



Institute of Planetology & Astrophysics of Grenoble

LAOG

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Laboratoire
de
Planétologie
Grenoble



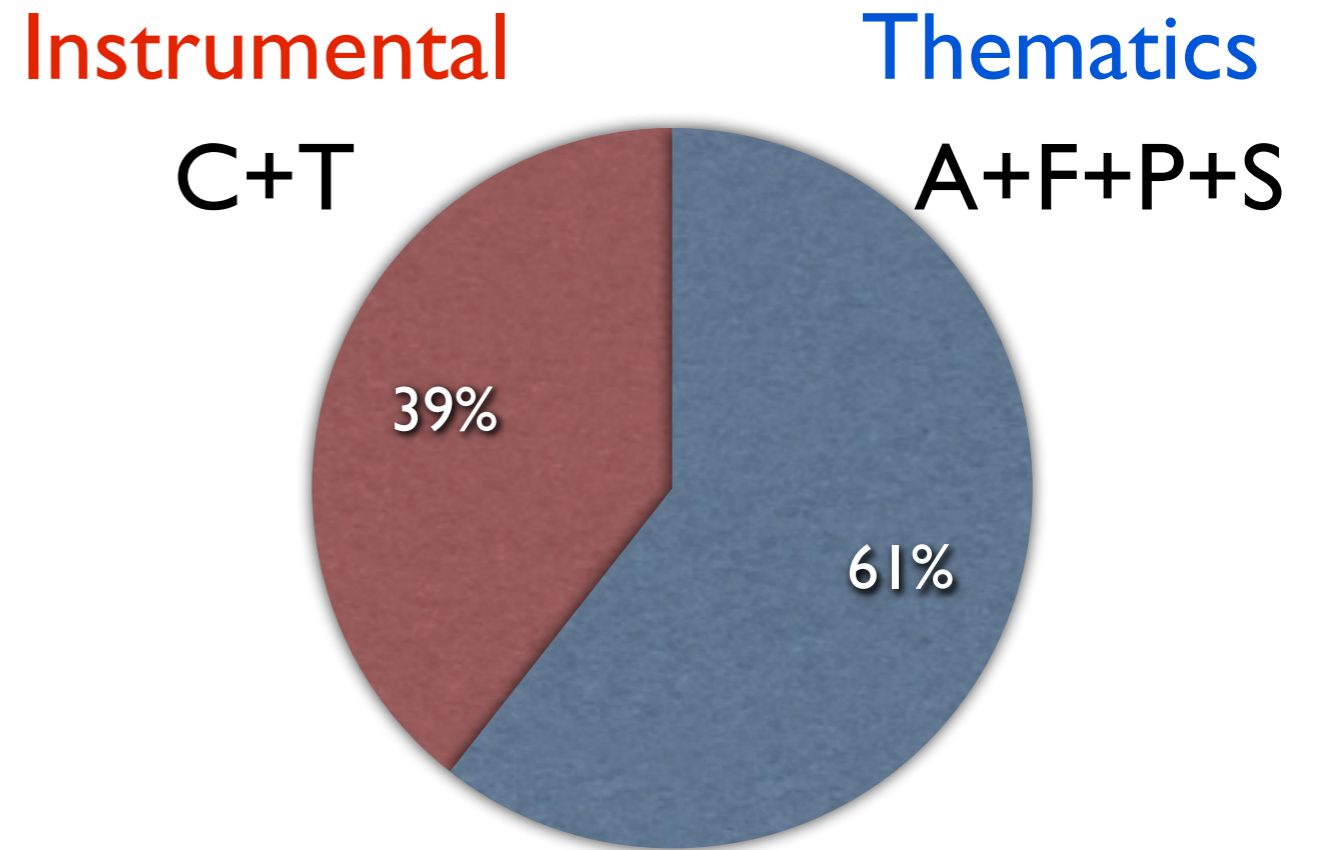
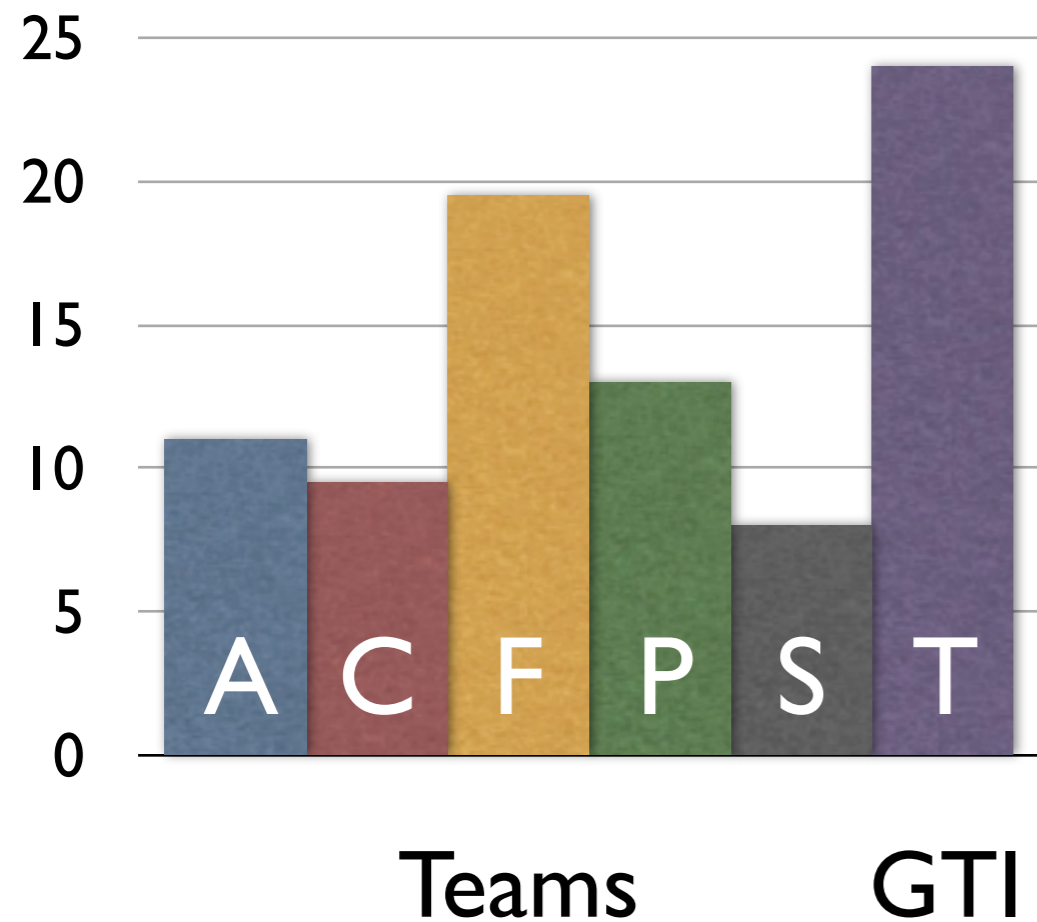
Astrophysics and Planetary sciences on the Grenoble Campus



- *Formation and evolution of stars and planets*
- *How do we and our solar system fit in ?*
- *Understand the extremes of the universe*
- *Invent, design and build the instruments of the future*



IPAG : STRUCTURE : 5 teams + Technical Group



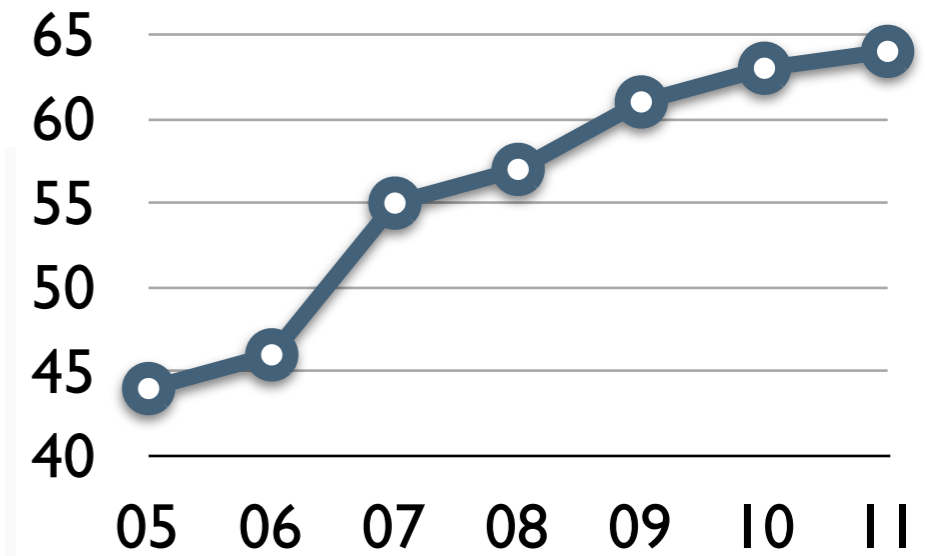
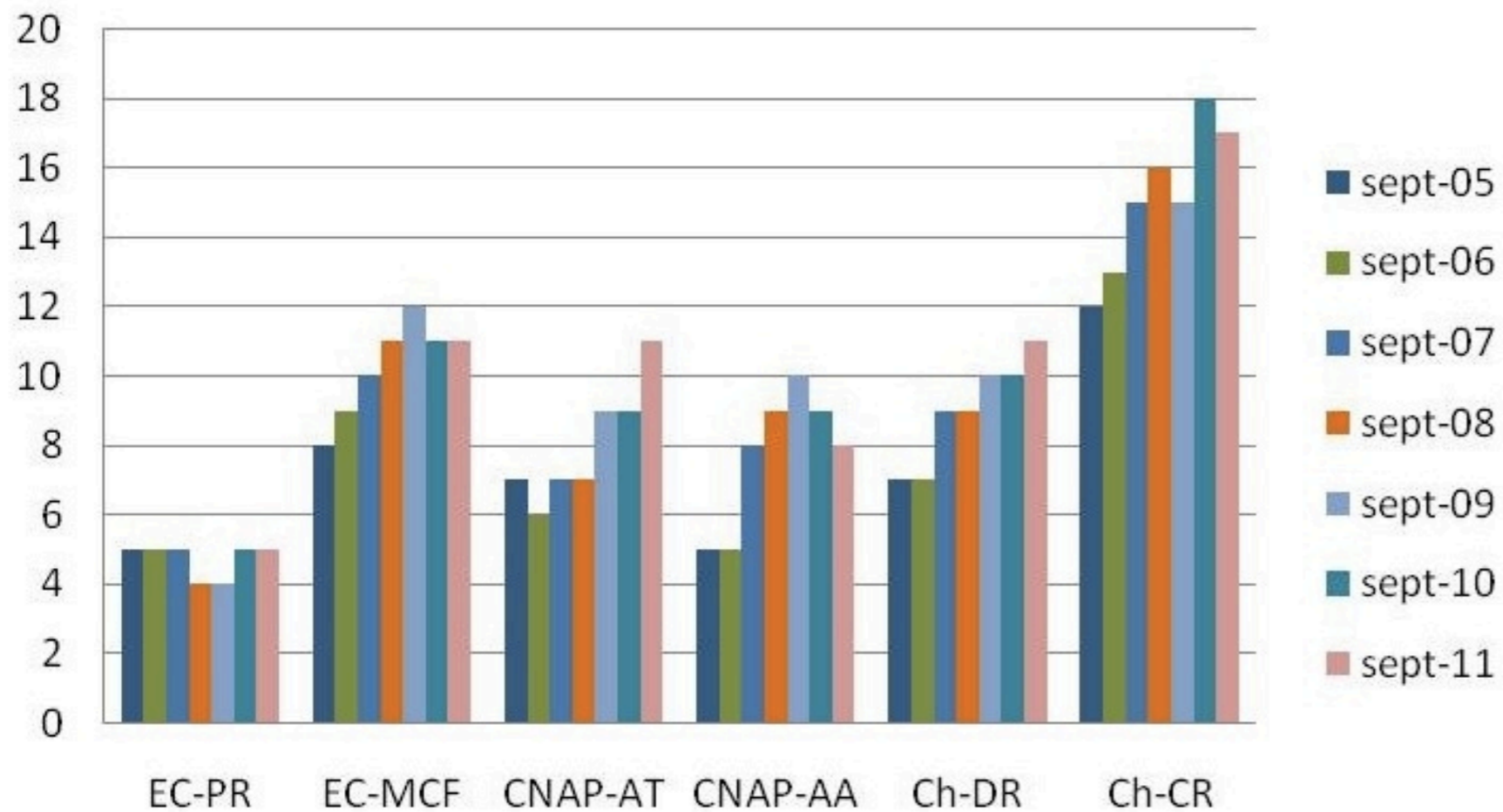
100 permanent positions (65 scientists, 35 ITA)
+ as many non permanent people (including 15 Post-Docs)
5 teams + technical group

ASTROMOL CRISTAL FOST PLANETO SHERPAS

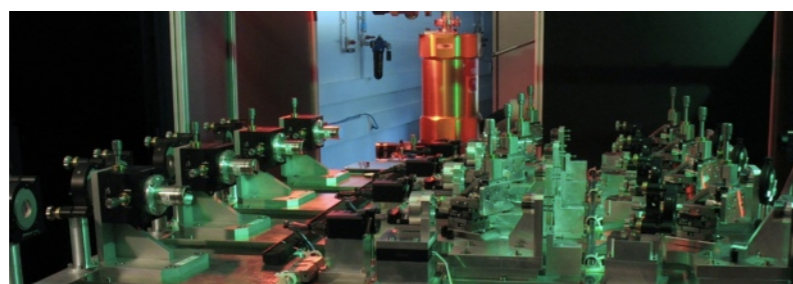
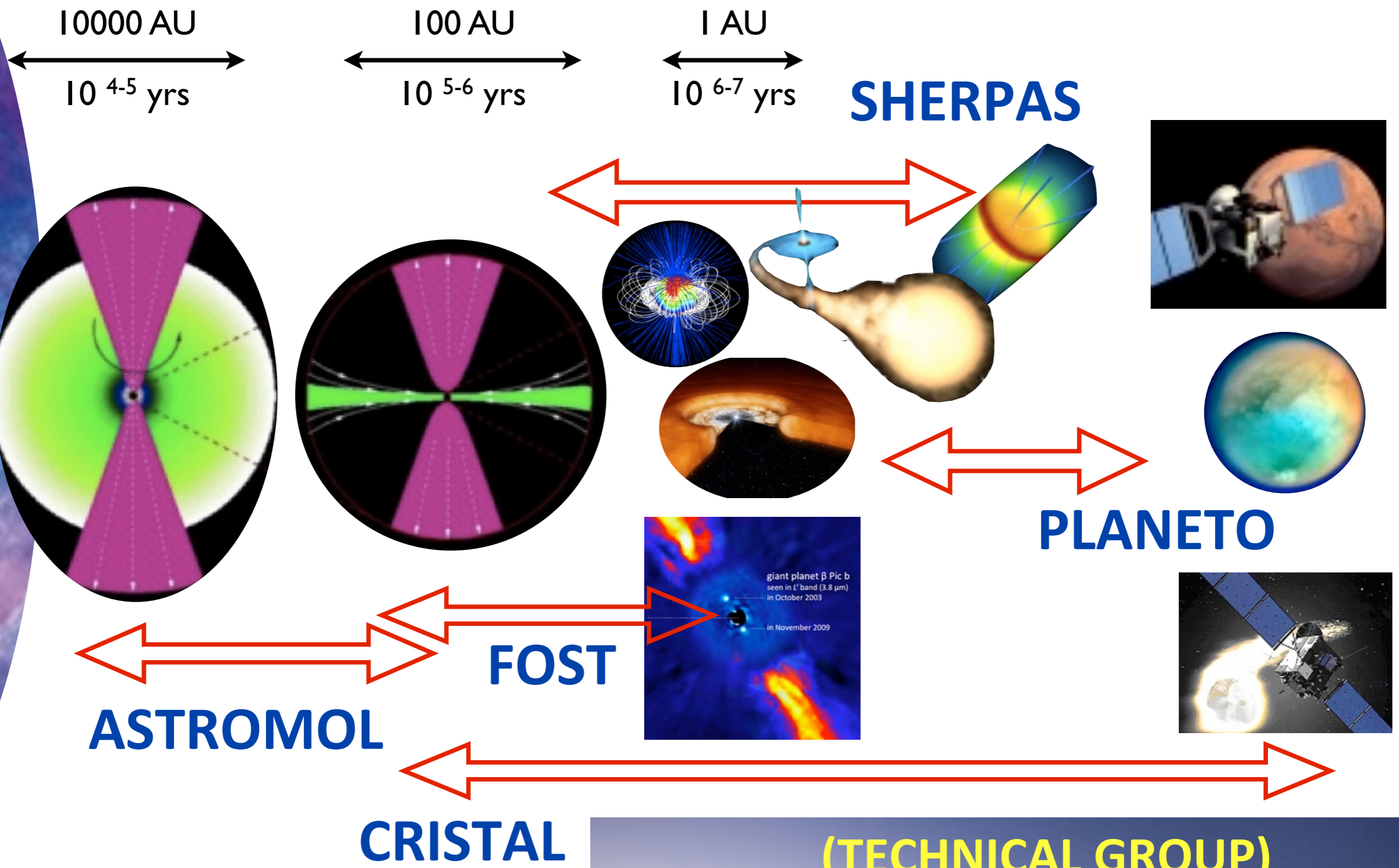
IPAG Growth

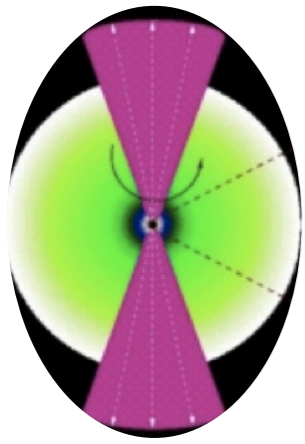
Scientists (CEC)

Evolution-CEC

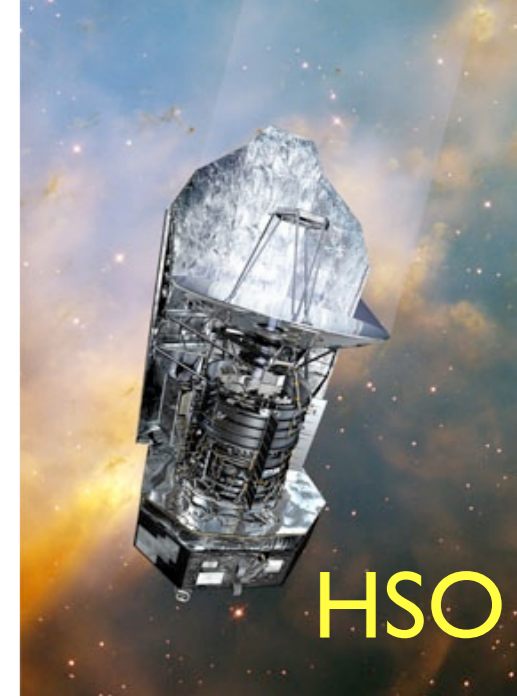


From the edge of the universe to planetary surfaces

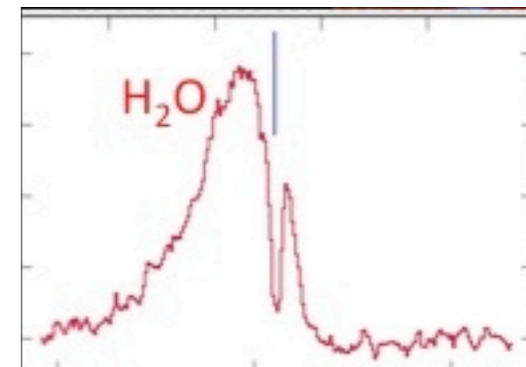




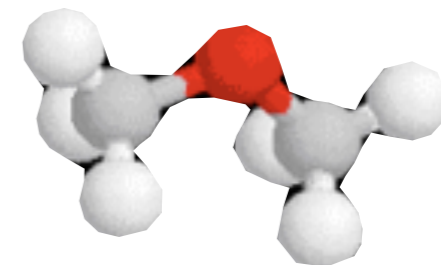
ASTROMOL : *Molecular Astrophysics*



- First stages of stellar formation
- Protostellar physics & chemistry, young disks
- Molecular complexity, theoretical computations, (sub)-mm observations (IRAM, HSO, ALMA)
- Toward *exobiology* (CNRS programme “origines des planètes et de la vie”).

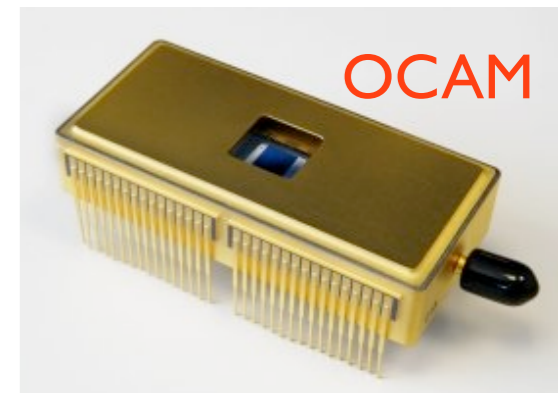
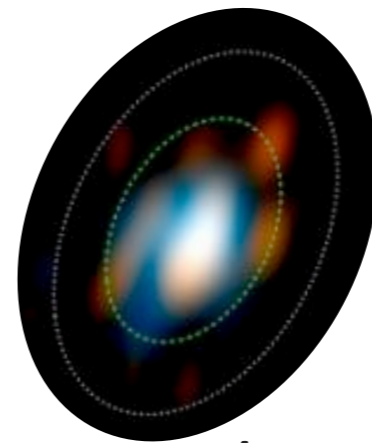
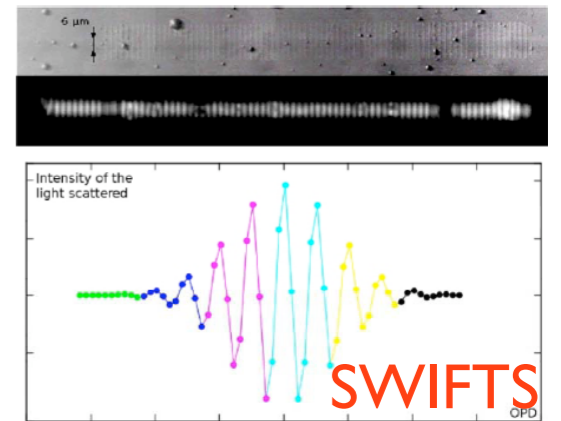


→ ALMA & NOEMA

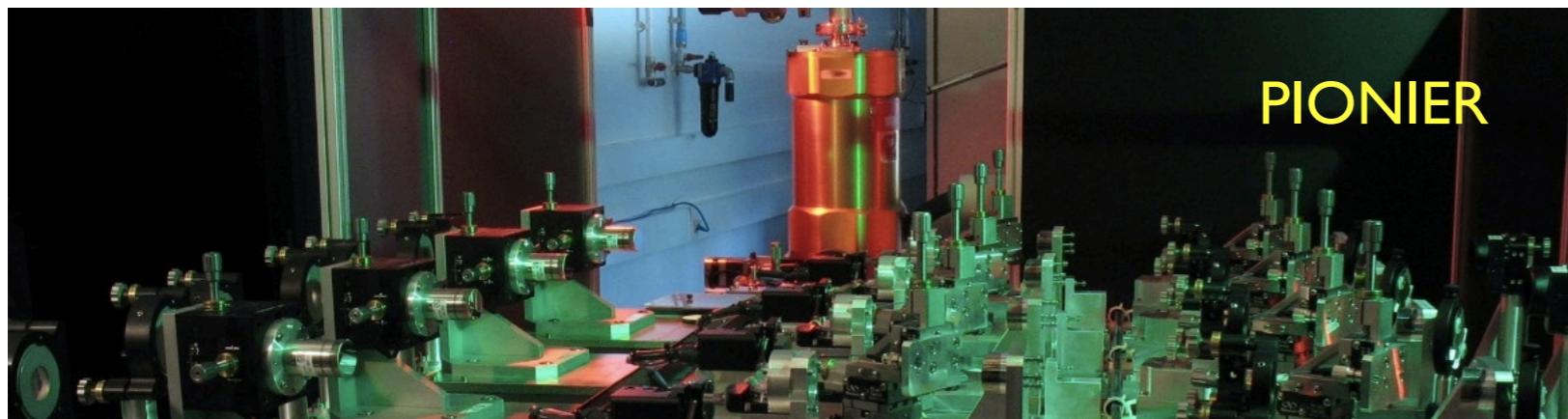


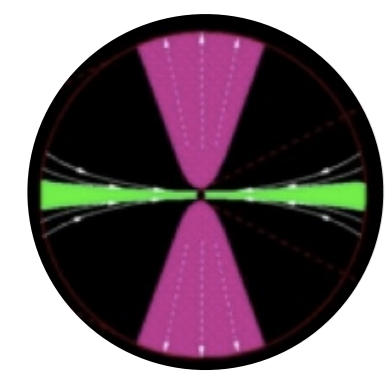
CRISTAL : Concepts, Instrumental Research, Systems, Signal processing, Algorithms.

- Adaptative Optics & interferometry
- Optical & IR detectors, radars
- (ESO, ESA, CNES) - VLT&E-ELT, VLTI 2e generation
- Interferometers in space
- Astrophysical R&D
- Laboratory experiments



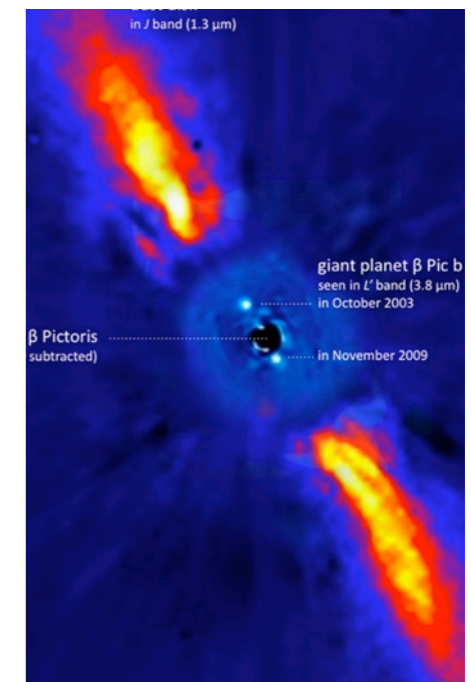
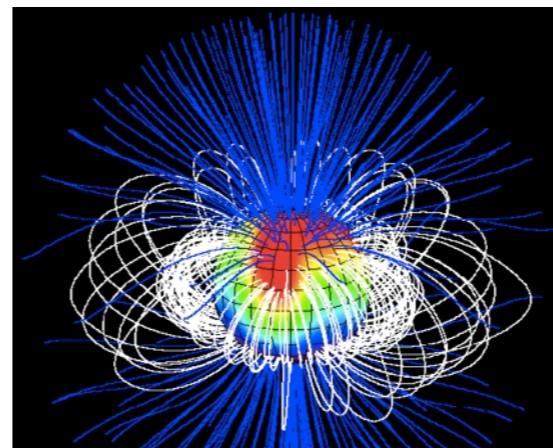
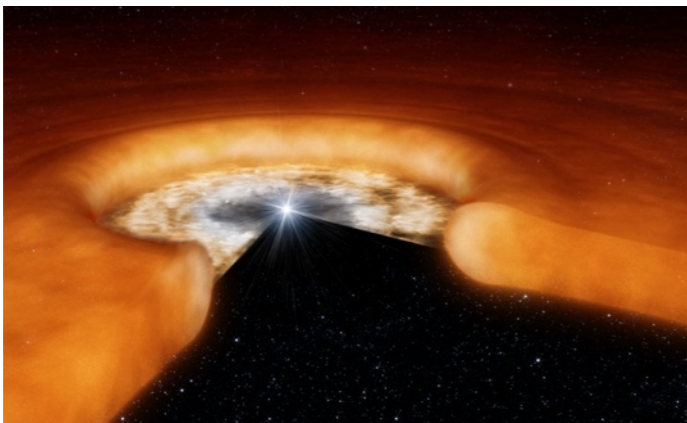
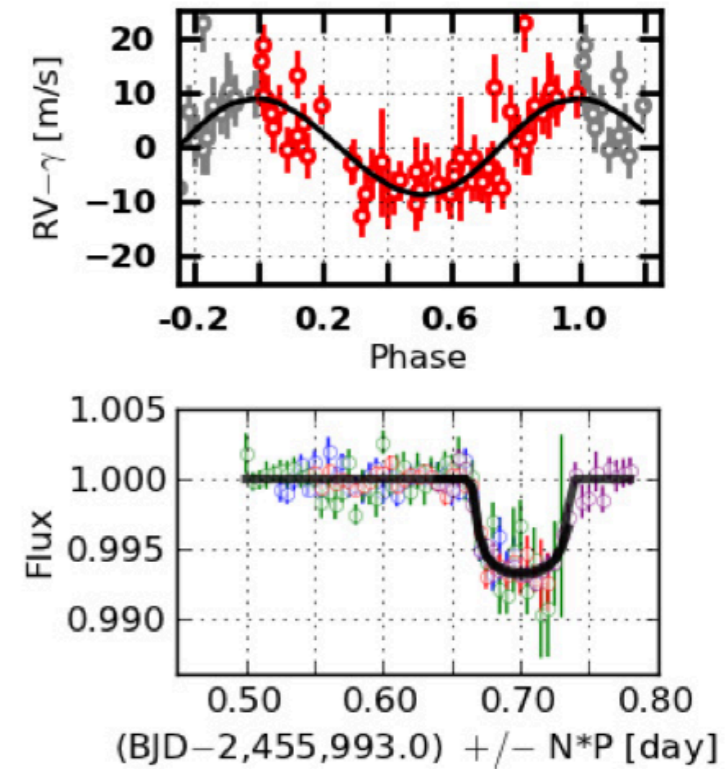
CRISTAL works lead to industrial valorisation (patents, 3 spin-offs, 3 FUI projects).



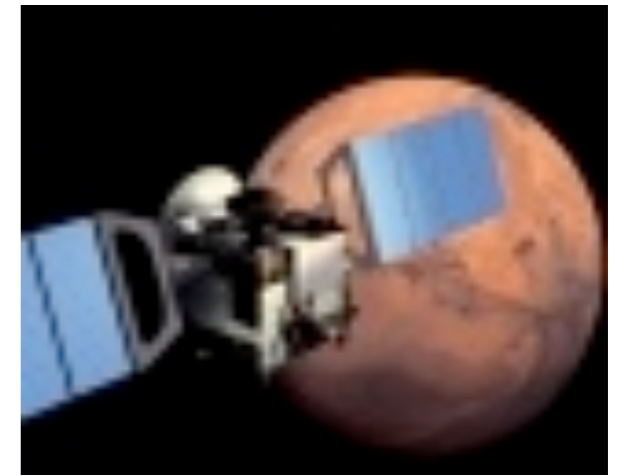
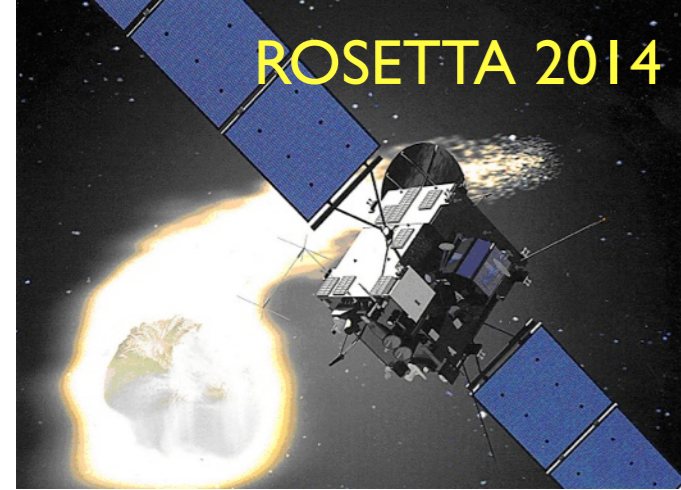


FOST : *Stellar and planetary Formation, brown dwarfs*

- Circumstellar **disks** (young - debris)
- Star-disk transition / interaction
- Jets & flows
- **Exoplanets** (*RV, transits*), Brown dwarfs
- Related modeling ; disk dynamics

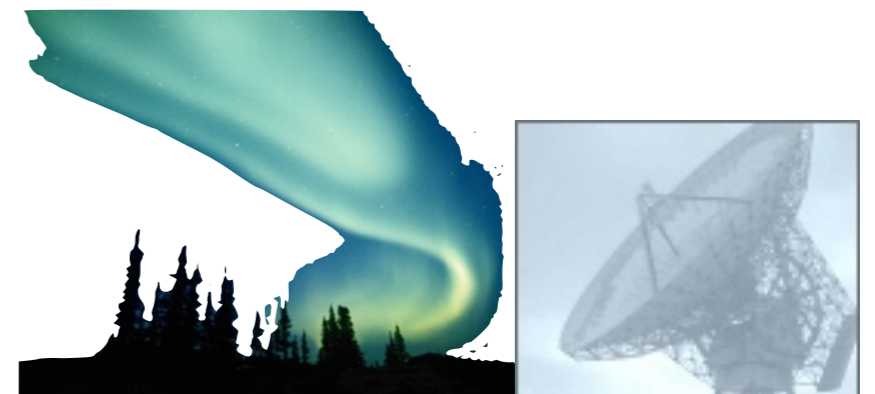


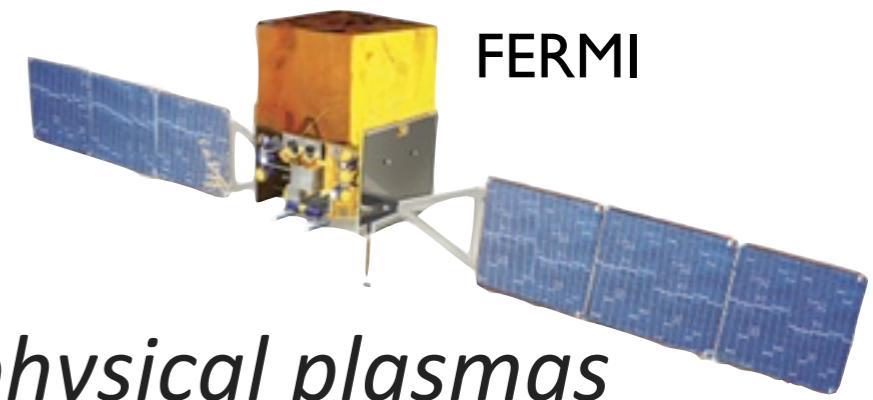
ROSETTA 2014



PLANETO : *Planets, Moons, Atmospheres, Nature, Evolution, In situ and remote sensing, Origins.*

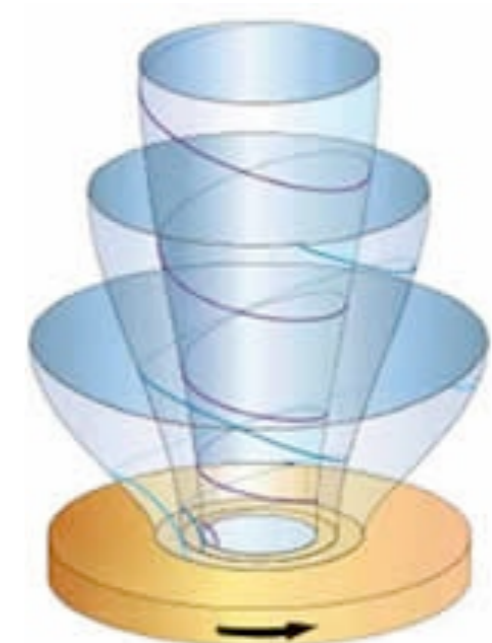
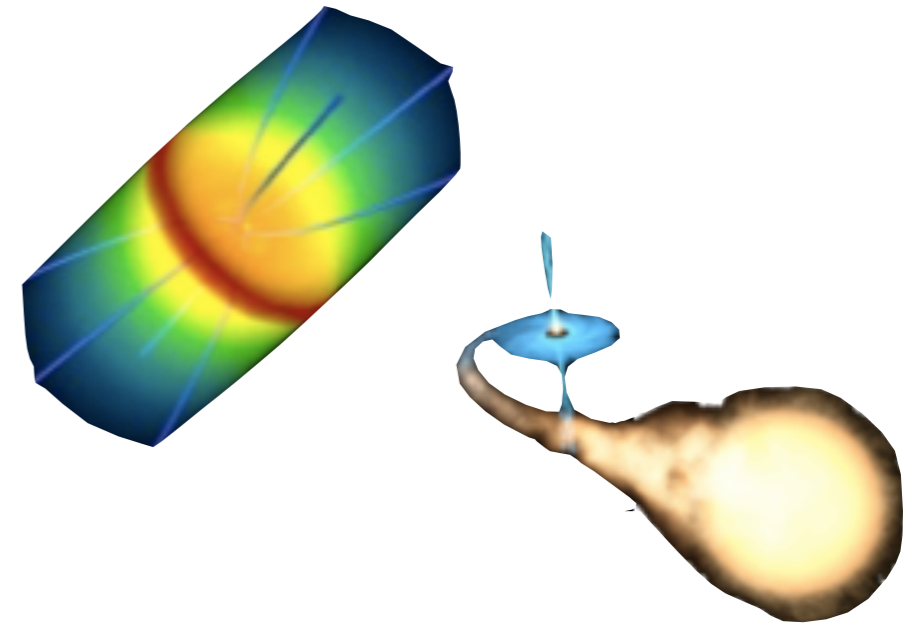
- Planetary Surfaces & subsurfaces, Cometary nuclei
- High planetary atmospheres - models
- Solid Molecular matter in the solar system
- formation & evolution of stellar and planetary systems
- links with *exoplanets*
- Laboratory experiments



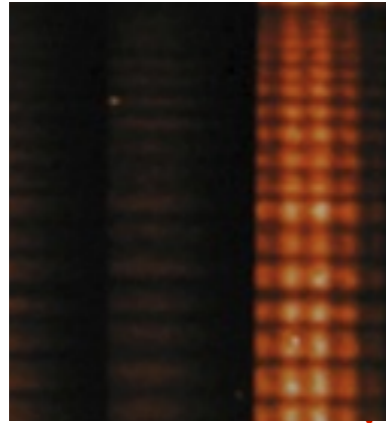


SHERPAS : *High energies, Relativity, Astrophysical plasmas*

- Theory of astrophysical plasmas
- Physical processes, accretion / ejection
- Heavy MHD Simulation
- Compact Objects
- Observation and high energy modelling (HESS et FERMI, -> CTA).



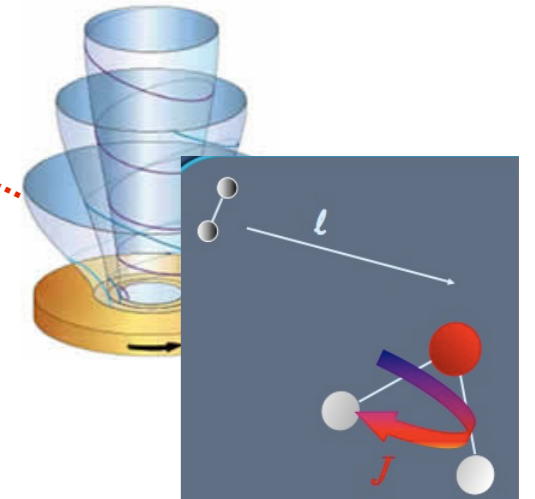
IPAG : SKILLS



DATA
REDUCTION

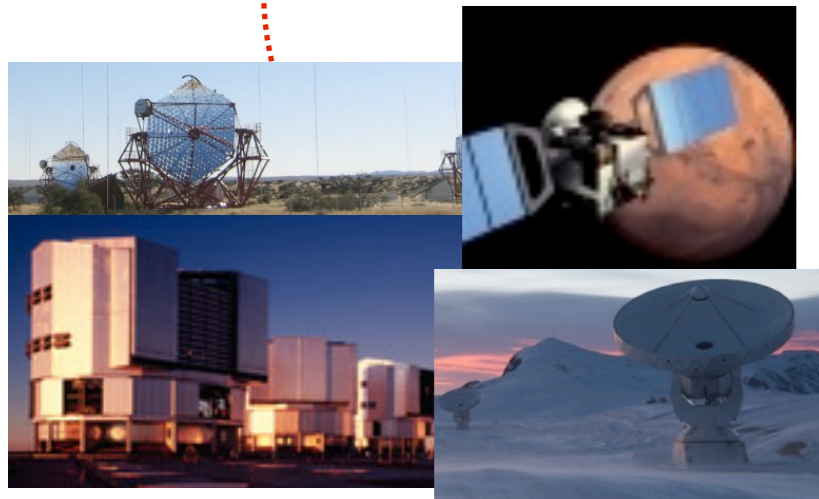


LABORATORY
EXPERIMENTS

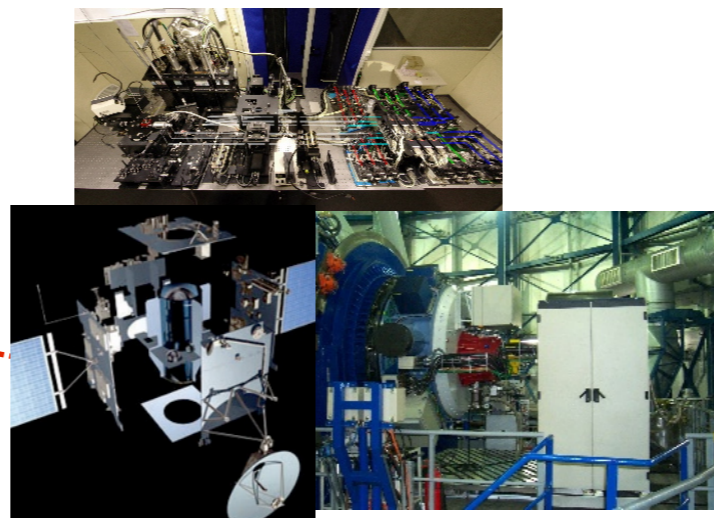


THEORY
(analytical)

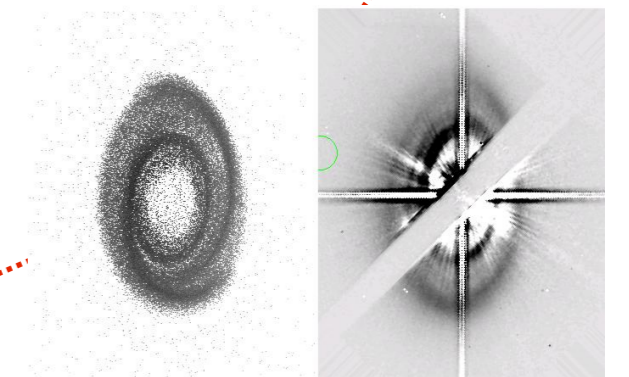
GROUND - SPACE



OBSERVATIONS
(from TeV to cm :
 $\times 10^{20}$)

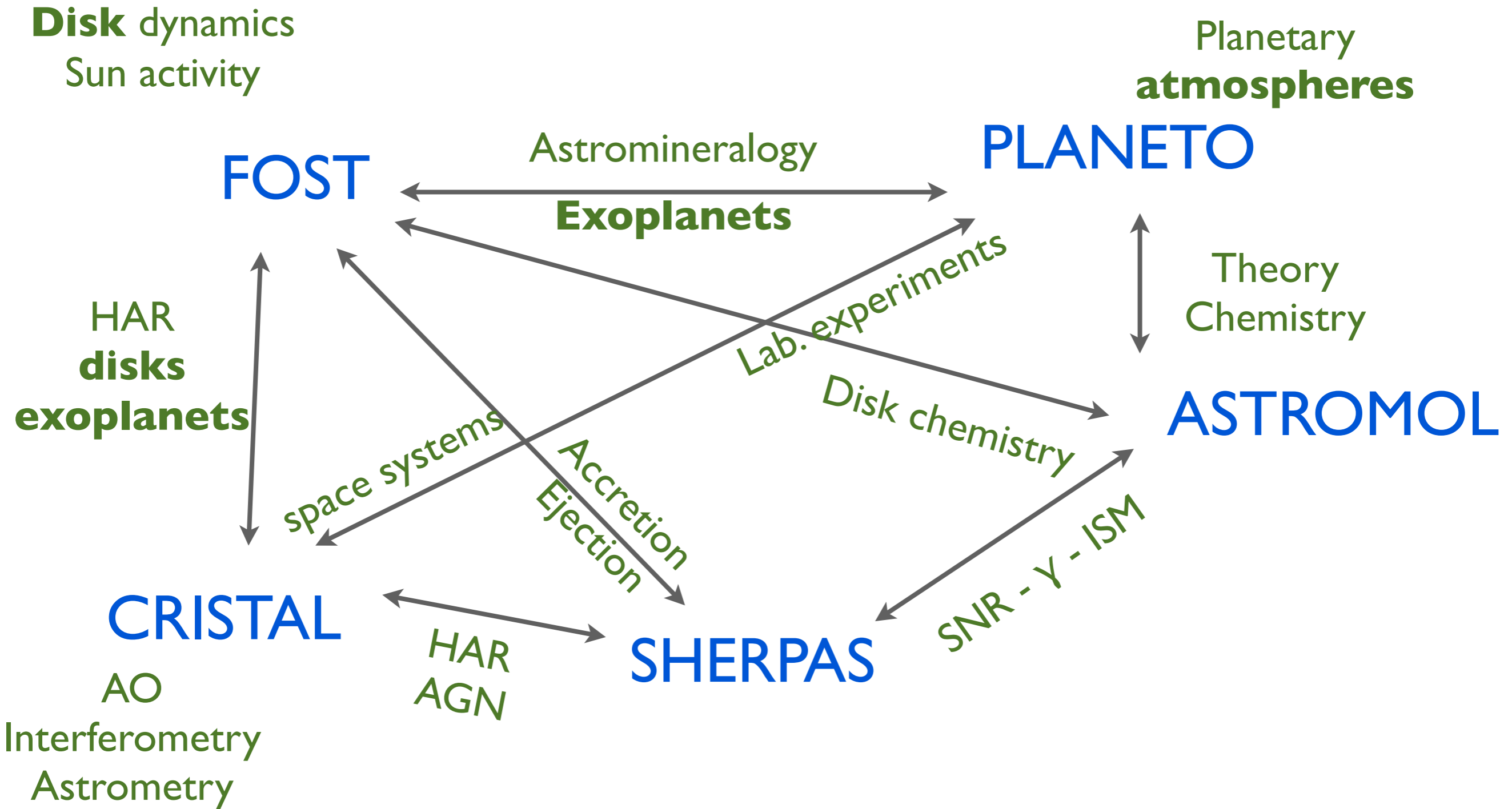


INSTRUMENTS



MODELS
(numerical)

IPAG COHERENCE



Astrophysics - Planetary Sciences Synergy

Astromol - FOST - Planeto

Compared (exo) planetology

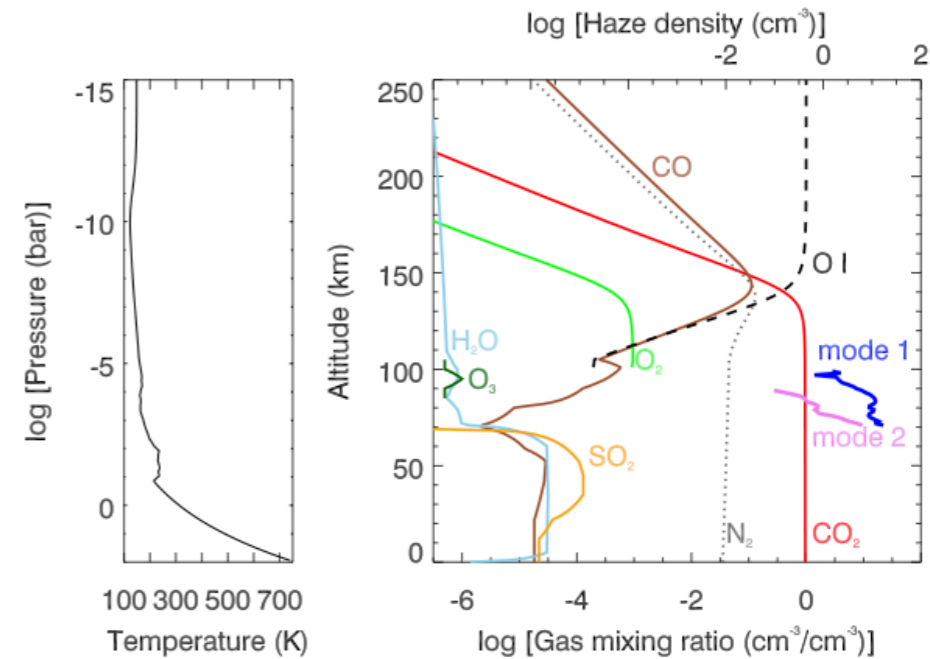
Outer atmospheres. Planet models

“The earth as an exoplanet”

Venus as a transiting exoplanet

FUV emission of hot jupiters

Atmospheric polarization



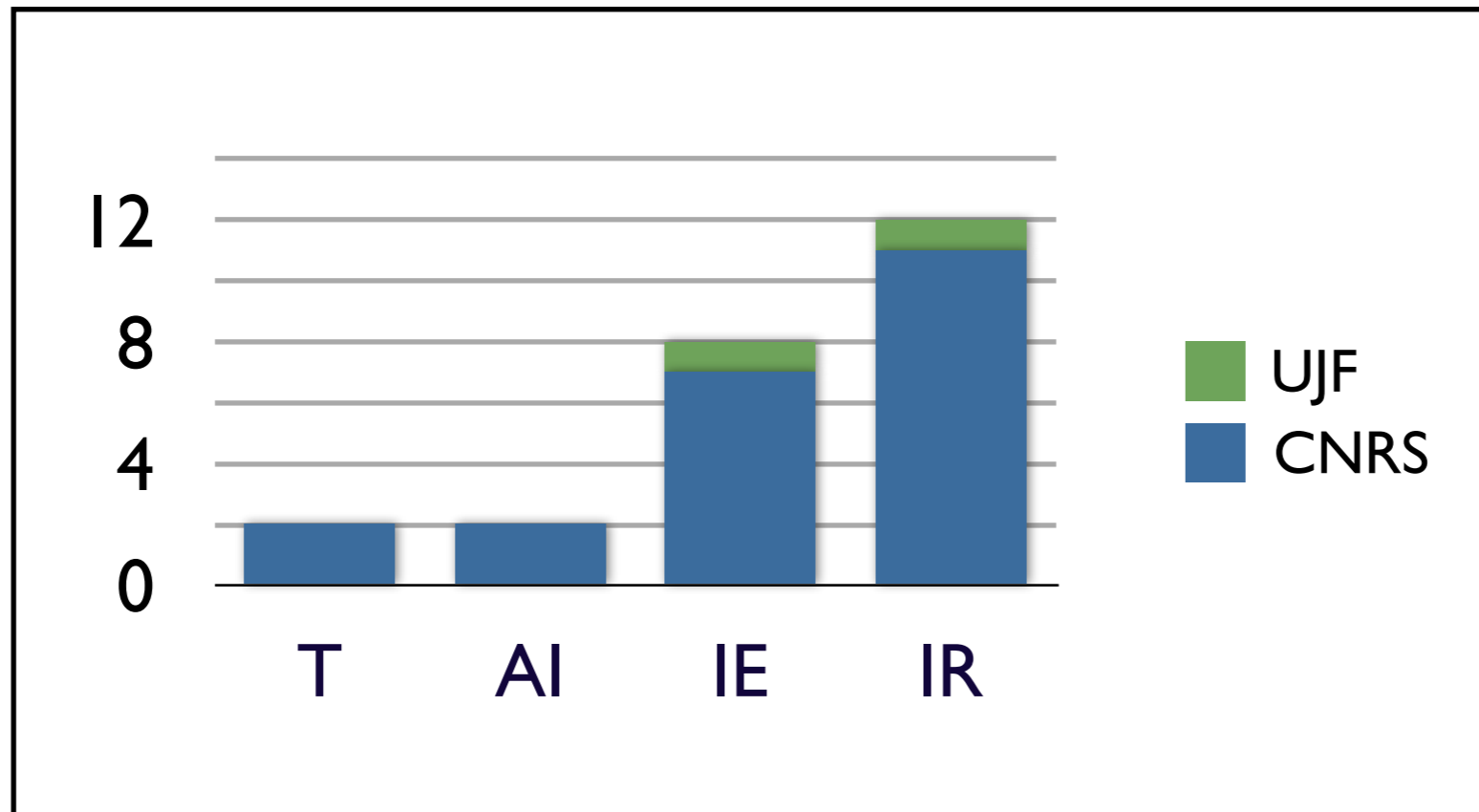
Chemistry

Interstellar medium

matter evolution in the solar system

laboratory experiments

Technical Group

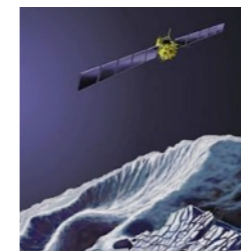
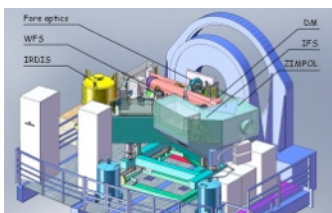


- Technical Group associated to an instrumental research team
- Specific profile : strong R&D potential, patents, spin-off
- Numerous collaborations with industrials

IPAG Large Instrumental Projects (Scientists + Technical Group)

- on the sky
- under construction
- under study

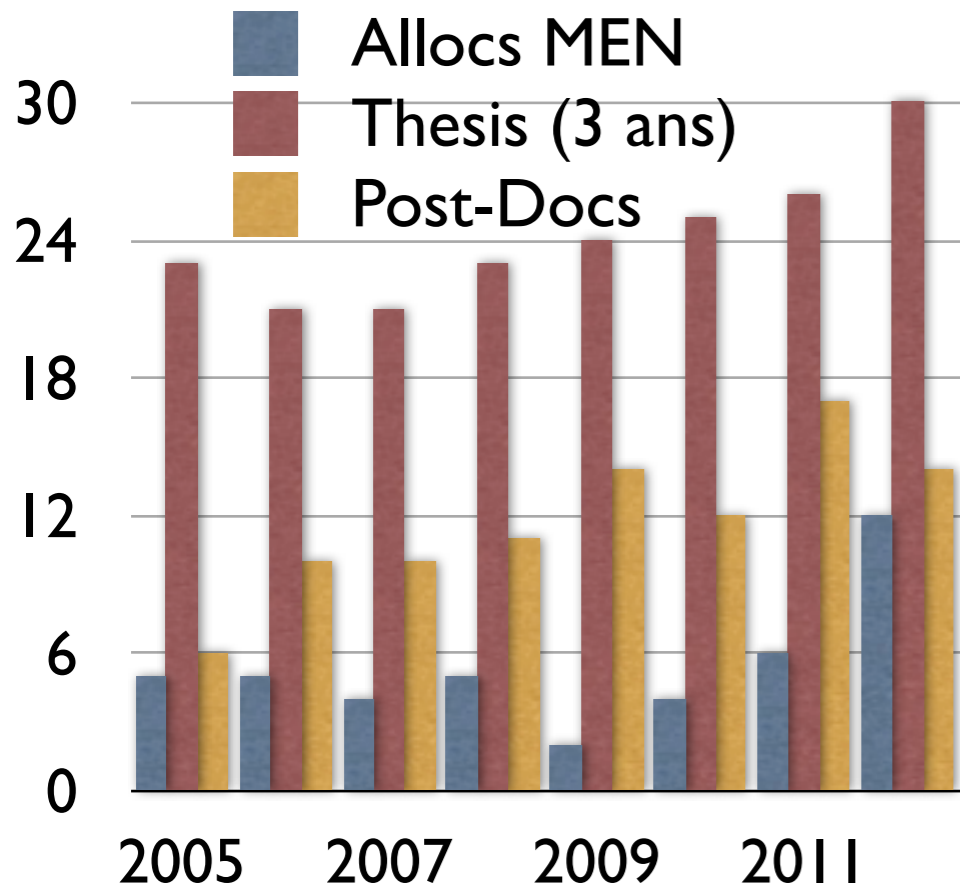
- **SPHERE** : Exoplanets imaging, adaptative optics on the VLT
- **EPICS** : High contrast exoplanets imaging on the ELT
- **Orbitrap** : space system (EJSM / JUICE, Marco-Polo, ...)
- **Rosetta / CONSERT**
- **PIONIER** : 4T ESO Interferometry : image reconstruction (**JMMC**)
- **GRAVITY** : Galactic Center Astrometry
- **SPIROU** : exo-earths, magnetic field imaging
- **ASSERT** : “consert for Asteroid”
- **CTA** : Cerenkov Array (imagery @ ~ 1 TeV)
- **R&D**, Instrumentation : new technologies for observation
- **NEAT** Exoplanets in the HZ astrometry



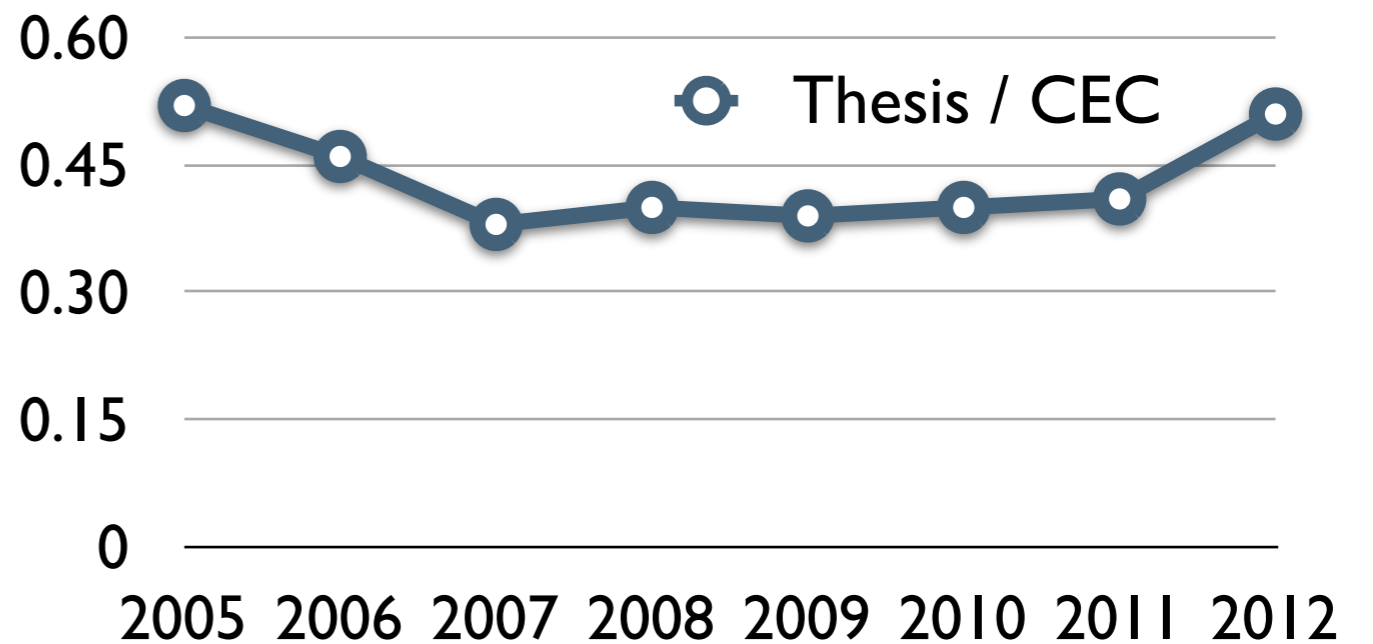
JMMC

GhoSST

PhDs & Post-docs



34 HDR (2 EEATS, 5 TUE, 27 Phys)



16 new PhDs at IPAG in sept 2011

A new “pre-doc” program on track for 2013