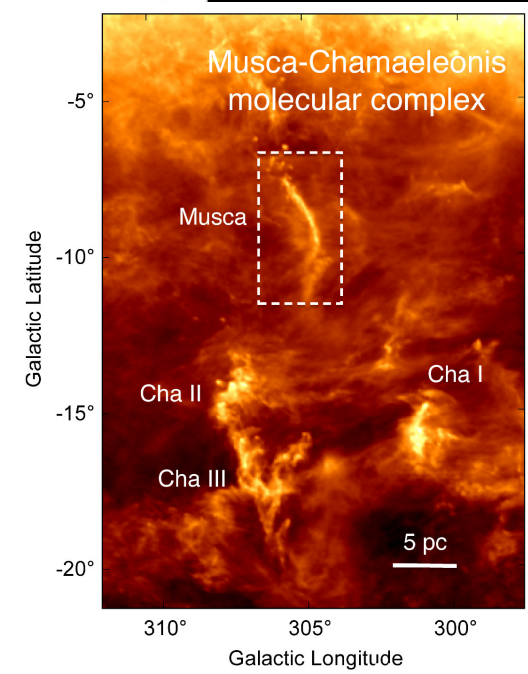
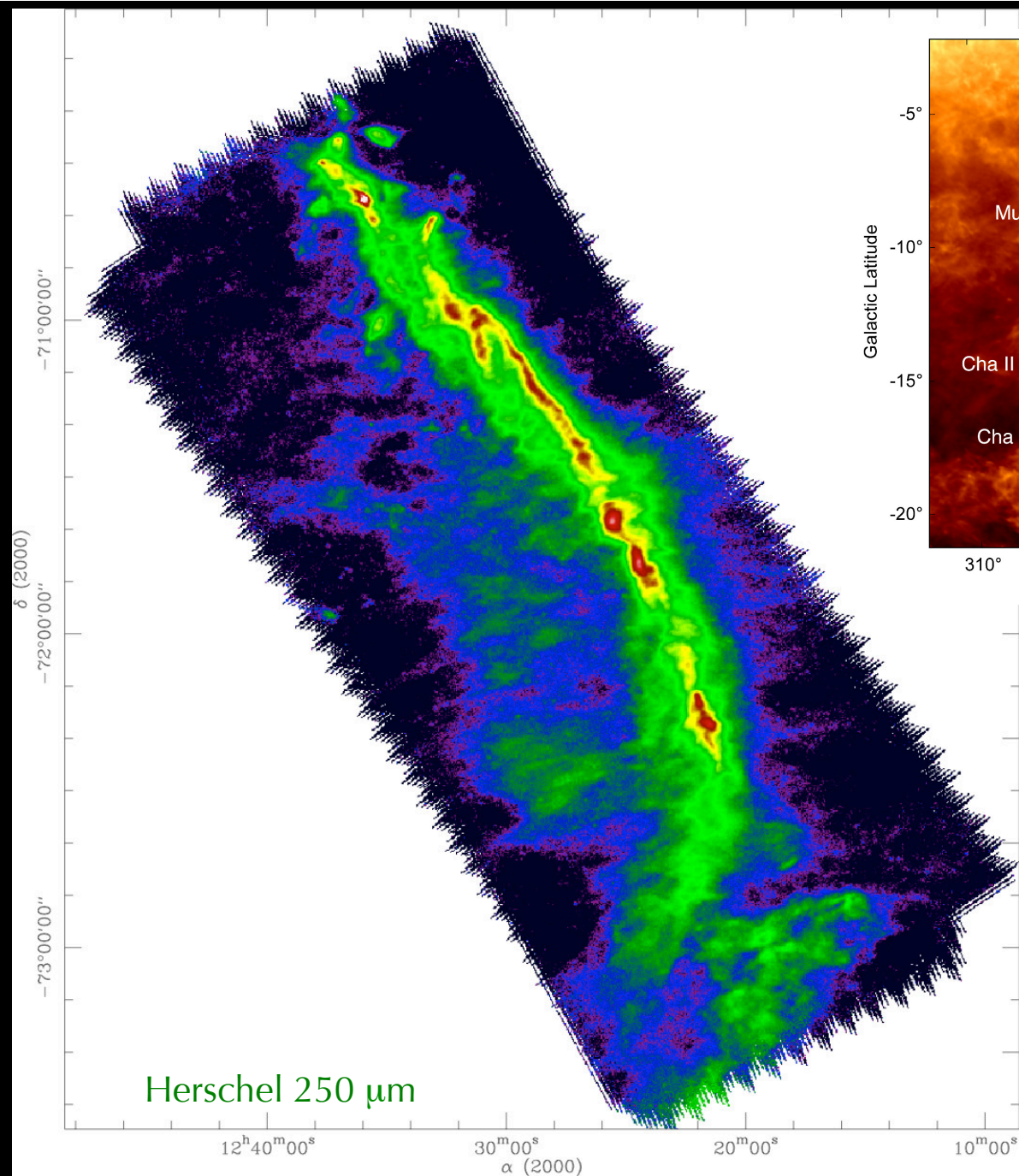
Orion B
Schneider et al. 2013



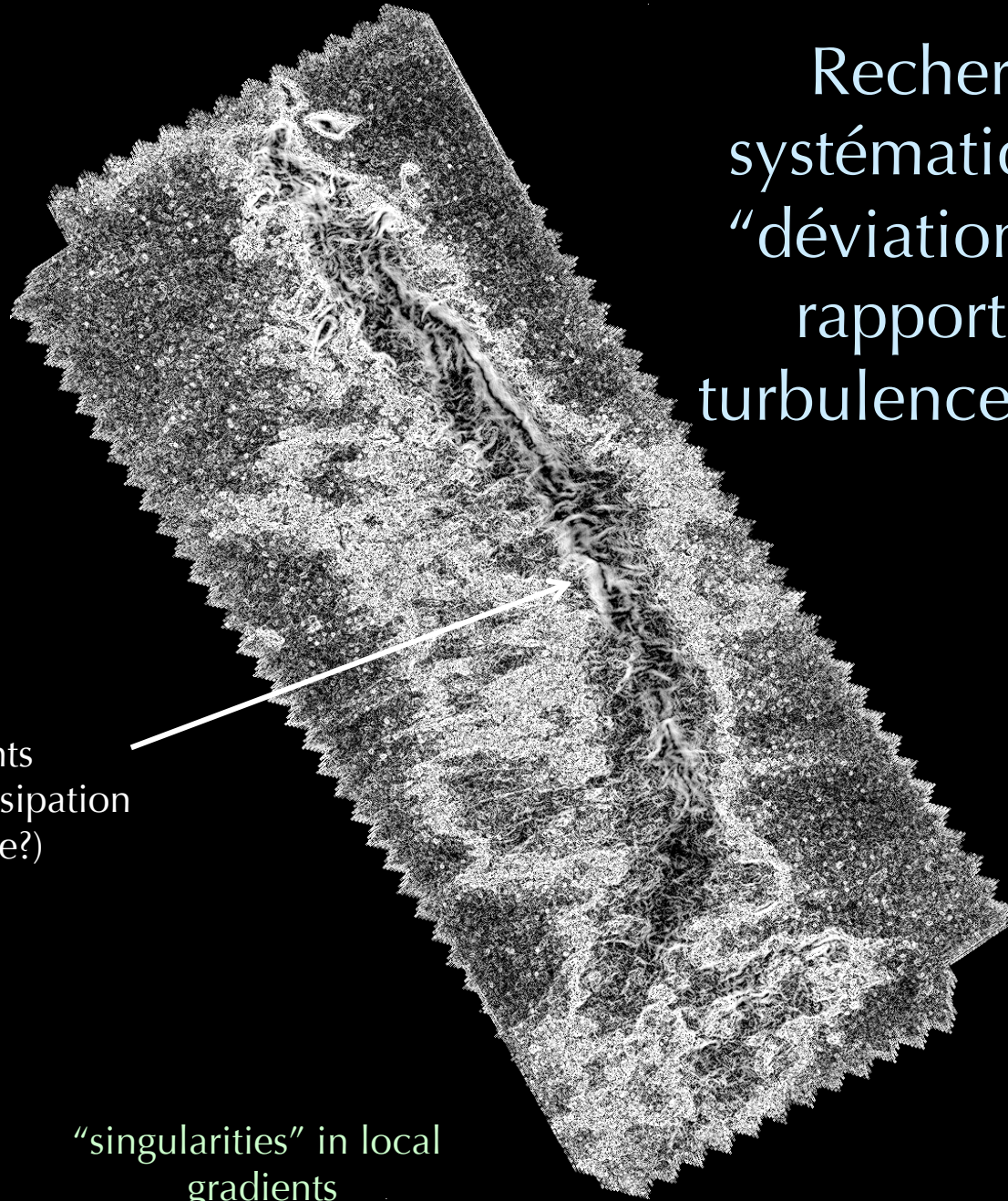
Innovative methods to analyse Herschel images



Yahia et al. (INRIA Bdx)



Recherche
systématique de
"déviation" par
rapport à la
turbulence (INRIA)



Enhanced gradients
(shocks? Dissipation
of turbulence?)

"singularities" in local
gradients

Star Formation is all about “cooling” – how, when, where to loss thermal, turbulent (kinetic) energy to allow for collapses?

1. Low-mass SF collapses at thermal equilibrium.
2. High-mass stars/clusters have kinetic energy not fully relaxed(?).
3. How ISM cools as a MC forms and dense structures build up?
4. Fraction of (line) cooling though shocks, TDRs, compressive vs solenoidal modes?
5. ... also What drives dynamics? MC scale collapses or large scale (galactic scale) motions?

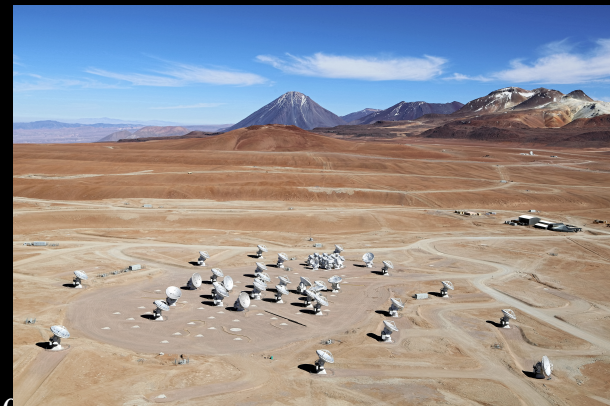


What?

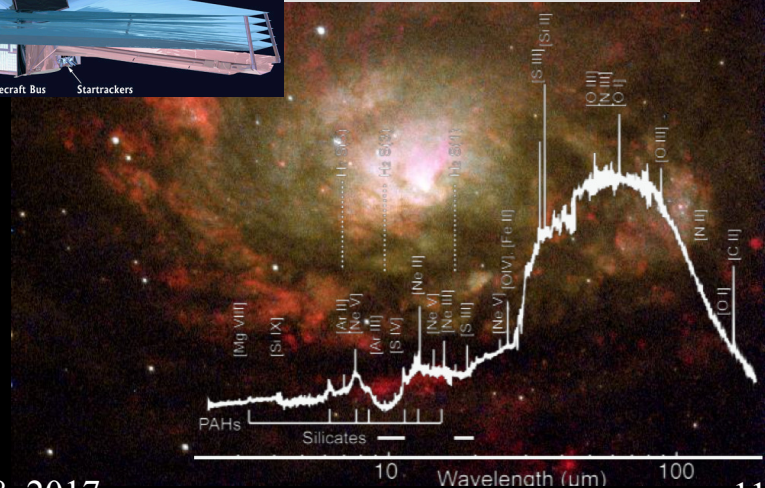
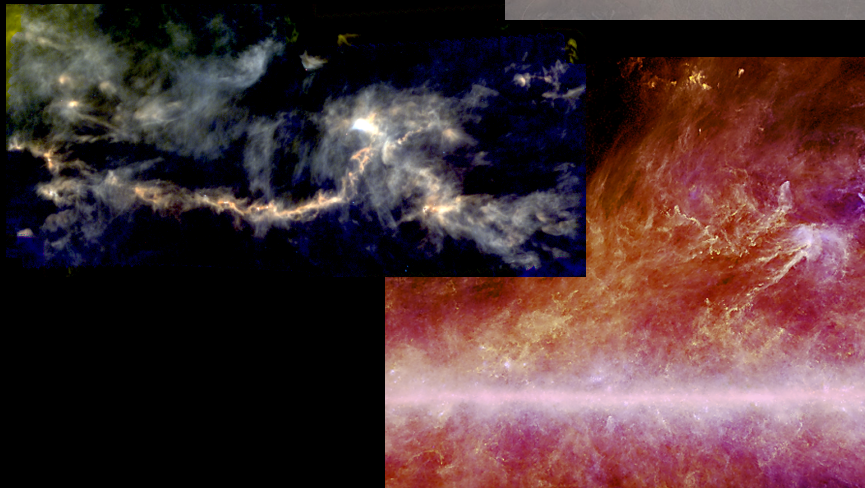
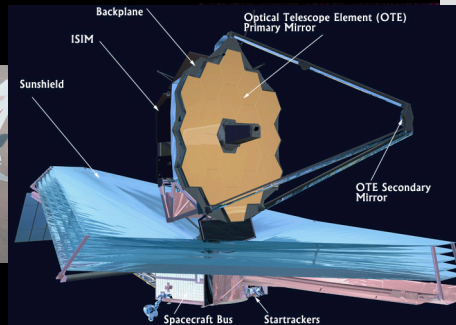
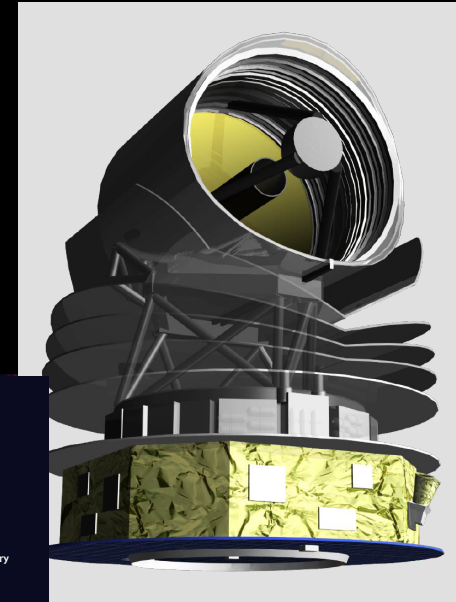
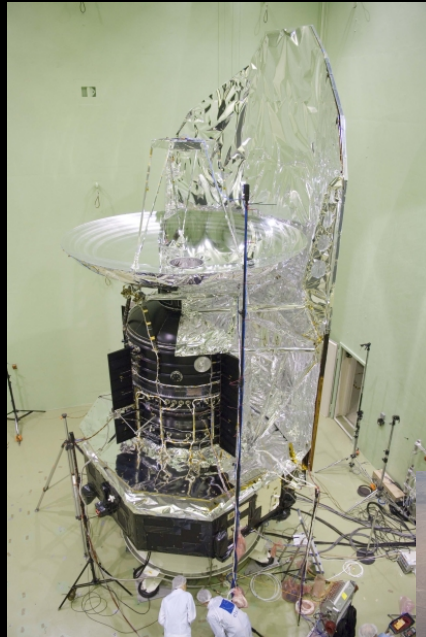
1. Filaments: a new view of cloud evolution towards formation of stars thanks to Herschel
2. Gravity: The absolute dictator or a subsidiary effect?
3. Structure analysis: the richness of information contained in Herschel maps
4. SOFIA - the new Far-IR observatory (cooling lines)

How?

1. Probe the shocks (SOFIA - Cologne) and velocity fields for filament formation (ALMA – Bordeaux/LAB).
2. Apply innovative analysis tools to Herschel images (INRIA Bordeaux).



From Herschel to SPICA/SAFARI through SOFIA / (JWST)

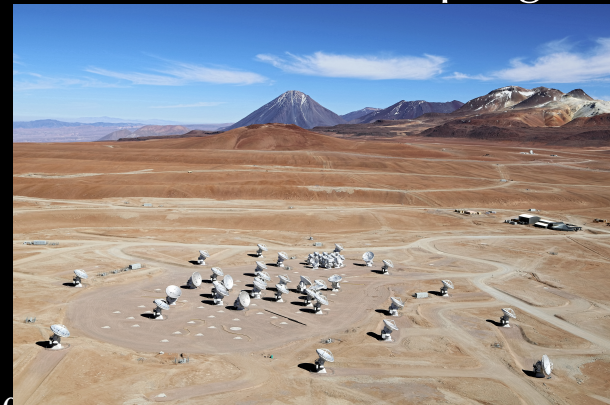


News

1. APEX CO(4-3) + SOFIA [OI] project for Musca.
2. ALMA large program – ALMA-IMF (Motte et al.).
3. PhD in LAB: Lars Bonne (1st october), post-doc in LAB: Arabindo Roy (15th November).

Goal(s) of the meeting

1. Exchange news and get to know each other ...
 2. Discuss science ...
 3. Identify immediate goals and plans, and in practice program.
-
1. Equilibrium/cooling in PDRs and diffuse gas, ISM modelling.
 2. SOFIA and other facilities to constrain ISM physics.
 3. Define main stream projects, coordination with other programs.



Program

Thursday @LAB

1. Session: Cooling of ISM gas/PDRs and shocks

10:00	10:15	Introduction to GENESIS/MOBS	Nicola
10:15	10:30	Introduction to GENESIS	Sylvain
10:30	11:00	Member presentation/all around GENESIS + coffee break	all
11:00	12:00	Irradiated shocks in diffuse and dense regions (talks and discussion)	Antoine, (Benjamin), (Pierre)
12:00	12:20	PDR modelling, KOSMA tau	Markus
12:20	13:00	Discussion: shocks vs PDRs, recent developments	all
13:00	14:00	<i>Lunch</i>	
14:00	14:20	SOFIA (and CCAT-Prime)	Robert
14:20	14:40	Data sets (SOFIA, IRAM,..) for GENESIS/MOBS	Nicola
14:40	15:00	CII in W51	Timea
15:00	15:20	The SILCC project/modelling stellar feedback	Annika
15:20	15:40	Molecular cloud formation simulations	Simon
15:40	16:00	<i>coffee break</i>	
16:00	~17:30	Discussion: Observational projects, priorities, collaborations, proposals..	all

Friday @INRIA

2. Session: Identification and characterization of ISM gas/energy repartition in the ISM

10:00	10:15	Ongoing projects in GENESIS/MOBS	Nicola
10:15	10:30	Future instrumentation and its link to GENESIS	Sylvain
10:30	11:00	Image analysis methods/tools	Hussein
11:00	11:20	<i>coffee break</i>	
11:20	11:40	Filament analysis methods	Volker
11:40	12:00	[Power spectra and filaments]	[Arabindo]
12:00	13:00	Discussion: structure analysis tools, turbulence characterization,...	all
13:00	14:00	<i>Lunch</i>	

3. Session: Formation of dense structures

14:00	14:20	ALMA Large Program	Sylvain
14:20	14:40	CMF/IMF in W43 with ALMA	Thomas
14:40	15:00	free slot for other presentations	
15:00	~16:30	Summary and Discussion	all