

# LYON ASTROPHYSICS RESEARCH CENTER - CRAL



## BASIC RESEARCH LABORATORY IN ASTROPHYSICS

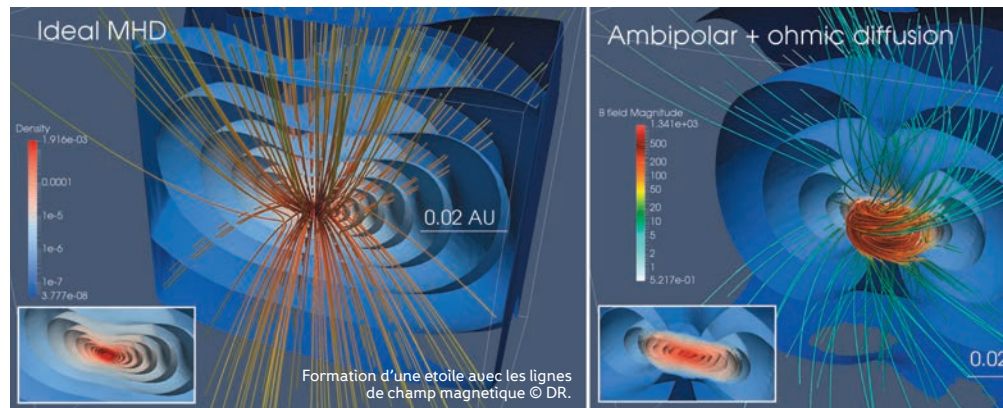
<https://cral.univ-lyon1.fr>

### RESEARCH TOPICS

- FUNDAMENTAL PHYSICS (STATISTICAL PHYSICS, HYDRODYNAMICS, RADIATIVE TRANSFER)
- PLANETARY, STELLAR AND GALACTIC ASTROPHYSICS
- COSMOLOGY
- NUMERICAL ASTROPHYSICS (MULTI-DIMENSIONAL NUMERICAL SIMULATIONS)

### CROSS-CUTTING THEMES

- Hydrodynamics, astrophysics, geophysics, climate
- Physics of dense matter, physics of high-power lasers (Laser MegaJoule (LMJ), PetaWatt Aquitaine Laser (PETAL))
- Fundamental physics: statistical physics, quantum mechanics, radiative hydrodynamics, general relativity
- Numerical methods (multidimensional codes, high-performance and algorithmic computing, new architectures (CPU, GPU))
- Theoretical and observational research in astrophysics and astronomy
- Development of instrumental projects for large observatories or space missions
- Deployment of national observation services in astronomy-astrophysics



### RESEARCH EQUIPMENT AND TOOLS

#### Optical rooms

- Development of new unpolished mirrors, instruments, spectrographs

#### Mechanical and scientific computing workshop:

- Support for the assembly and integration phase
- Design, verification of equipment
- Data analysis and modeling

#### Instrumentation service

- Cryogenics system for testing instruments under extreme controlled conditions (ExoLife Finder project)
- Electronics laboratory

### KEY FIGURES

**78** staff including **46** researchers, **13** PhD students and post-doctoral fellows, **19** research support staff (mainly engineers with a wide range of expertise in software, mechanics, optics, etc.)

#### Over the last 5 years:

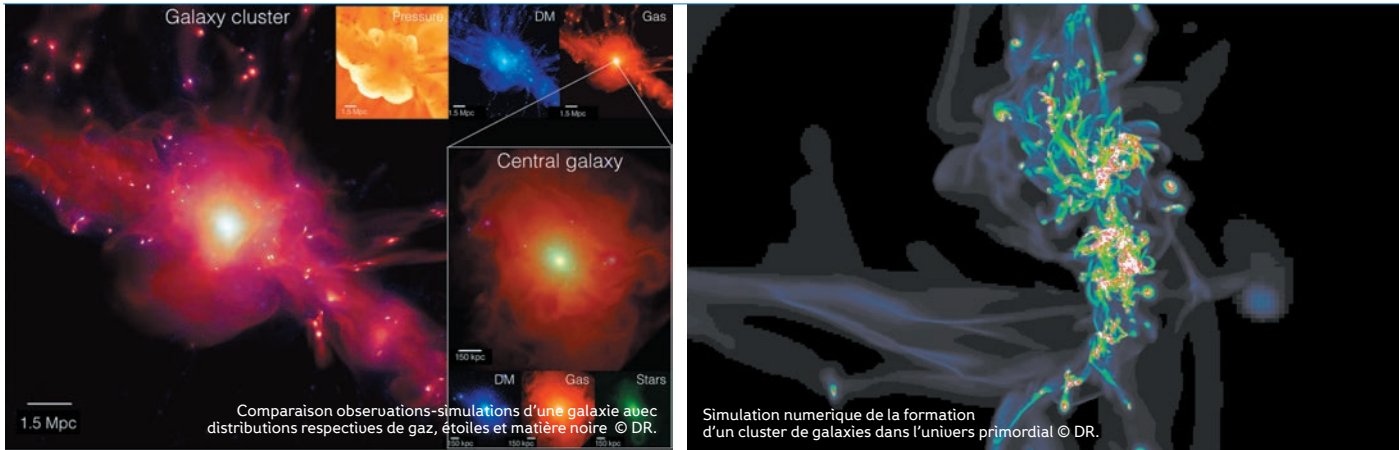
**600** publications

**13** prizes and distinctions including **2** CNRS medals, **1** IUF, and **10** others

**20** public funding including **5** ERC, **2** Horizon 2020, **6** ANR, and **7** international programs and collaborations

TRL scale between **1** and **5**

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## FROM THE LABORATORY TO THE SOCIO-ECONOMIC WORLD

### TOPICS OF STUDY

- Relativistic cosmology
- Stellar and planetary structure and formation
- Formation and evolution of galaxies and large structures
- Nature of dark energy and dark matter

### EXPERTISE

- High angular resolution
- Data acquisition, processing and analysis
- High-precision, high-frame rate signal and image processing
- Numerical simulation, advanced software developments: star formation, high-energy processes, galaxy formation, radiation transfer, etc.
- Theoretical developments, numerical simulations and field observation campaigns
- Electronics, optical interferometry, polarimetric and adaptive optics

## FOCUS ON

### Institutional partnership research

- Develop and integrate sophisticated instruments for the current and next generation of large telescopes.

### Private partnership research

- We have partnered with many companies in the construction of sophisticated optical, mechanical and electronic components for use in astrophysical instrumentation and research and development.

### Service

- We share our love of the universe through teaching at ENS de Lyon and in presentations to schools and the general public including open houses at the Lyon Observatory. Thanks to our instrumentation program, we support industries in France.

### CONTACT

CRAL - UMR 5574

ENS de Lyon, Monod campus

Observatoire de Lyon - Université Claude Bernard Lyon 1  
9 avenue Charles André, 69230 Saint-Genis-Laval

Director: Matthew Lehnert

Email: [matthew.lehnert@uniu-lyon1.fr](mailto:matthew.lehnert@uniu-lyon1.fr)

Telephone: +33 (0)4 78 86 85 24

<https://cral.uniu-lyon1.fr>

