



# Workshop IFJ PAN-IJCLab



Bienvenu(e)s  
à Orsay

Witamy  
w Orsay

**December 7-8  
2023**

**IJCLab Orsay France/ Auditorium I. Joliot-Curie**



université  
PARIS-SACLAY

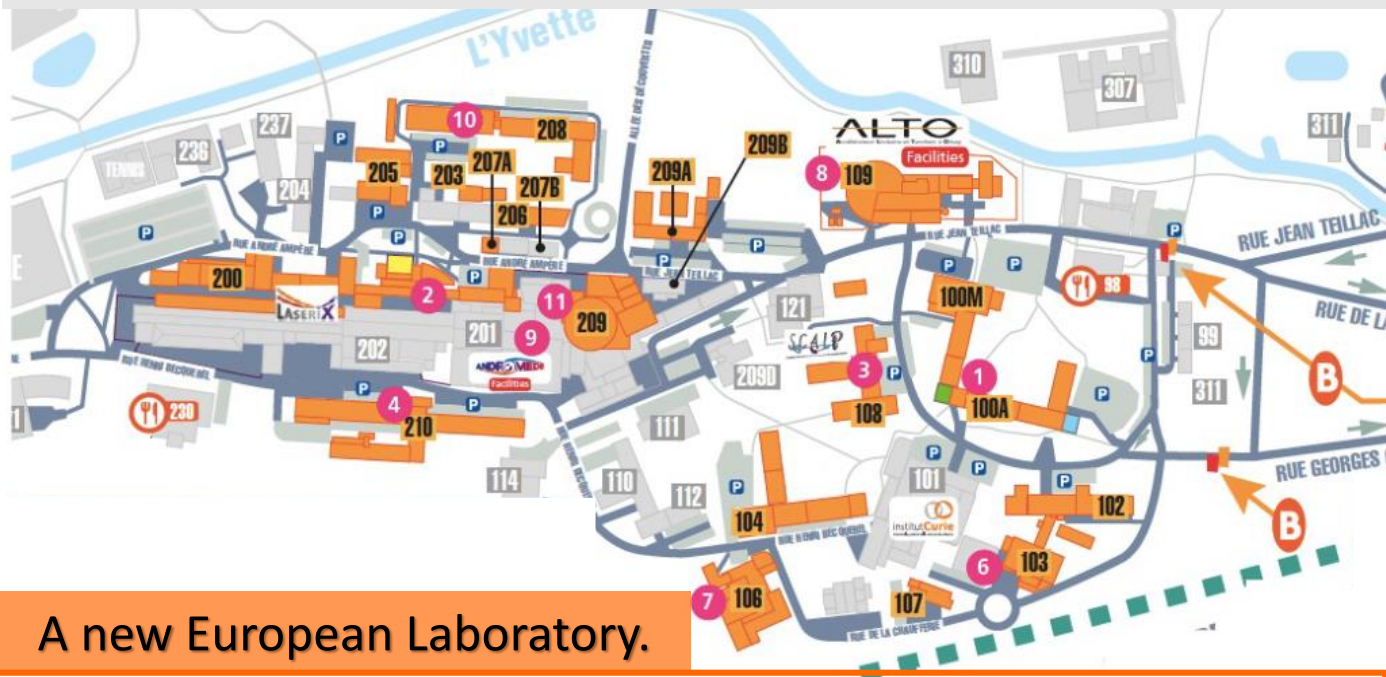




# IJCLab : Located in Orsay Campus, 30 Km South-Paris, Campus Paris-Saclay



IJCLab is occupying a large part of the Orsay Campus (~50000m<sup>2</sup>)

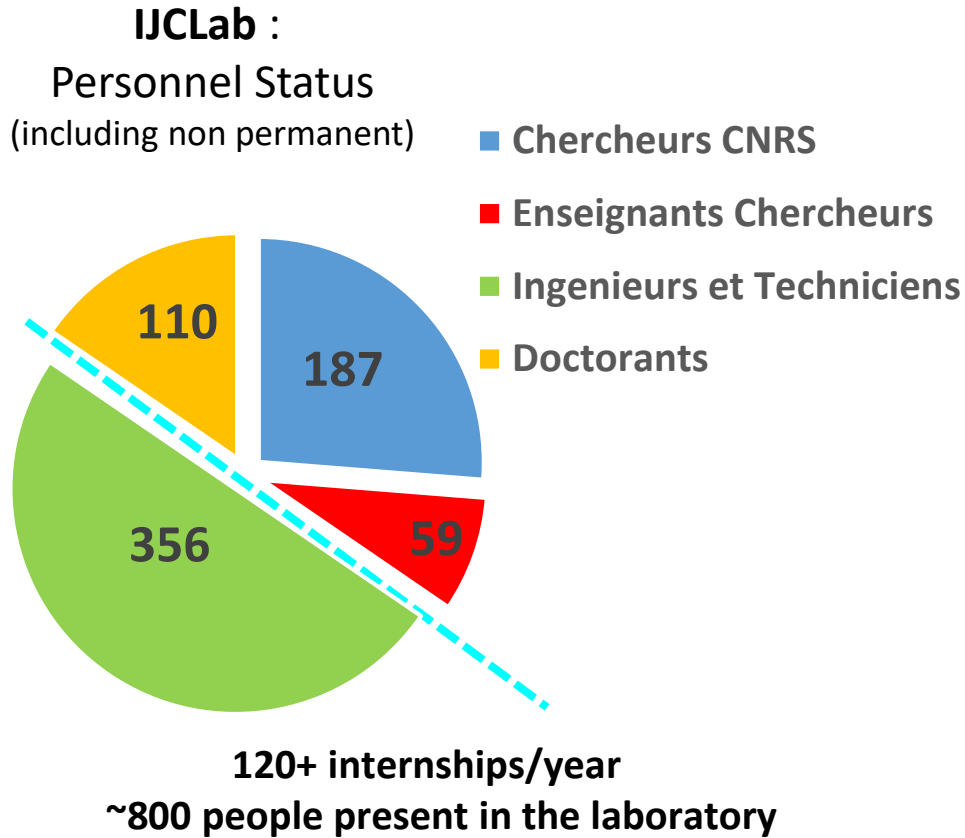


## A new European Laboratory.

Formed on 2020 by the merging of 5 Laboratories in Orsay-France

- CSNSM** *Centre de Sciences Nucléaires et de Sciences de la Matière*
- IPN** *Institut de Physique Nucléaire*
- IMNC** *Imagerie et Modélisation en Neurobiologie et Cancérologie*
- LAL** *Laboratoire de l'Accélérateur Linéaire*
- LPT** *Laboratoire de Physique Théorique*

**1st January 2020 : creation of IJCLab**



## 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 mainly linked to IN2P3.
- **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*)
- 13<sup>th</sup> Shanghai ranking (Physics : 9<sup>th</sup> World, 1<sup>st</sup> Europe)
- 48000 students (with 9000 Master, 4000 PHD)

## University de Paris

- Specific links with IJCLab in Health Physics



# The transformation of the Valley's urban planning



## Renovation and new urban planning in the Orsay Valley

The transformation of the Orsay Valley accompanied the creation of IJCLab. Today it has taken on a new lease of life after the creation of IJCLab.

Extension bâtiment 108



Ateliers bâtiment 100



Restructuration du Hall D1-D2, de l'IGLOO, bat 201



Ateliers bâtiment 200



Hall D3-D4 Bâtiments 201



Salle blanche bâtiment 200



Extension Virtual Data bâtiment 206

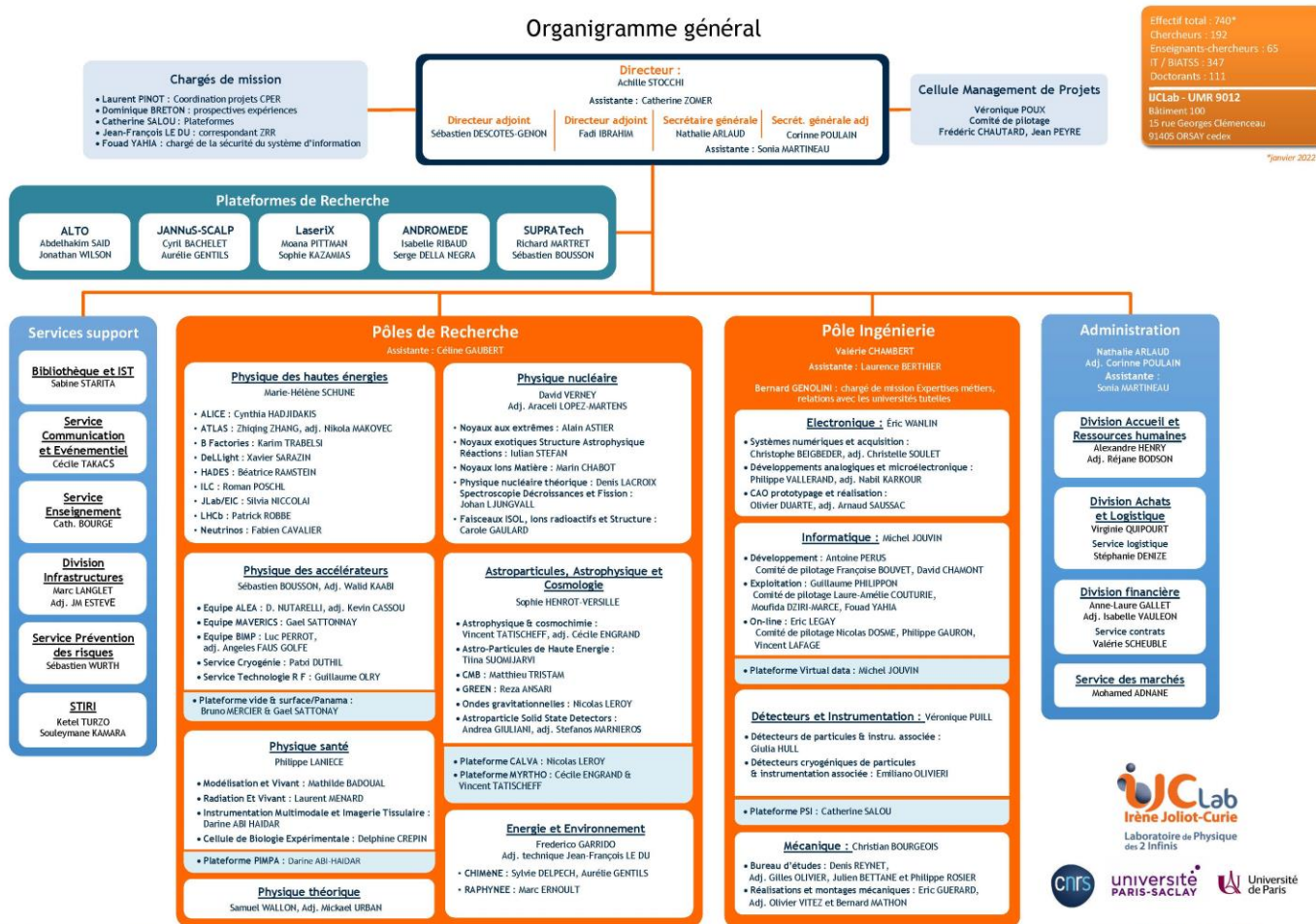


Cafeteria – Bât.102





# IJCLab : Organisation in 1 page !



**7 Research Poles**  
31 research teams and 2 Departments

**1 Engineering pole**  
4 Departments with 10 Services

**1 Administration Pole**  
3 Divisions + 1 Service

**6 support Services**  
**5 Platforms**  
**(with external users)**  
**+ several technical platforms**

**6 GROUPES TRANSVERSES**

- Saveurs: Quarks et Leptons**  
Yasmine Amhis(PHE), Thibaut Louis (A2C), Olcyr Sumensari(TH)  
QCD  
Jean-Philippe Lansberg(TH), Laure Massacrier(PHE).  
**Fabrication Additive Technologies Innovantes (FATI)**  
Stéphane Jenzer(PI-Mécanique), Nicolas Delerue (PA)  
**Calculs et Données**  
David Chamont(PI-Informatique), David Rousseau (PHE)  
**Cosmologie et Physique des Hautes Energies (COSPT)**  
Eugeny Babichev(TH), Thibaut Louis (A2C), Dirk Zerwas(PHE)  
**Physique nucléaire dans le cosmos**  
Nicolas Leroy (A2C), Nicolas de Séréville(PN), Michael Urban(TH)



[www.ijclab.in2p3.fr](http://www.ijclab.in2p3.fr)

Dernière MAJ : 19/07/2021



# IJCLab in a nutshell

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.

**A2C** Astroparticles, Astrophysics & Cosmology

**PHYSIQUE NUCLÉAIRE**  
**NUCLEAR PHYSICS**



Theory



Health Physics



**Accelerator Physics**



Including RF and cryogenic services



**Energy and Environnement**



~ 120 PhD

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**

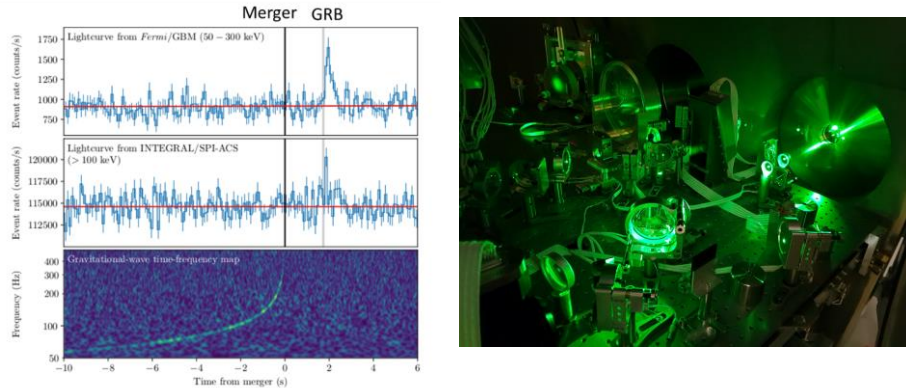
The standard model and the discovery of the Higgs boson!  
The missing piece of the standard model

**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

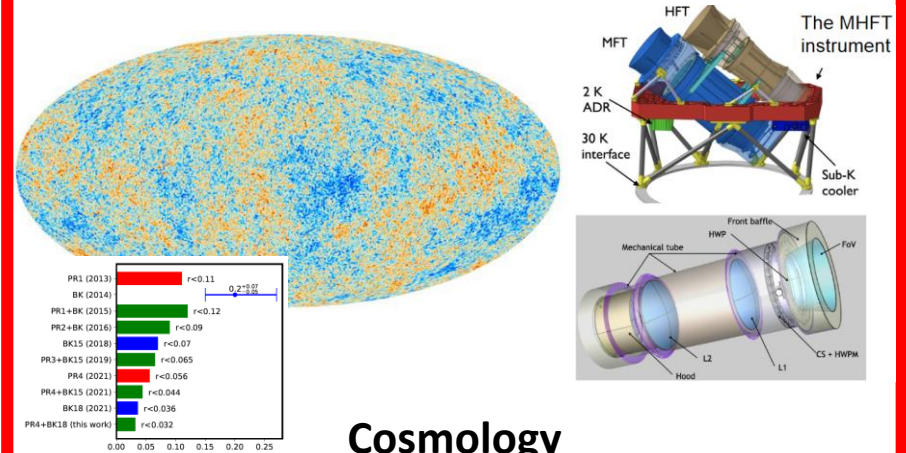
## The observation of gravitational waves LIGO/VIRGO Space-time waves, direct observation of black holes / other compact objects



### 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)



## Design, develop and build tools to carry out this research

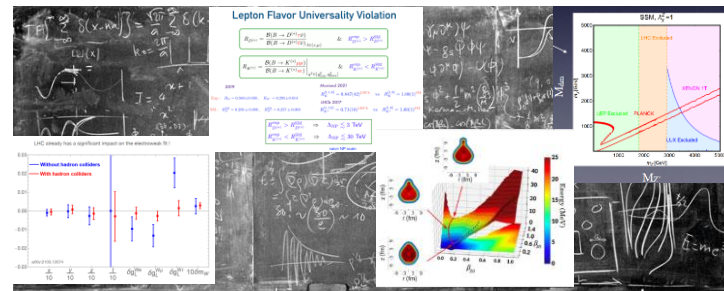


### Accélérateurs

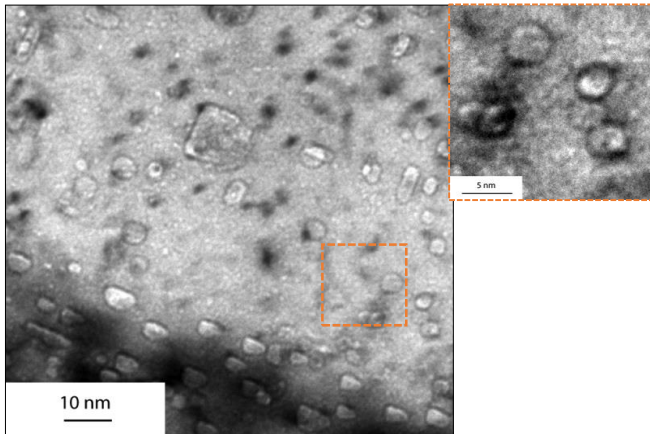


### Detectors/Instrumentation

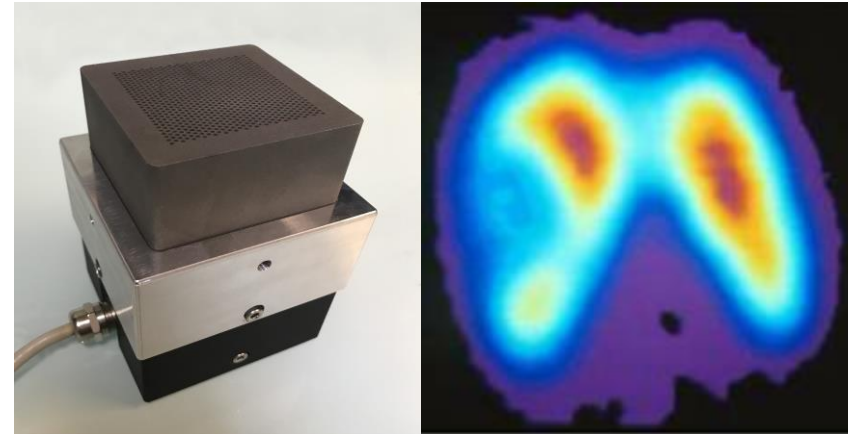
### Theory



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 : Technical Skills

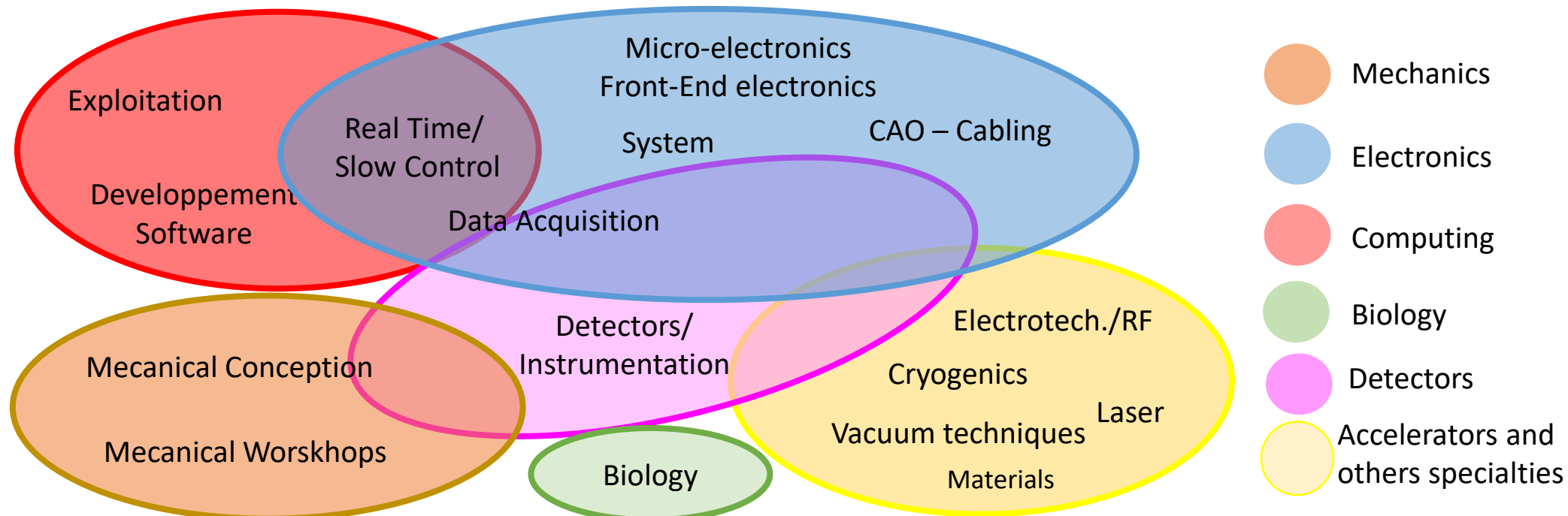
## Services in accelerator Pole

- RF
  - Cryogenics
- ~30 staff members

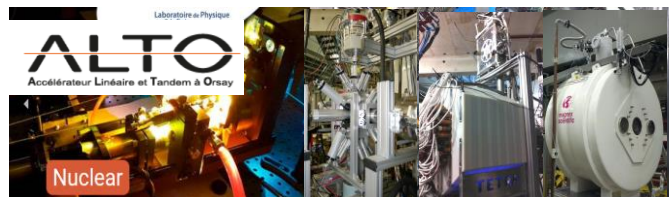
### Technical staff with technical skills/expertise

**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



~30 permanent staff operating/  
working on the platforms



- **15 MV Tandem** (from protons to agregats)
- **Electron linac** -> radioactive beams by photofission

**Nuclear, Health Physics, Irradiation**

Open to external users



Multi-MeV protons, multi-charged atomic ions, gold molecules and nanoparticles

**Nuclear/A2C, Health Physics, Irradiation**

Open to external users



**Irradiation / ion implantation and in situ characterization techniques (TEM, IBA)**

**Energy, nuclear materials, health physics, irradiation physics and chemistry**



# IJClab : The Plateformes in a nutshell



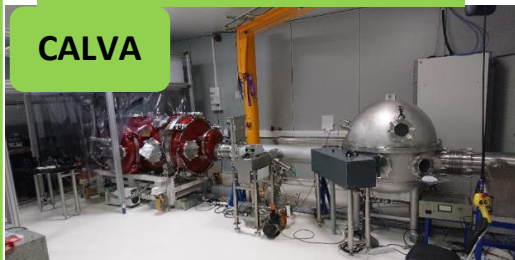
## PSI

Silicon Detector  
Characterization/Production



## Research topics A2C

### CALVA



Cavity locking/Squeezing for VIRGO and ET

Preparation/analysis Micrometeorites



### Myrtho

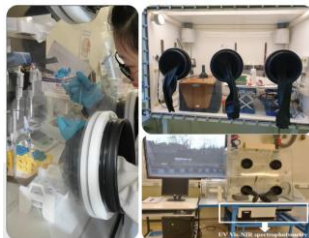
detector for astro gamma

## VIRTUAL DATA

Advanced computing  
resources infrastructure  
Grid / Cloud



## Laboratoire de radiochimie Actinides - Bat 107



Research topics Health Physics



non linear optical biphotonique imaging

## Research topics/accelerator technologies

Open to Materials, atomic physics, detectors



### SUPRATECH

R&D on superconducting cavities  
preparation, packaging, assembly and  
testing of superconducting RF cavities



### LaseriX

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



*Vacuum and Surfaces*



# IJCLab in a nutshell: Support Services Support



The Support Services are essential to support all scientific and technical activities of the laboratory

## Administration

47 members

Division accueil et ressources humaines

Division achats et logistique  
Service logistique

Division financière  
Service contrats

Service des marchés

**A strong and newly structured administrative department**  
**3 divisions**  
**2 departments**

3

**CeMaP**

*Project Management Unit. Accompanies and supports project leaders, provides input and advises IJCLab management.*

38 members

Management of libraries, common digital library, simplified access to all documentary resources and laboratory productions.

National/international visibility of the IJCLab: external and internal communication, organization of events, heritage activities...).

Support to teaching activities: make the IJCLab a meeting place for students.

Essential for a "laboratory builder". for the success of the new implementation of IJCLab.

Key role, given the specificity of our research activities and all the facilities involved.

International cooperation and links with companies: two pillars of IJCLab

## Services support

Documentation

Communication & Événementiel

Enseignement

Infrastructures

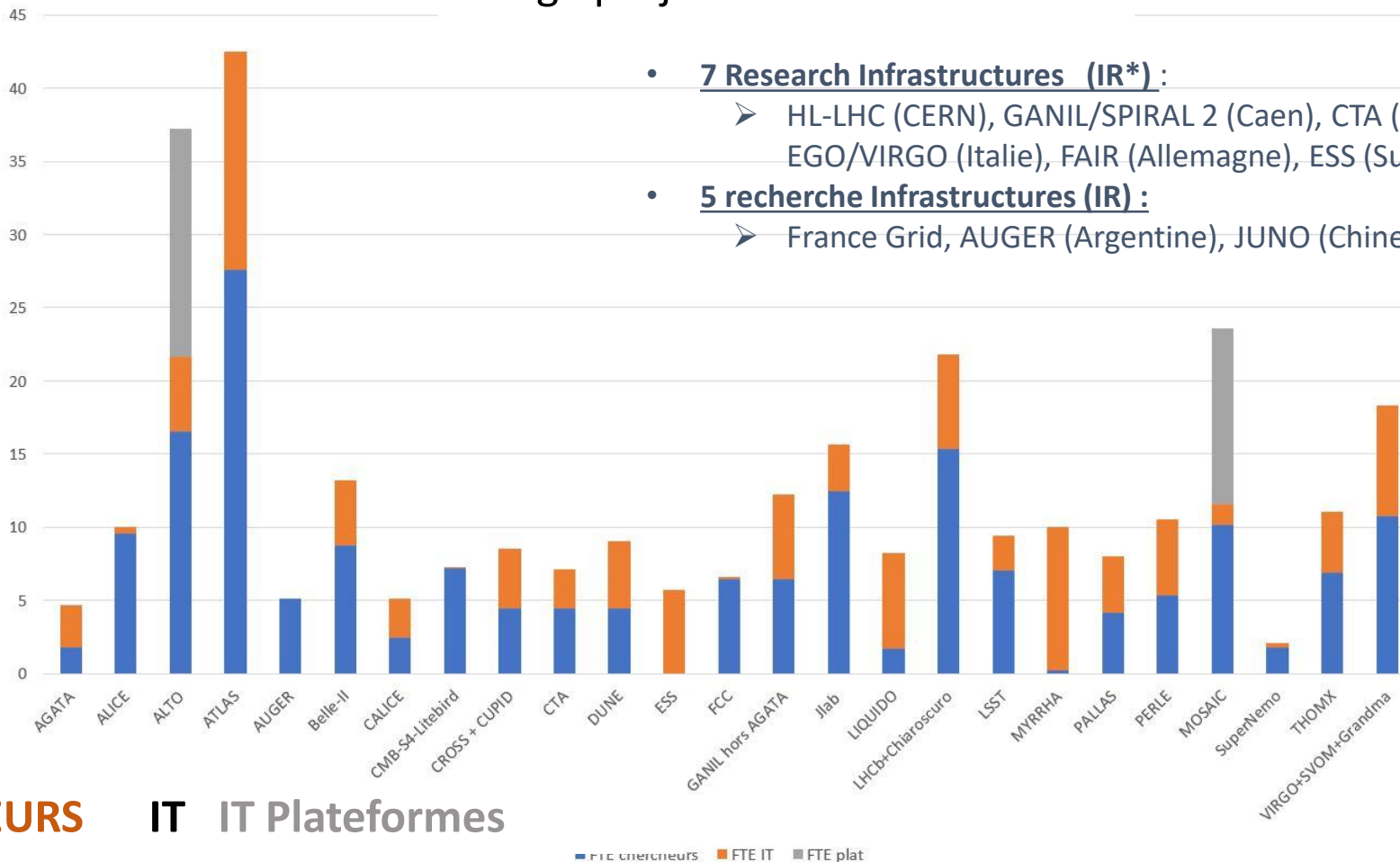
Prévention des risques

STIRI



## Large projects at IJCLab

Full Time Equivalent



- **7 Research Infrastructures (IR\*) :**
  - HL-LHC (CERN), GANIL/SPIRAL 2 (Caen), CTA (Espagne et Chili), EGO/VIRGO (Italie), FAIR (Allemagne), ESS (Suède), DUNE (États-Unis)
- **5 recherche Infrastructures (IR) :**
  - France Grid, AUGER (Argentine), JUNO (Chine), AGATA, EMIR&A

CHERCHEURS

IT IT Plateformes



# IJCLab : “A Year budget”



<b>Assigned by governing bodies</b>	Laboratory operation (including “Frais Campus”/electricity)	~6.5M€
	Specific programs	~3.5M€
<b>Contracts : ANR/Europe/industry/Region...</b>		~4.5M€
<b>Own Resources (overheads, services, ..)</b>		~2.5M€
<b>Special funding for infrastructures (CPER) [last 6 years]</b>		~3.0 M€
<b>TOTAL RESOURCES</b>		<b>~20M€</b>

Salary of permanent staff	~40.5M€
Salary of non permanent	~2.5M€
<i>The salaries of the permanent staff are not in the laboratory budget : directly payed by the employers (CNRS/Universities)</i>	





# The valorization of our research with a strong economic and social impact, links with th

## Opening of the platformes to industrials

~1M€ (PIA- filiere BPI/Region)  
IT transfert



## Know-how Transfert



Assembly of cryomodules (accelerators)



CNIM

## 1 Start up

**Beams** Gamma Camera (Health Physics)  
(hosted at IJCLab)



Recall : Spin-off of lab: ACS



## 6 Technological Transferts

from DECLIC (TRL1-2) to Maturation (TRL 8)

~3.0M€

## 19 Contrats with industrials

(13 on going)  
~2M€  
8 PHD CIFRE





## Teaching

### Academic, Technical, Platforms

*~60 Researchers-Teachers + ~30 Researches-CNRS are involved in University teaching.  
~60 Technical staff teach different skills and specialities (university / Schools..)  
Research Installations/ Platforms -> Educational platforms with dedicated lines*

## Internships for students

### Internships: the gateway for students to discover research

*Internships at different level (from L1 to M2 and international.) :  
~180 internships in 2022 corresponding to approximatively ~500 months*

## Thesis

### PhD Training by research and for research

*~110 PhD students in the ensemble of the laboratories (from 30 different nationalities)  
Number of technical theses rapidly increasing*

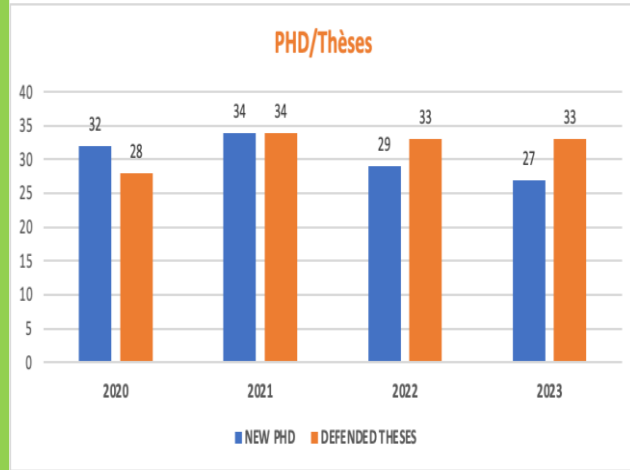
## International Schools

### Participation and creation of international/national schools

*Participation/creation of international/national schools  
School : WISHEPP (Palestine), TESHEP (Ukraine...), QCD, School at L3 level...  
IJCLab leads Erasmus+ MIC Colombia / Georgia / Ukraine / Palestine and Erasmus Mundus Lascala*

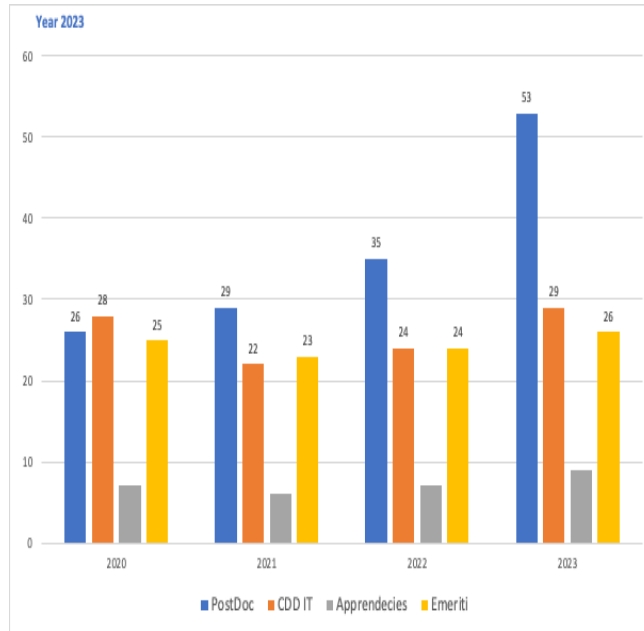


# Some significant figures/stats



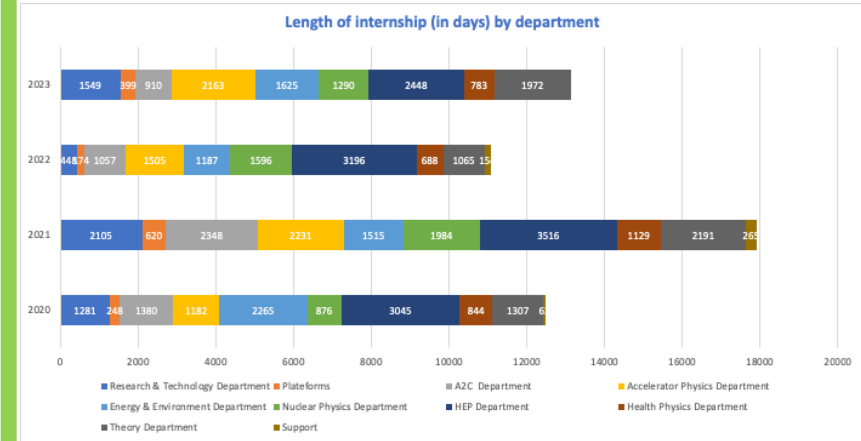
~30 PHD student incoming/year  
~30 PHD defences/year

## CDD/Postdoc



A timid increase of PostDoc, to be confirmed with the increasing success of the different national/European calls

## Internships



	2020	2021	2022	2023
<b>Number of internships</b>	151	210	148	169
<b>Number of months</b>	530	664	436	505
<b>% Bac + 2</b>	12%	9%	12%	8%
<b>% L</b>	21%	22%	33%	33%
<b>% M1</b>	33%	34%	27%	29%
<b>% M2</b>	34%	35%	28%	30%

**Internships – Visible Strategy of the laboratory**



## In conclusions, our Manifesto



- **Contributing to projects at all stages:** proposal, design, construction, operation, data analysis, theory
- **Playing a major role in the conception, design and construction of current and future accelerators.**
- **Developing and operating research infrastructures and technological platforms** supporting these research areas as well as original research in health physics and energy
- **Promoting the development of new technologies for science for the benefit of society** and thus supporting national and European industrial competitiveness
- **Welcoming students that the laboratory trains through and for research** in the heart of a world-class academic environment.



# Welcome !



**Workshop IFJ PAN - IJCLab**  
*7-8 december 2023*

*Auditorium Joliot-Curie bldg. 100A*



We expect two fruitful days

Aiming to start in 2024 commun projects / mobilities !