

Welcome at Laboratoire de Physique des 2 infinis Irène Joliot Curie IJCLab

<https://www.ijclab.in2p3.fr>

IJCLab: New Laboratory born in 2020 from the merger of CSNSM, IMNC, IPNO, LAL, LPT



IJCLab : Located in Orsay Campus, 30 Km South-Paris, Campus Paris-Saclay

IJCLab is occupying a large part of the Orsay Campus ($\sim 50000\text{m}^2$)



We are here

RER B
Bures

IRFU/CEA in the same Campus

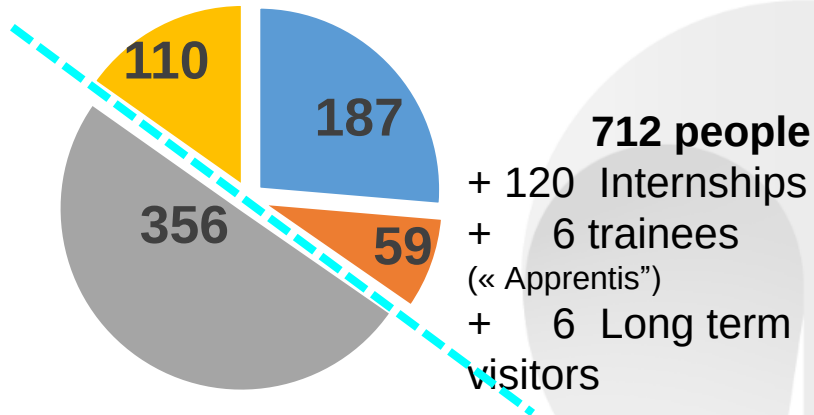
RER B
Orsay



IJCLab staff and guardianships

IJCLab : Personnel Status (including non permanent)

- Researchers CNRS
- Researchers-Teachers
- Engineers + Technicians



All in all >800 people present at the laboratory

CNRS (Centre National de la Recherche Scientifique)

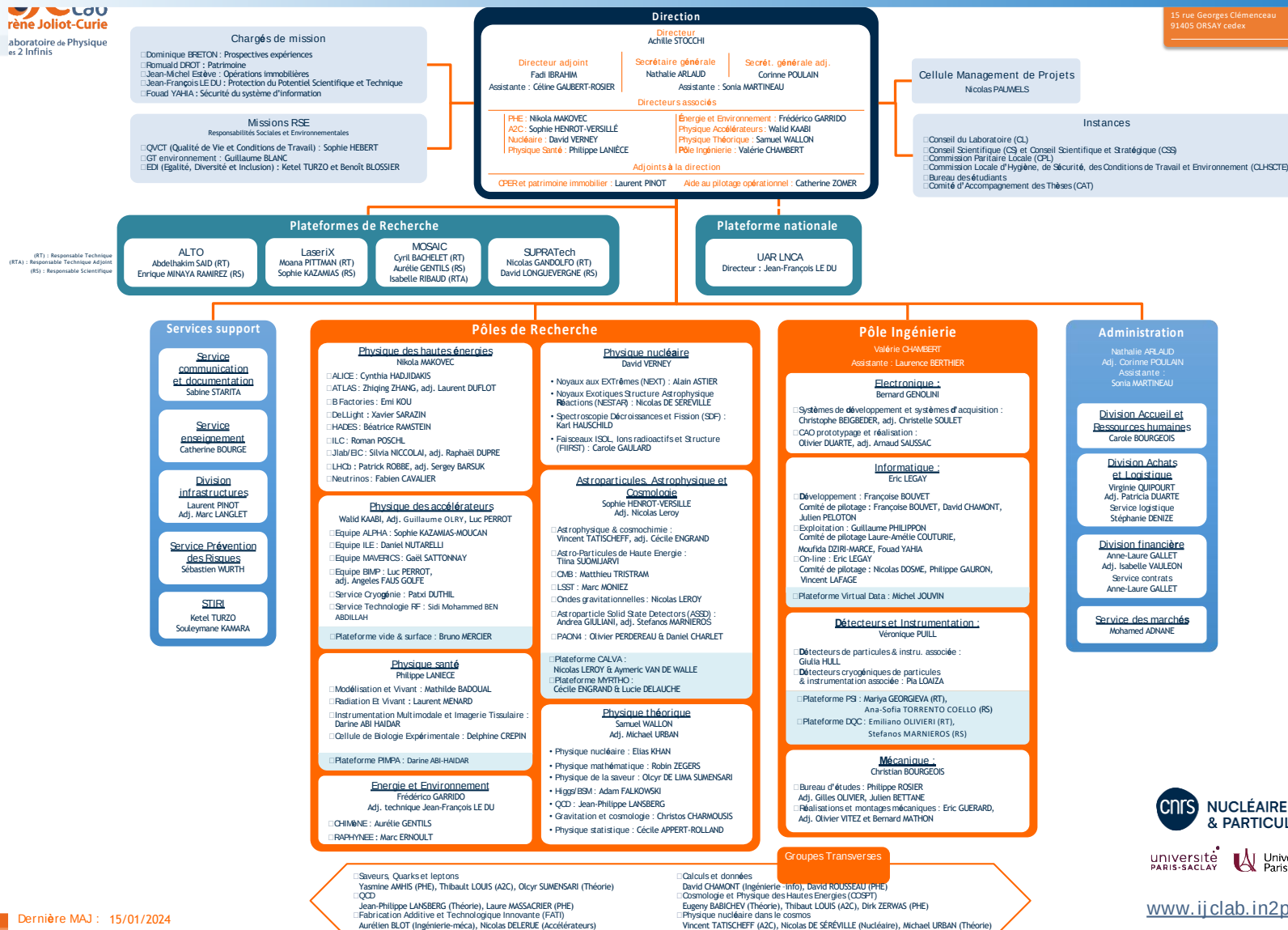
- ~17000 researchers + 16000 technical staff
- 10 institutes among them **IN2P3 (Institut national de physique nucléaire et de physique des particules)**
- IN2P3 composed by ~20 large-scale laboratories
- IJCLab is a IN2P3 laboratory
- **IJCLab (~700 people) ~1/4 of HR of the IN2P3.**

University Paris-Saclay

- 275 laboratories : 9000 researchers, 11000 IT (*University and research organism altogether, comprising CNRS and CEA*)
- 13th Shanghai ranking (Physics : 9th World, 1st Europe)
- 48000 students (with 9000 Master, 4000 PHD)

University de Paris

- Specific links with IJCLab in Health Physics



Dernière MAJ : 15/01/2024

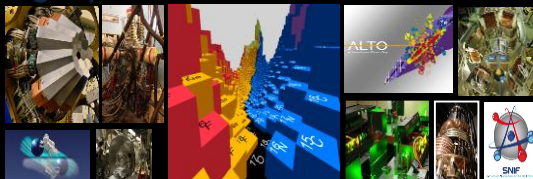


IJCLab in a nutshell

7 Pôle Scientifiques

All the themes of the "physics of the two infinities" with the presence of strong historical/existing poles, emerging poles and activities at the interfaces.

**PHYSIQUE NUCLÉAIRE**
NUCLEAR PHYSICS



~ 61

**A2C** Astroparticles, Astrophysics
& Cosmology



~ 58

Theory



~ 72

Health Physics



~ 25

Accelerator Physics ~ 87



Including RF and cryogenic services

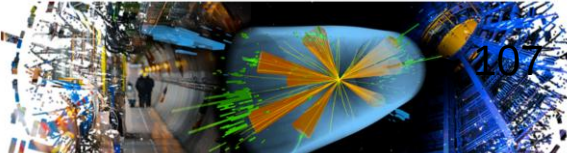
Energy and
Environnement



~ 34

~ 106

**PHE** Physique des Hautes Energies
High Energy Physics



~ 110 PhD



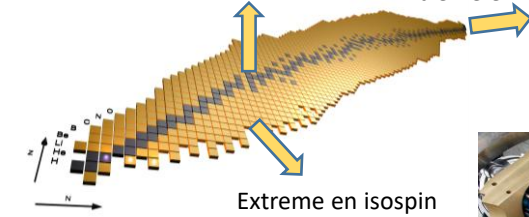
IJCLab : The Research Themes

Probing matter at small distances/high energy $E=hc/\lambda$, discover new particles $E=mc^2$

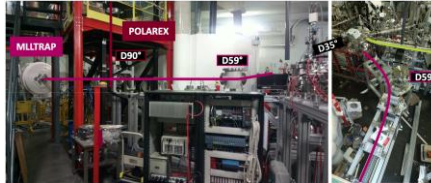
emergent properties of an effective interaction

Extreme en spin

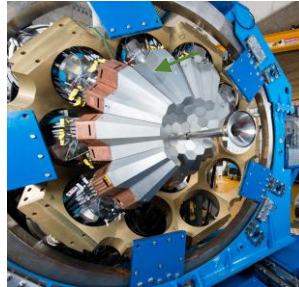
Extreme en mass



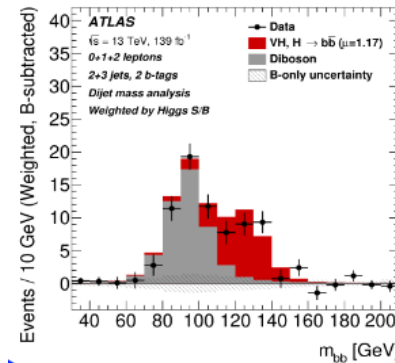
Extreme en isospin



Nuclear Physics



The standard model and the discovery of the Higgs boson!
The missing piece of the standard model

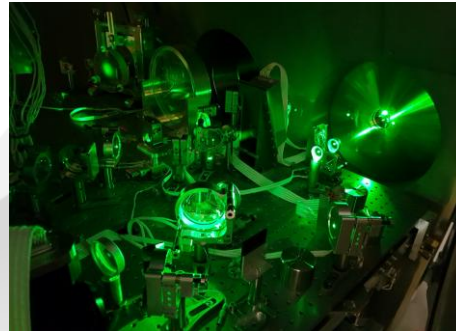
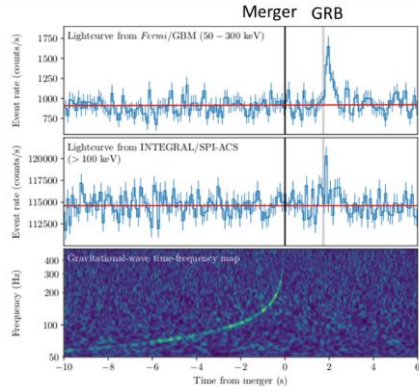


Particle/Hadronic

Understand the constituent elements of matter, their interactions
and how the properties of matter are derived from them

To understand the evolution of the Universe and to study the violent phenomena that occur in it, in connection with high energy physics

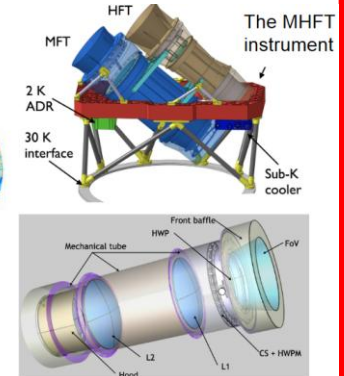
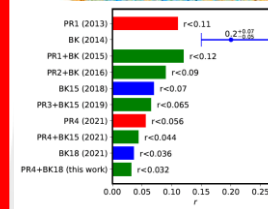
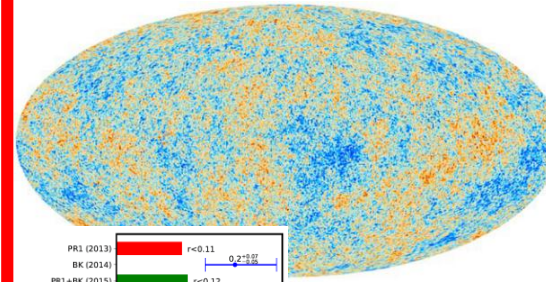
The observation of gravitational waves LIGO/VIRGO Space-time waves, direct observation of black holes / other compact objects



ASTROPARTICLES

Astrophysical events (high energy cosmic rays, black hole fusion, general relativity...)

The early universe seen by the CMB! The first picture of the universe



Cosmology

(evolution of the Universe, inflation, large structures, dark matter and energy)



IJCLab : The Research Themes

Design, develop and build tools to carry out this research

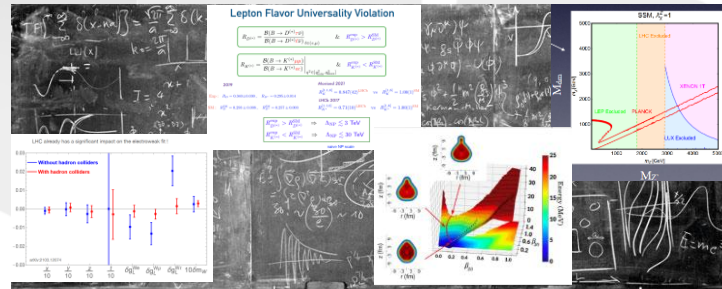


Accélérateurs



Detectors/Instrumentation

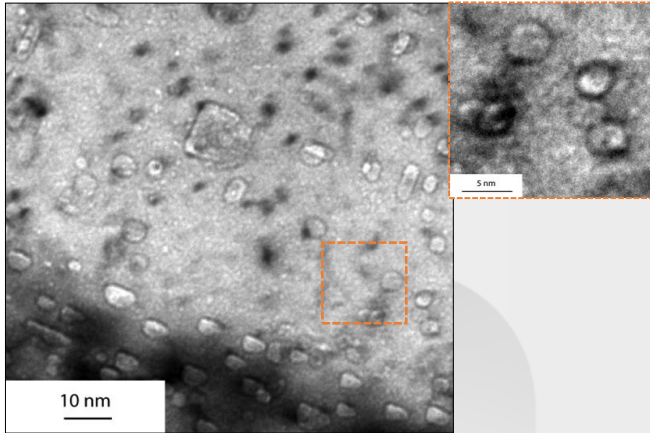
Theory



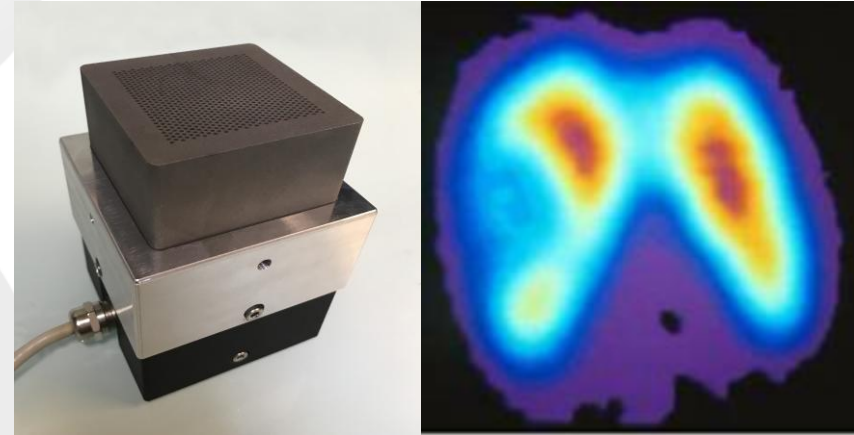


IJCLab : The Research Themes

Tools and concepts applied in areas that have an impact on society



Energy and environment: nuclear energy, radiochemistry and materials



Health physics:
Imaging, radiation therapy, life modeling



~180 staff members

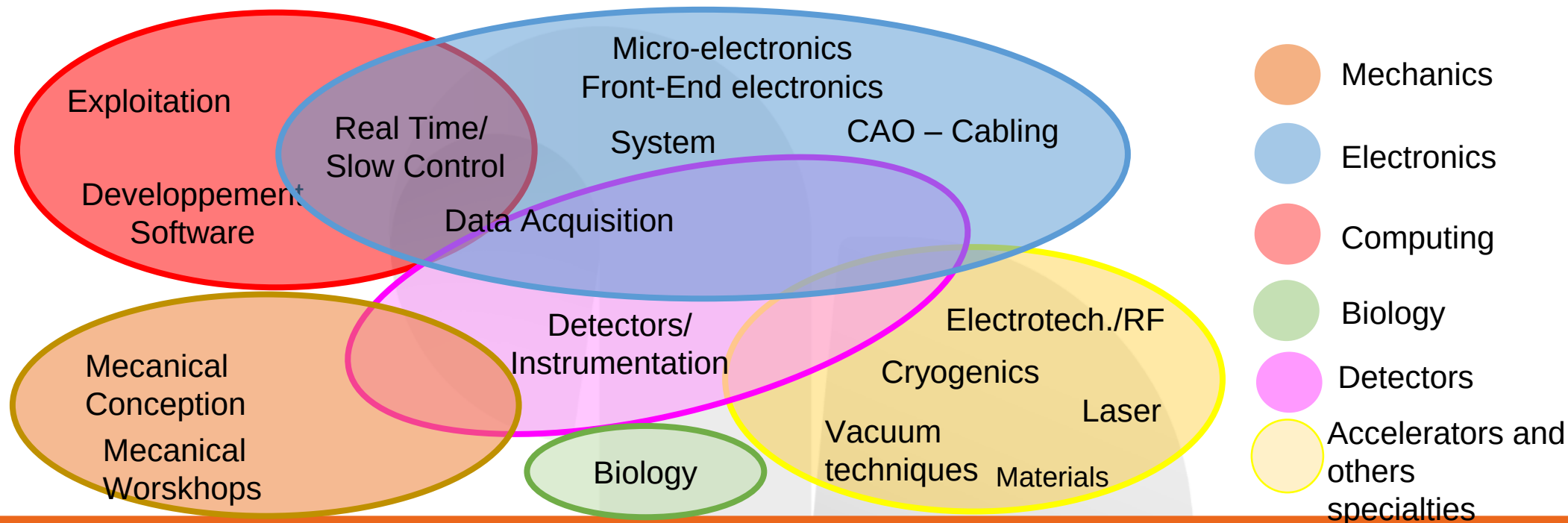
4 Departments :

Electronics /
Computing
Instrumentation / **Mechanics**
 with 10 Services

IJClab in a nutshell – III : Technical Skills

Technical staff with technical skills/expertise
essential pillars for the laboratory to design, draw and build instruments.

- Technical services are fuelled by the challenges of research (R&D and projects)
- The proximity of technical and research teams (integrated teams)
- The ability to combine and make coexist versatility and specialization



~ 180 personnes
11 services

Mécanique

- Bureau d'études
- Réalisations et montages mécaniques



700 m² d'atelier

- 11 Tours et Fraiseuses conventionnels + 2 tours CN
- 5 fraiseuses - 1 imprimante 3D
- + tôlerie + contrôle

Informatique

- Développement
- Exploitation
- On-line



Virtual Data datacenter
51 racks (2000 servers)
up to 600kW

Détecteurs et Instrumentation

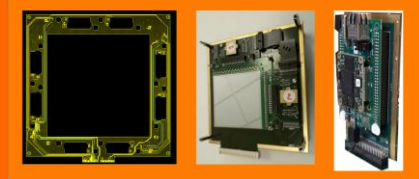
- Détecteurs de particules
- Détecteurs cryogénique

et instrumentation associée

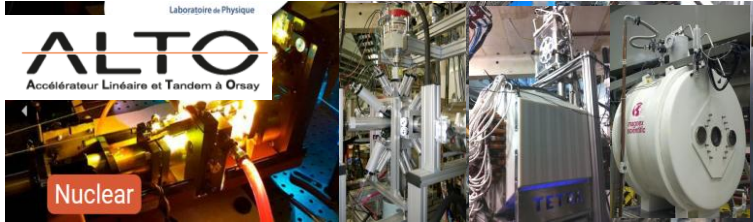


Electronique

- Dev. analogiques et micro-électronique
- Syst. numériques et acquisition
- CAO prototypage-réalisation



Electronique bas bruit pour détecteur Si à pistes



- **15 MV Tandem** (from proton to aggregates)
- **electron linac** -> radioactive beams by photofission

Nuclear, Health physics, Irradiation

Opened to external
users



Several MeV protons, multicharged atomic ions, gold molecules and nanoparticles

Nuclear/A2C, Health physics, Irradiation

Opened to external
users

mosaic

Ion irradiation / implantation and *in situ* characterization techniques (TEM, IBA)



Energy, nuclear materials, Health physics, Irradiation physics and chemistry

Opened to external
users

Semiconductor Platform :

Silicon Detector
Characterisation/Production



VIRTUAL DATA

Advanced computing
resources infrastructure
Grid / Cloud



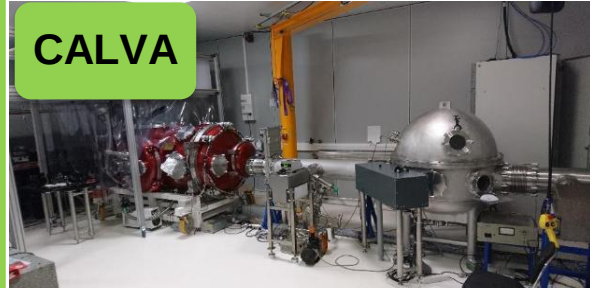
Health research themes



non linear optical biphotonique imaging

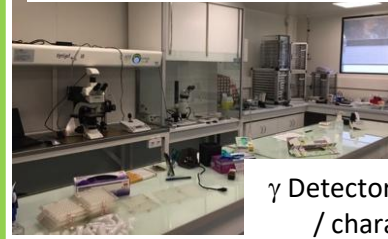
A2C Research themes

CALVA



Cavity locking/Squeezing for VIRGO and ET

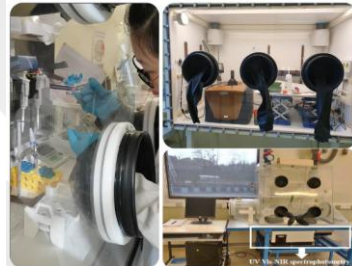
Micrometeorite Preparation/analysis



Myrtho

γ Detectors development
/ characterization

Radiochemistry laboratory Actinides - Bat 107



IJClab in a nutshell – V : The Platforms

Accelerators research themes/technologies

Opening to Materials, atomic physics, detectors

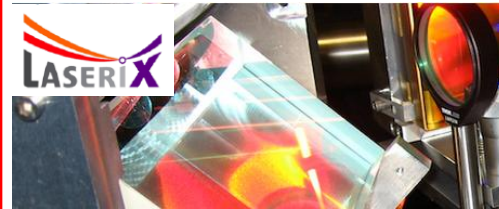
SUPRATECH

R&D on the superconducting
cavities (prepare, package,
assemble & test of the
superconducting RF cavities).



LaseriX

coherent, intense, brief (50fs
to 10 ps) sources in near-
infrared (800nm) and EUV (30
to 90 eV)



Vide et Surfaces
In construction





Major laboratories with facilities or facilities in the world where IJCLab is involved

Europe

SCK-CEN-Belgium
CERN
CTA-Spain
DESY-Germany
Dubna-Russia
EGO/VIRGO-Italy
ESS-Sweden
GANIL-France
GSI-Germany
Jyväskylä -Finland
LNCA-France
LNGS-Italy
LNL-Italy
LSM-France

World

Auger-Argentina
LBNL/SLAC-US
Fermilab-US
JLab-US
KEK-Japan
LSST-Chili
Riken-Japan

Each year, several bilateral international collaborations are signed with research centers and universities.

Recent example given below

