

Présentation d'IJCLab

Visite CNES – 21 Septembre 2021

BIENVENUE



Formed on 2020 by the merging of CNSM, IPN, IMNC, LAL, LPT



Chargés de mission

CeMaP

Direction du laboratoire

Plateformes de Recherche

ALTO

ANDROMEDE

JANNuS/SCALP

SUPRAtech

LaserIX

Pôles de Recherche

PHYSIQUE DES HAUTES ÉNERGIES

- ALICE
- ATLAS
- B Factories
- DeLLight
- HADES
- ILC
- JLab/EIC
- LHCb
- Neutrinos

PHYSIQUE DES ACCÉLÉRATEURS

- ALEA
- MAVERICS
- BIMP
- Cryogénie
- Technologie RF
- Plateforme /PANAMA

PHYSIQUE SANTÉ

- Modélisation et vivant
- Radiation et vivant
- Instrumentation Multimodale et Imagerie Tissulaire
- Cellule de Biologie expérimentale

PHYSIQUE THÉORIQUE

PHYSIQUE NUCLÉAIRE

- Noyaux aux extrêmes
- Noyaux exotiques structures astrophysique réactions
- Noyaux ions matière
- Physique nucléaire théorique
- Spectroscopie décroissances et fission
- Faisceau ISOL, ions radioactifs et structure

ASTROPARTICULES, ASTROPHYSIQUE ET COSMOLOGIE

- Astrophysique & cosmochimie
- Astro-particules de haute énergie
- CMB
- GREEN
- Ondes gravitationnelles
- Astroparticules Solid State detectors

ENERGIE ET ENVIRONNEMENT

- CHIMÈNE
- RAPHYNEE

Pôle Ingénierie

ELECTRONIQUE

- Systèmes numériques et acquisition
- Développements analogiques et microélectronique
- CAO prototypage et réalisation

INFORMATIQUE

- Développement
- Exploitation
- On-Line

DÉTECTEURS ET INSTRUMENTATION

- Détecteurs de particules & instrumentation associée
- Détecteurs cryogéniques de particules & instrumentation associée

MÉCANIQUE

- Bureau d'études
- Réalisations et montages mécaniques

Administration

Division accueil et ressources humaines

Division achats et logistique

Service logistique

Division financière

Service contrats

Service des marchés

~710 membres (530 permanents)

One of the biggest laboratory in CNRS / Paris-Saclay / Université de Paris



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

7 Pôles de recherche

31 research teams et 2 services

1 Pôle Ingénierie

4 Départements with 11 Services

1 Pôle Administration

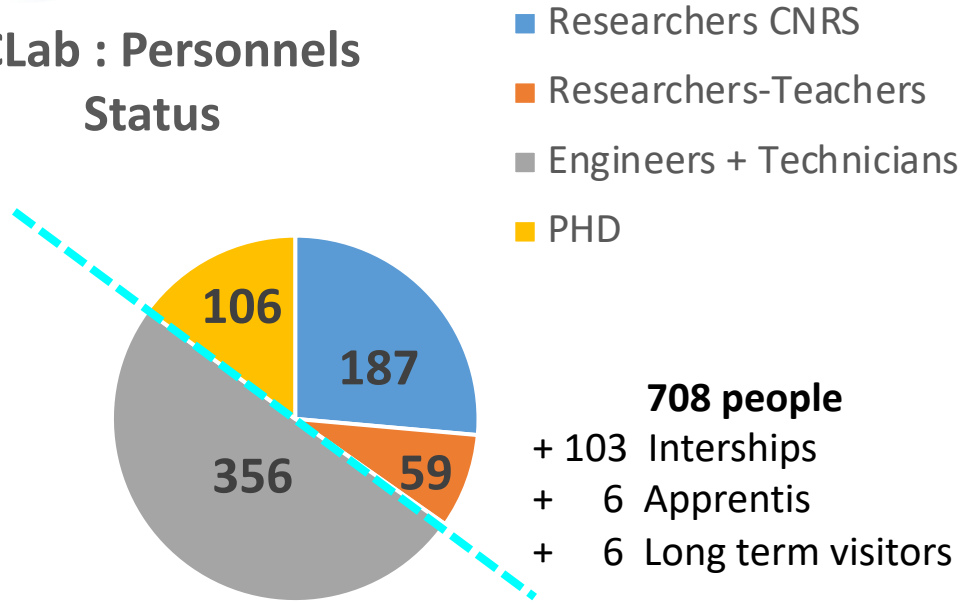
3 Divisions + 1 Service

8 Support Services

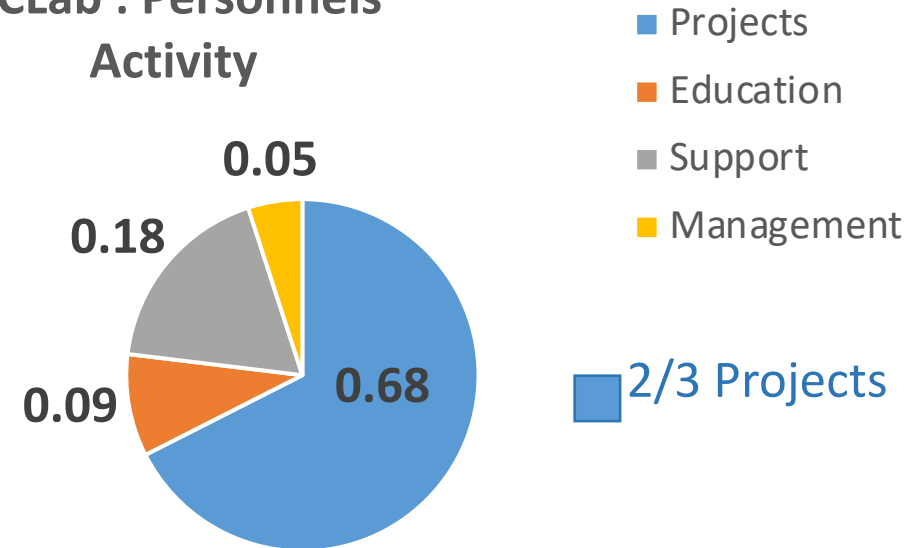
5 Plateformes (with externals)

+ several technical platforms

IJCLab : Personnels Status



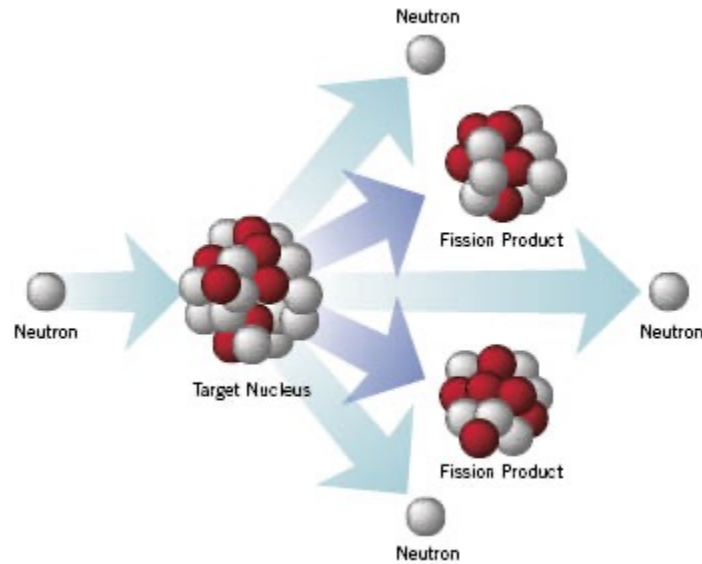
IJCLab : Personnels Activity



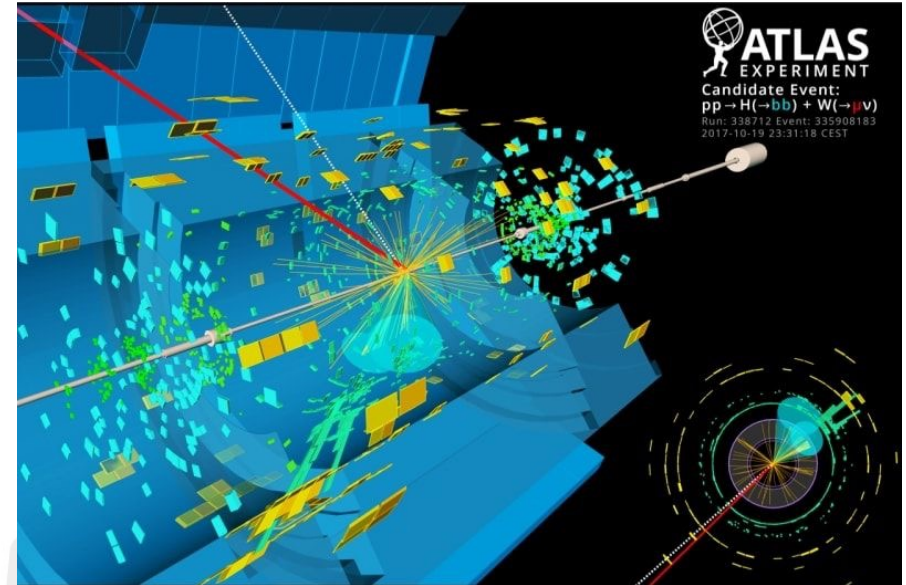


IJCLab in a nutshell (1)

Historically : Probing matter at small distances/high energies due to $E=hc/\lambda$



Nuclear Physics



Particle Physics

Understanding the building blocks of matter, their interactions, and how matter properties emerge from them

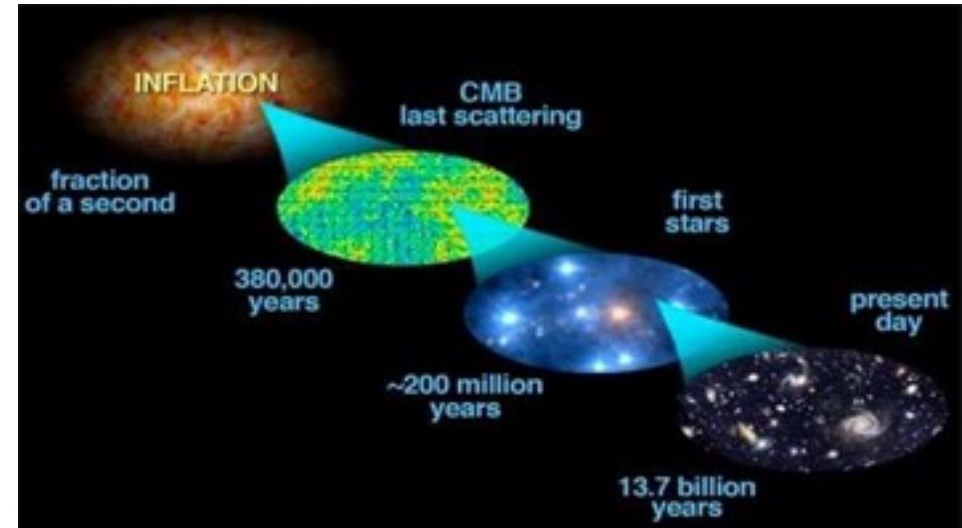


IJCLab in a nutshell (2)

High energies also involved in studying violent phenomena of the Universe with natural links with high-energy physics



Astrophysical events
(high-energy cosmic rays,
black holes merger,
general relativity...)

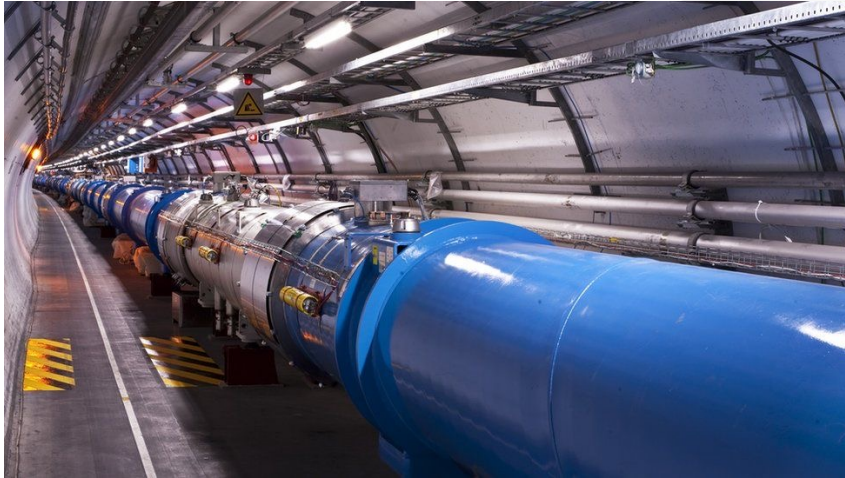


Cosmology
(evolution of the Universe,
inflation, large structures,
dark matter and energy)

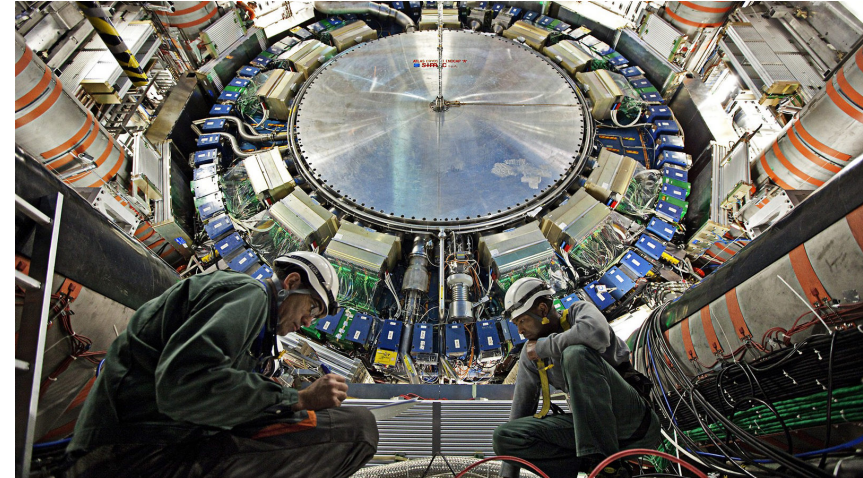


IJCLab in a nutshell (3)

Building tools to perform these investigations

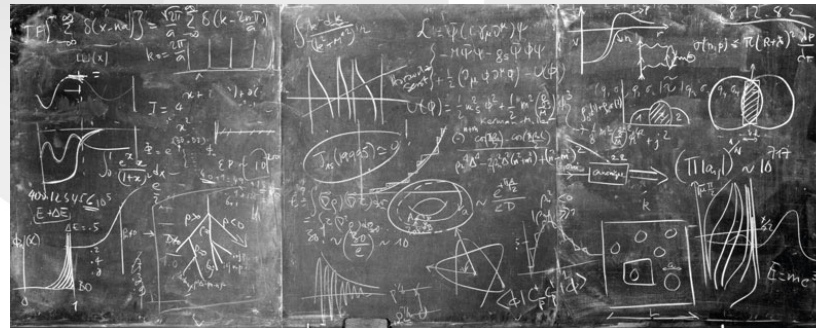


Accelerators



Detectors

Theory : interpreting
and relating results



and suggesting new
tests and ideas

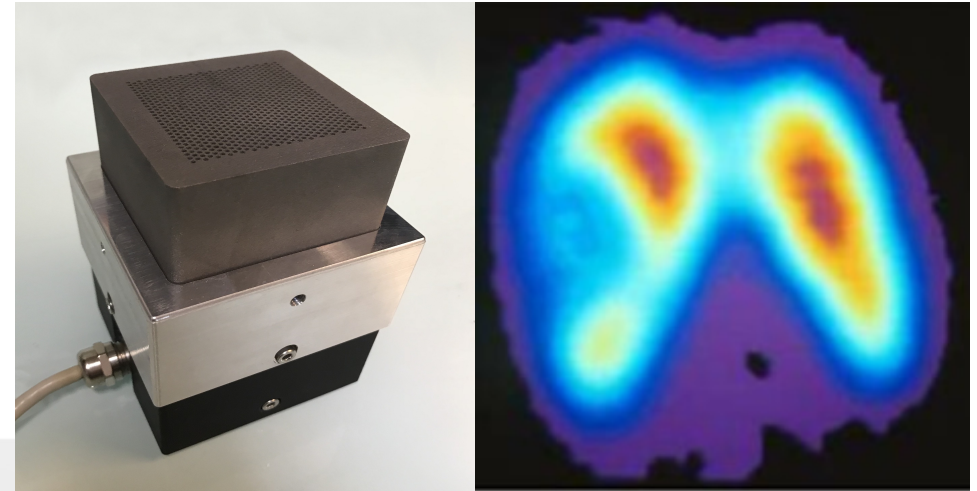


IJCLab in a nutshell (4)

Tools and concepts applied in areas with impact on society



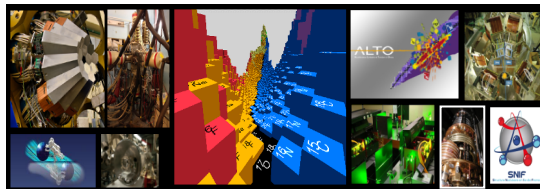
energy and environment
(nuclear energy,
radiochemistry...)



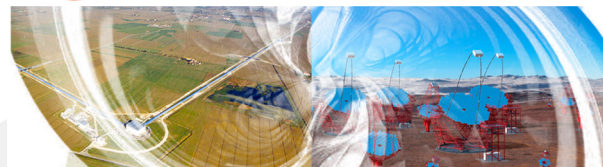
health physics
(imaging,
therapy by irradiation)

The ensemble of all the themes of “the physics of the two infinities” with the presence of strong historical/existing poles, of emerging poles and of activities at the interfaces

PHYSIQUE NUCLÉAIRE
NUCLEAR PHYSICS ~ 71



A2C Astroparticles, Astrophysics
& Cosmology ~ 64

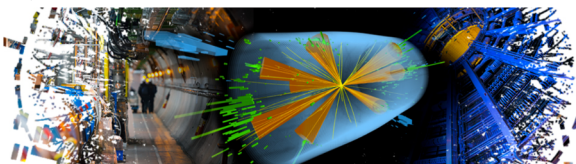


Accelerator Physics ~ 87

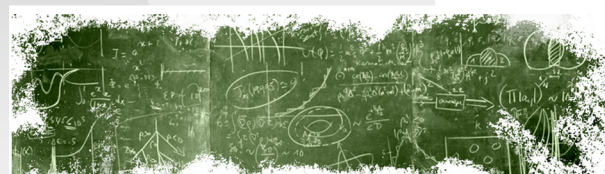


Including RF and cryogenic services

PHE Physique des Hautes Energies
High Energy Physics ~ 107



Théorie ~ 52



Energie et Environnement ~ 40



Santé ~ 23

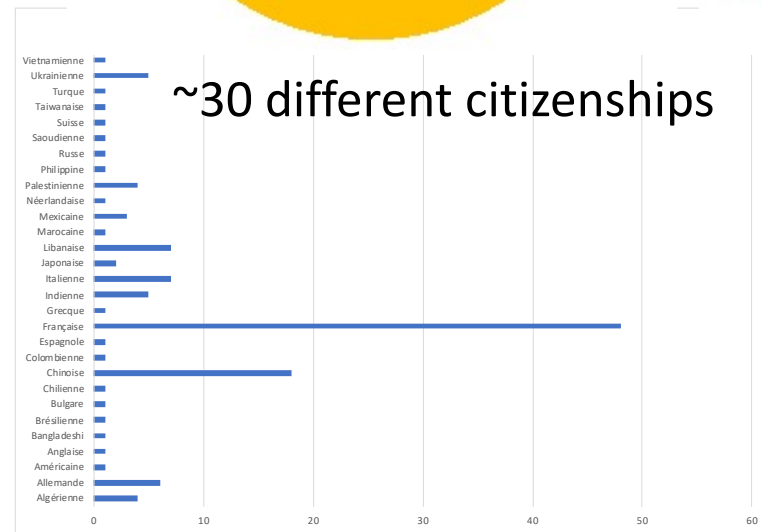
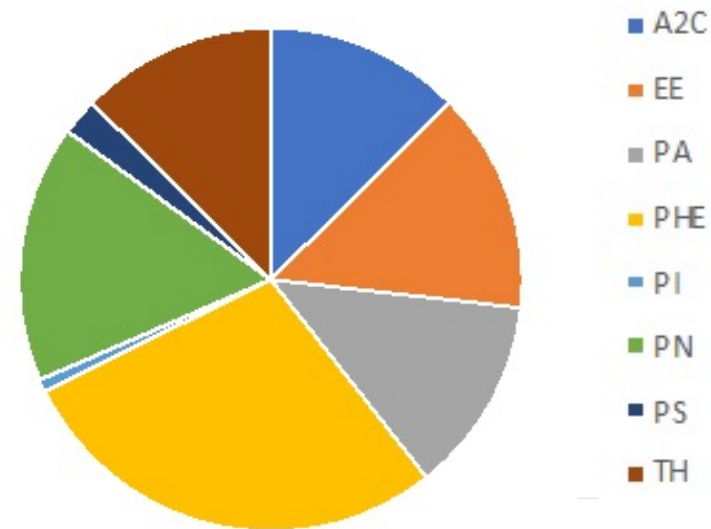


~ 130 PhD



Pole	1 st year	2 nd year	3 rd year	4 th year	Total
A2C (Astro)	4	5	4	3	16
EE (Energy)	4	6	6	2	18
PA (Accelerators)	4	2	4	6	16
PHE (High-Energy)	19	5	7	5	36
PI (Engeneering)	1	0	0	0	1
PN (Nuclear)	4	5	9	3	21
PS (Health)	0	2	0	1	3
TH (Theory)	3	6	6	1	16
Total	39	31	36	21	127

127 PhD students today @ IJCLab





Technical Services / Specialities- I

One of the essential characteristics of the IJCLab is the presence of services and technical platforms with remarkable or unique skills and technical expertise that are essential to the success of the scientific project.

This multidisciplinary expertise is recognized at the national and international level and constitutes an essential part of our contributions to the projects.

Keys to success:

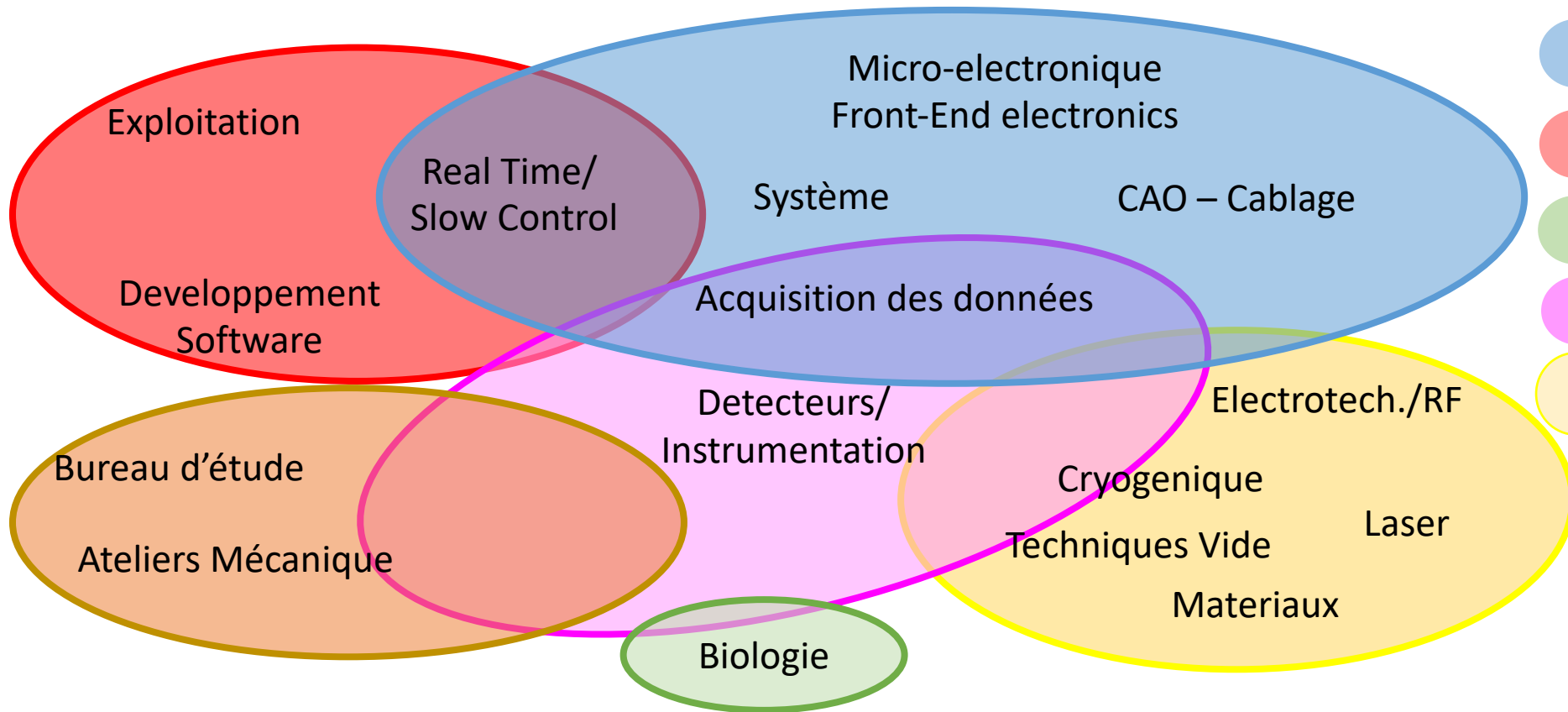
- The fact that technical services are fueled by research challenges (R&D and Projects)
- the proximity of the technical and research teams (integrated teams)
- the ability to combine and make coexist versatility and specialization





Technical Services / Specialities- I

- Mecanique
- Electronique
- Informatique
- Biologie
- Detecteurs
- Accélérateurs et autres spécialités



A strong center of competence, essential pillars for the laboratory to conceive, design and build the instruments.

~ 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

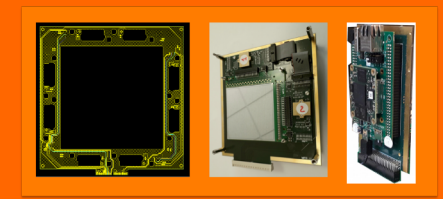
- Détecteurs de particules
- Détecteurs cryogénique

et instrumentation associée



Electronique

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



Electronique bas bruit pour détecteur Si à pistes



The Platforms - I

~30
Technical
staff

The **ALTO** platform with two accelerators unique in France :

- **15 MV Tandem type electrostatic** accelerator for accelerating stable beams from proton to aggregates
- **electron linear accelerator for producing radioactive beams by photofission.**

10 physics lines (nuclear physics, astrophysics and multidisciplinary studies...), 4000 hours/year, 30 experiments/ year.



ALTO
Accélérateur Linéaire et Tandem à Orsay

in the process of obtaining the
status of national platform

Equipment delivering specific beams:

- Stable light beams with heavy ions
- Radioactive beams
- Aggregate bundles
- Neutron beams



The Platforms - II

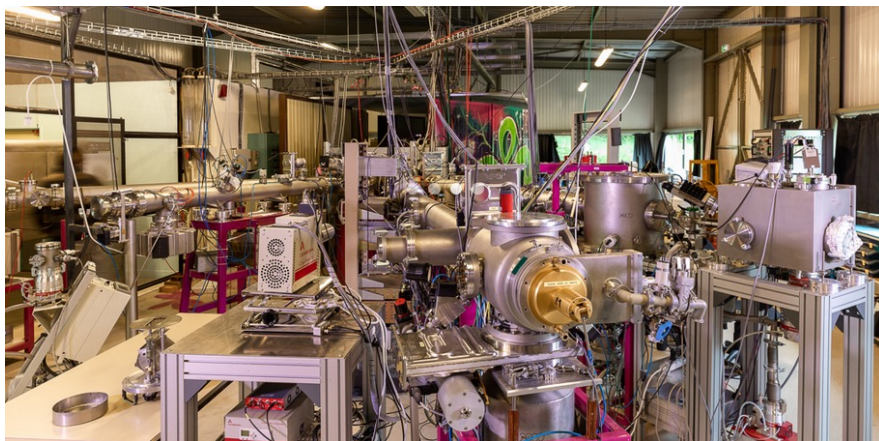
Andromede : multidisciplinary platform, unique in the range of beams of several MeVs delivered: protons, multicharged atomic ions, gold molecules and nanoparticles. Including an "ion source" R&D activity. It is equipped with two beam lines (90° and $1^\circ 29'$).



JANNU-S-SCALP : interdisciplinary platform for fields ranging from materials sciences to astrophysics, including geology and nuclear physics.



JANNU-S-SCALP founding member of the EMIR & A federation included in the national roadmap for research infrastructures.



ongoing extension in CPER and Equipex+ DIAPASON

Different equipments for ion irradiation / implantation and analysis . Coupling of Transmission Electron Microscope with ARAMIS and IRMA lines unique in the world due to the diversity of elements and energies accelerated in situ inside the MET.



The Platforms - III

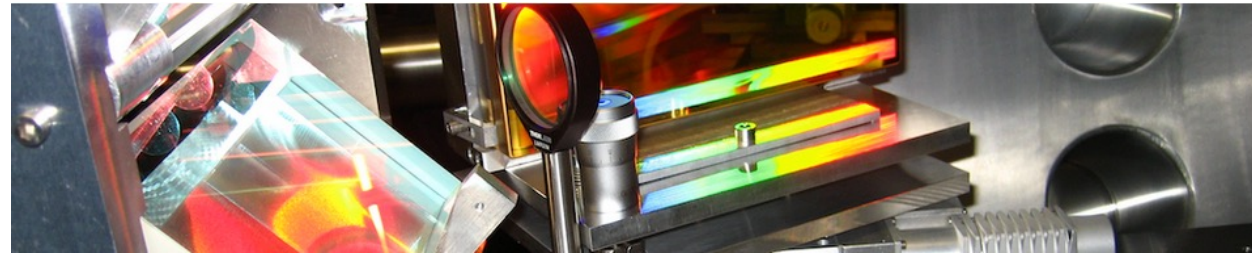
SUPRATECH platform dedicated to R&D on the superconducting cavities of the future high-energy, high-power particle accelerators. Equipment to prepare, package, assemble and test superconducting RF cavities for IJCLab projects.



- ✓ a chemistry room
 - ✓ an ISO4 clean room (80 m², with 50 m² class10)
 - ✓ an assembly hall, for the integration of cryostats
 - ✓ two experiment halls (with vert. & hor. cryostats)
- and equipped with :

- RF power sources at frequencies of 88, 350, 700 MHz,
- a helium installation comprising a helium liquefier
- a 400 kW cooling system (HF sources)

LASERIX : laser platform providing coherent, intense and brief (50fs to 10 ps) sources in the near-infrared (800 nm) and EUV (30 to 90 eV) domains. Will be completed including the electron photo-injector (PHIL).



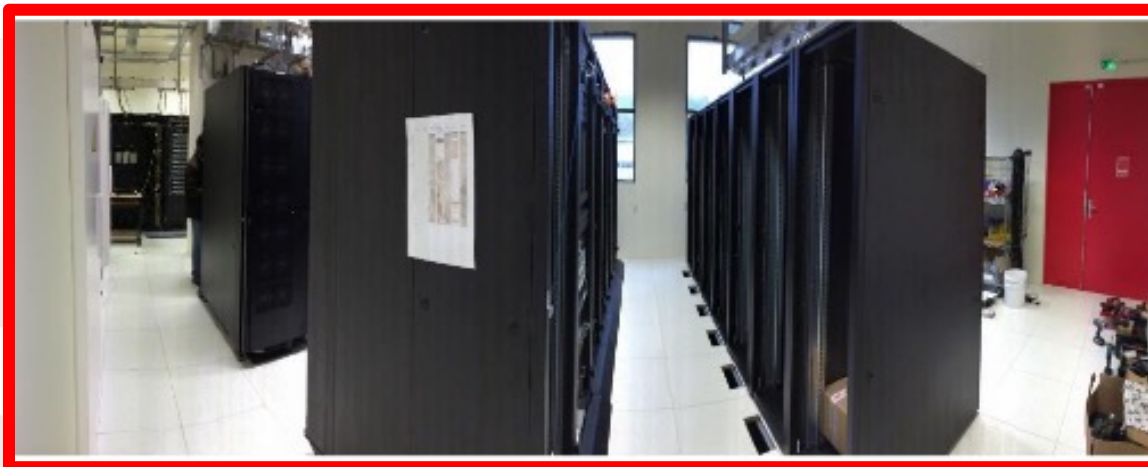


The Platforms - IV

But more platforms : Two examples of platforms inside the Engineering Pole

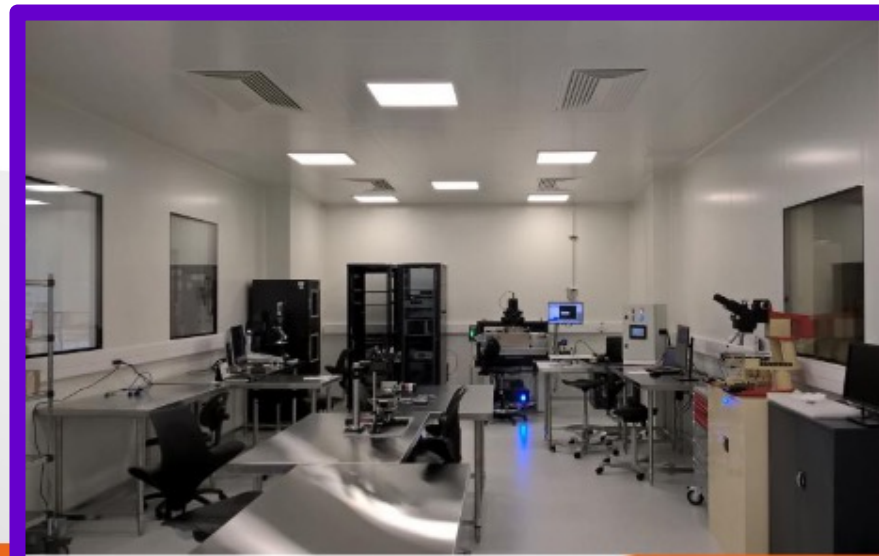
Virtual Data datacenter recently extended

- 51 racks (capacity = 2000 servers)
- up to 600 kW



CAPTINNOV. Reinstalled and working since 1/3/2020
Test bench white room for Detector characterization.
Essential in the next years for *ATLAS ITK* and *HGTD*

+ Platforms in the scientific poles



« Large » projets at IJCLab Numbers of people working on it

