AGENCE NATIONALE DE LA RECHERCHE ANR

INVESTIR L'AVENIR

International Scientific Council and Labex Day

30 November – 2 December 2022

Sylvie Leray (Irfu) and Bruno Espagnon (IJCLab)

with Anne-Laure Pelé

Agenda of the meeting

- **Wednesday 30th November**
  - *13h30: General presentation of the Labex*
  - *14h30: The Flagship projects*
  - *15h30: Break*
  - *16h00: Postdoc presentations*
  - *16h35: Emerging projects – part 1*
  - *17h35: The Astroparticle Symposium*
- **Thursday 1st december**
  - *9h00: Emerging projects – part 2*
  - *10h45: Break*
  - *11h15: PhD presentations*
  - *11h50: P2IO Thesis prize recipients*
  - *12h30: Lunch*
  - *14h00: Presentation of the Physics GS*
  - *15h30: Break*
  - *16h00: P2I and Astro presentations / closed session of the ICS*

Outline

- **General overview**
  - *Brief reminder about P2IO*
  - *Actions funded*
  - *Budget distribution*
- **Review of 2022 activities**
  - *Call for platforms*
  - *Call for postdoc and PhD grants*
  - *Education and Training*
  - *Outreach and communication*
- **Conclusions and perspectives**
  - *Summary*
  - *Perspectives*

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General overview

P2IO: Physics of the 2 Infinites and the Origins

- **P2IO (Physics of the 2 Infinites and the Origins)**
  - *funded for 9 years (2011-2019) with a 14 M€ grant from ANR Investments for the Future programme (PIA) coming from the interests of a non-consumable endowment*
  - *applied for and received a 5-year extension in 2018*
  - *Since 2020, imbedded into the IDEX Université Paris-Saclay (without Ecole Polytechnique), which became the recipient of the 1.36 M€/year allocated to the Labex*
  - *UPSaclay decided to continue the Labex only for 3 years and allowed P2IO to spend 4.75 M€*

- **P2IO in a nutshell**
  - *Unique concentration on the Paris-Saclay Campus of world leading laboratories : ~2000 persons, a large fraction of the national effort,*
  - *covering a broad disciplinary spectrum including particle physics, astroparticle, nuclear physics, astrophysics, accelerator science,*
  - *combining state-of-art instrumentation for space or ground-based observatories, subatomic physics experiments and cutting-edge particle accelerators, together with the most advanced techniques in data analysis and major progress in theory,*
  - *fostering the emergence of creative interdisciplinary applications in other domains, such as nuclear energy, biology and medicine.*

P2IO: Physics of the 2 Infinites and the Origins

- **Irfu: Institute of research into the fundamental laws of the Universe**
  - *Department of Accelerators, Cryogenics and Magnetism (DACM)*
  - *Department of Detectors, Electronics and Computing for Physics (DEDIP)*
  - *Systems Engineering Department (DIS)*
  - *Particle Physics Department (DPhP)*
  - *Department of Nuclear Physics (DPhN)*
  - *Department of Astrophysics/UMR Astrophysics, Instrumentation, Modeling (DAp/AIM)*
- **Institute for Theoretical Physics (IPhT)**
- **Studies service of reactors and applied mathematics (SERMA)**
- **IJCLab: Laboratory of the Physics of the two infinities Irène Joliot-Curie**
  - *Astroparticles, Astrophysics and Cosmology pole (A2C)*
  - *Energy and Environment pole (EE)*
  - *Accelerator Physics pole (PA)*
  - *High-Energy Physics pole (PHE)*
  - *Nuclear Physics pole (PN)*
  - *Health pole*
  - *Theoretical Physics pole*
- **Ecole Polytechnique**
  - *Center for Theoretical Physics (CPhT)*
  - *Leprince-Ringuet Laboratory (LLR)*
- **Université Paris Saclay**
  - *Institut d'Astrophysique Spatiale (IAS)*

18 laboratories – 5 supervising bodies

(AIM and IJCLab/health pole)

Scientific priorities 2020-2024

- **4 scientific themes:**
  - *S1 - Symmetries in the subatomic world,*
  - *S2 - Dark universe and multi-messenger astronomy,*
  - *S3 - Strongly coupled nuclear matter,*
  - *S4 - Formation of stellar and planetary systems, conditions for emergence of life,*
- **3 technological themes:**
  - *T1 - Innovations in accelerator science and related spinoffs,*
  - *T2 - Advanced sensors and spinoffs,*
  - *T3 - Simulation and knowledge extraction from complex data,*
- **2 interdisciplinary themes:**
  - *I1 - Nuclear energy for the future,*
  - *I2 - Medical technologies: Imaging and radiation-based therapy.*

Governance

- **Management board (CODIR): Coordinator, Deputy Coordinator + ~12 experts**
  - *Day-to-day management of the actions of the Labex*
- **Scientific and technical evaluation committee (CEST)**
  - *conduct the evaluation process of the projects submitted in response to the different calls*
- **Assembly of Unit Directors (ADU): directors of the involved laboratories + directors of P2I and Astrophysics axis of UPSaclay Physics GS**
  - *Nomination of CODIR members, endorsement of the selection of the projects*
- **The Supervising Body Committee or Conseil des Tutelles (COTUT) : one representative from each partner institution**
  - *Approval of the general strategy, the sharing of the budget and the final selection of the Flagship projects, nomination of the ICS members*
- **International Scientific Council (ISC)**
  - *Assessment of the scientific quality of the projects funded by the Labex and advice on the overall strategy of the Labex*

Management Board (CODIR)

- **Current membership**
  - *S1: Julie Malclès (Irfu/DPhP), Philippe Busson (LLR)*
  - *S2: Mathieu Langer (IAS), Patrice Hello (IJCLab/A2C)*
  - *S3: Araceli Lopez-Martens (IJCLab/PN)*
  - *S4: Vianney Lebouteiller (Irfu/DAp/AIM), Rafael Garcia (Irfu/DAp/AIM)*
  - *T1: Walid Kaabi (IJCLab/Accelerators), Bertrand Baudouy (Irfu/DACM)*
  - *T2: Frank Gunsing (Irfu/DPhN)*
  - *T3: Michel mur (Irfu/DEDIP)*
  - *Theory: Benoit Blossier (IJCLab/Theory)*
  - *I1: Jean-Christophe Trama (SERMA)*
  - *I2: Laurent Menard (IJCLab/Health)*
  - *Teaching and formation: Bruno Espagnon (IJCLab/PHE)*

Assembly of Unit Directors (ADU)

- **CNRS/IN2P3**
  - *IJCLab/A2C : Sophie Henrot-Versille*
  - *IJCLab/Accelerators : Sébastien Bousson*
  - *IJCLab/EE : Frederico Garrido*
  - *IJCLab/PHE : Marie-Hélène Schune*
  - *IJCLab/PN : David Verney*
  - *IJCLab/Health : Philippe Lanièce*
  - *IJCLab/Theory : Samuel Wallon*
- **UPSaclay**
  - *IAS : Marc Ollivier*
  - *GS Physics, P2I : Tiina Suomijarvi*
  - *GS Physics, Astro : Alain Abergel*
- **CEA**
  - *Irfu/AIM/Dap : Pierre-Olivier Lagage*
  - *Irfu/DACM : Pierre Vedrine*
  - *Irfu/DEDIP : Eric Delagnes*
  - *Irfu/DIS : Pierre Manil*
  - *Irfu/DPhN : Hervé Moutarde*
  - *Irfu/DPhP : Nathalie Besson*
  - *IPhT : Catherine Pépin*
  - *SERMA : Loïc Decarlan*
- **Ecole Polytechnique**
  - *CPhT : Jean-René Chazottes*
  - *LLR : Yves Sirois*

Scientific and Technical Evaluation Committee (CEST)

- **Comité d'Evaluation Scientifique et Technique (CEST) :**
  - *Established for the evaluation of the Flagships 2020 projects*
  - *Solicited for each calls (except EdC)*

	S1: Symmetries in the subatomic world,	S2: Dark universe and multi-messenger astronomy	S3: Strongly coupled nuclear matter	S4: Formation of stellar and planetary systems, conditions for emergence of life	T1: Innovations in accelerator science and related spinoffs	T2: Advanced sensors and spinoffs	T3: Simulation and knowledge extraction from complex data	I1: Nuclear energy for the future	I2: Bio-medical technologies: Imaging and radiation-based therapy
CPhT	Emilian Dudas								
IJCLab	Xavier Sarazin		Marlène Assié Jean-Philippe Lansberg		Angeles Faus-Golfe Luc Perrot	Laurent Serin	David Rousseau	Charles-Olivier Bacri	Marc-Antoine Verdier
Irfu	Fabrice Balli	Jérôme Rodriguez Eric Armengaud	Nicole D'hose	Anaelle Maury	Stéphane Chel	Olivier Limousin	Frédéric Bournaud		
IAS				Cateline Lantz					
IPhT		Philippe Brax							
LLR	Roberto Salerno	Denis Bernard							Marc Verderi
SERMA								Cheikh Diop	

Actions funded by P2IO

Most funding is allocated through calls for proposals with selection criteria favoring novelty/innovation and synergies between different laboratories, but some additional actions may be funded on an ongoing basis upon request.

- **Support to projects from small R&D**
  - *Calls for R&D and emerging projects*
  - *Calls for Flagship projects (fostering collaboration between P2IO laboratories and increasing the national and international visibility of the Paris Saclay Campus)*
- **Calls for allocations of grants**
  - *Postdocs grants (generally for 2 years)*
  - *½ PhD thesis grants*
- **Support to platforms**
  - *Calls for new or upgrade of technological platforms open to all partners of P2IO and to external users*
- **Attractiveness : invitation of scientists, support to conferences and workshops, communication and outreach**
  - *Since 2017 "Emilie du Châtelet" calls once or twice per year*
  - *Funding possible between calls upon request*
- **Education and training : support to student visits and travel, organization of schools, innovative experimental teaching platforms, MOOCs, etc…: upon request**

Actions funded through calls

Support to innovative projects

Calls for R&D and emerging projets

AOs R&D and Emerging projects						
Year	2011	2013	2015	2017	2021	**Total**
Nb of projects submitted	84				26	**110**
Nb of projects funded	9	9	3	5	9	**35**
Allocated budget	500 000 €	532 000 €	177 000 €	201 200 €	502 900 €	**1 913 100 €**

Calls for Flagship projects

AOs Flagsfip projects			
Year	2015	2020	**Total**
Nb of projects submitted	9	11	**20**
Nb of projects funded	5	2	**7**
Allocated budget	3 200 000 €	1 000 000 €	**4 200 000 €**

Calls for allocations of postdocs and PhD grants (1/2 grants):

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019*	2020	2021	2022	Total
AOs post-docs													
Nb of projects submitted	340								34	43	32	33	**482**
Nb of projects funded	6	8	6	6	5	3	3	5	7	5	3	3	**60**
Allocated budget	500 000 €	800 000 €	600 000 €	600 000 €	450 000 €	300 000 €	285 925 €	357 500 €	330 000 €	495 000 €	354 000 €	354 000 €	**5 426 425 €**
** one year allocations*													
AOs PhDs													
Nb of projects submitted	133										30	24	**187**
Nb of projects funded			3	4	4	4	4				4	4	**27**
Allocated budget			150 000 €	200 000 €	200 000 €	175 000 €	200 000 €				236 000 €	314 700 €	**1 475 700 €**

Calls for platforms

AOs Platforms					
Year	2011	2012	2016	2022	**Total**
Nb of projects funded	8	6	6	4	**24**
Allocated budget	87 000 €	74 000 €	193 000 €	350 000 €	**704 000 €**

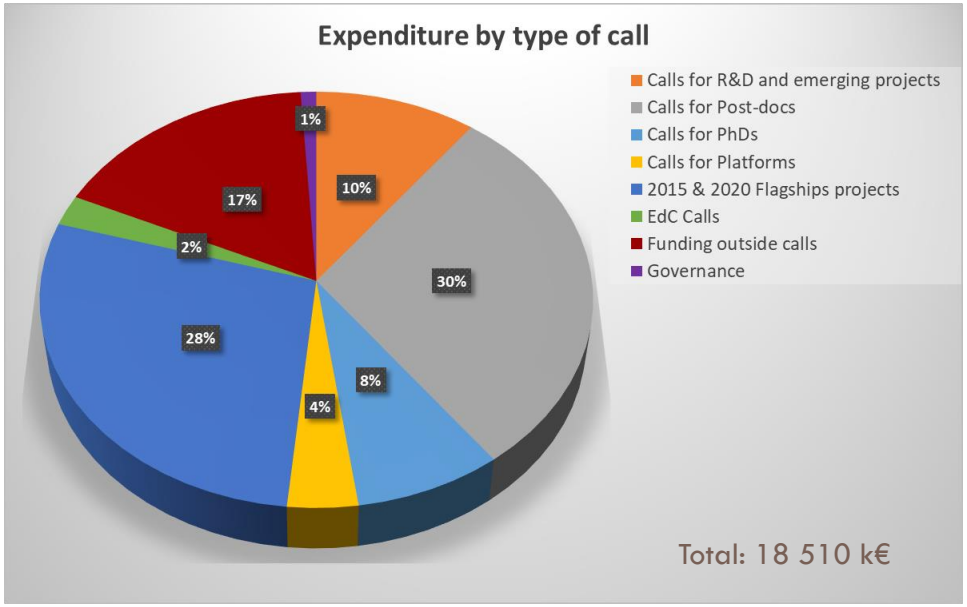
Calls "Emilie du Châtelet" for attractiveness

EdC								
Year	2017	2018-1	2018-2	2019	2020	2021	2022	**Total**
Nb of projects submitted	14	20	30	30	15	14	29	**152**
Nb of projects funded	11	18	21	26	13	11	23	**123**
Requested funding	58 100 €	83 360 €	79 000 €	107 800 €	63 940 €	67 900 €	134 605 €	**594 705 €**
Allocated budget	53 100 €	73 300 €	63 500 €	79 300 €	38 500 €	40 000 €	94 453 €	**442 153 €**

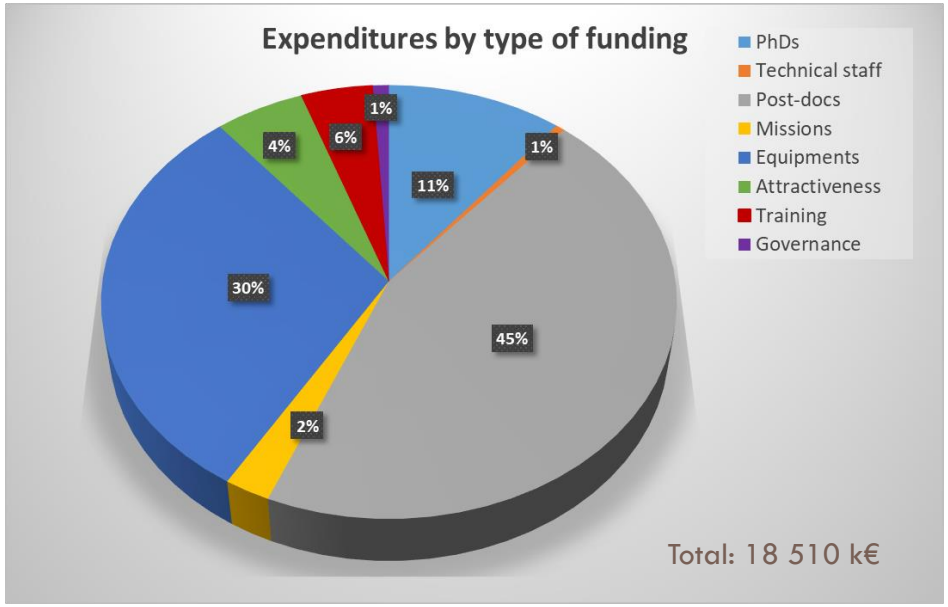
P2IO Physique des 2 Infinis et des Origines

Distribution of funding 2011-2022

- *Distribution by type of call*



- *Distribution by type of funding*



➥ *Numerous PhD and post-doctoral students also funded in the framework of emerging and flagship projects*

Labex Days

- **Each year, a Labex day is organized**
  - *Presentation of the actions of the year*
  - *Report from Flagship projects*
  - *Presentation by postdocs or PhD students funded by P2IO*
  - *Presentation by PhD thesis laureates*
  - *A seminar of general interest (SCOPI)*
- **Last meetings:**
  - *November 26, 2021: https://indico.in2p3.fr/event/25388/*
  - *November 27, 2020: https://indico.in2p3.fr/event/22324/*
  - *November 27, 2019: https://indico.cern.ch/event/852913/*
  - *November 15, 2018 : https://indico.in2p3.fr/event/18133/*
  - *November 15, 2017: https://indico.in2p3.fr/event/16330/*

Impact of the actions funded by P2IO

- **Contributing to the structuration of the communities and visibility of Paris-Saclay**
  - *The 2015 Flagship projects have contributed to gather the teams of Paris-Saclay which could reach a critical size and become more visible (e.g. in CTA, CMS, ATLAS, JWST, …)*
  - *The two 2020 Flagships projects have brought together different sub communities and each can be viewed "instead of a single flagship rather as a fleet of several ships capable to unite and to strike for specific common goals", and allowed to propose new hardware projects*
  - *A large number of publications have resulted from the funded projects, but also from collaboration with visiting scientists funded through the EdC calls, in particular for theoreticians*
  - *EdC funding has contributed to enhance the visibility of Paris-Saclay in the organization of national and international conferences (Higgs Hunting, GDR QCD school, …)*
  - *The Paris-Saclay Astroparticle Symposium is now internationally recognized*

Impact of the actions funded by P2IO

- **Leveraging effect to obtain additional funding from regional, national or European agencies**
  - *CANEVAS: P2IO's support was essential to make NectarCAM a viable camera for CTA and to obtain TGIR funding for the whole NectarCAM subnetwork*
  - *HGCFC: helped obtain TGIR funding and the high granularity calorimeter (HGCAL) developed within P2IO has been chosen by CMS for HL-LHC*
  - *Several SESAME projects (Ile-de-France region) obtained thanks to an initial funding of platform or bringing the additional 1/3 contribution requested. Examples:*
    - Charting Terra Incognita SESAME
    - CATTISA R&D project on innovative thermal and surface treatments led to the SESAME AXE-SRF project and together with the platform PANAMA contributed to obtain the PACIFICS EQUIPEX+
  - *ERC or ANR grants obtained following R&D project. Examples:*
    - 2015 R&D project, Nuclear fragments detector for CLAS12, help to obtain an ERC starting grant in 2018 which included funding for the construction of the complete detector
    - SUCRE emerging project continuing with the ANR CRYOSEL and possible upgrade for the RICOCHET experiment
    - ALICE-FT emerging project continuing within the MALICE ANR project

Impact of the actions funded by P2IO

- **Support to outreach actions**
  - *Support to local actions as well as bigger events such as Night of antimatter, night of times…*
- **Support to education and training has been crucial for**
  - *Organizing regular student visits to CERN, astrophysics observatories*
  - *Support to well established schools: Summer meetings for L3 students "From the infinitely large to the infinitely small", JUAS, …*
  - *Support to experimental teaching platforms*

Review of the 2022 activities

Call Platforms 2021-22

- Objective: to support the development of new platforms, contribute to upgrades or foster an extension of existing platforms, with mandatory criterion of openness to the P2IO community, to other communities and/or to industry
- Budget for the call: 350 k€
  - ↪ 4 applications received for a total of 481 k€

Theme	PI 1	Lab 1	PI 2	Lab 2	Title	Requested	Granted	Comment on cut
I1	GENTILS Aurélie	IJCLab/ Energie	JUBLOT-LECLERC Stéphanie	IJCLab/ Energie	***High resolution ultra-fast camera for in situ dynamic studies at the nanoscale of materials irradiated by one or two ion beams***	130 000,00 €	100 000,00 €	Option STEM
S1, T1	LE BLANC François	IJCLab/PN			***NeWLIR (New Wavelength for Laser Ions with RIALTO)***	137 000,00 €	87 000,00 €	Option UV
T1, T3, I1, I2	MANIL Pierre	Irfu/DIS			***Platform 4.Φ - Immersive virtual reality room***	99 561,00 €	73 000,00 €	Lay out and equipment of the premises
S2, S4, T2	CHIPAUX Rémi	Irfu/DEDIP	DALY François	Irfu/DAp	***PIGSIE - Gamma Irradiation Platform for Science, Industry and Education***	115 000,00 €	90 000,00 €	Control-command system and gamma camera
						481 561,00 €	**350 000,00 €**	

High resolution high speed camera
for *in situ* TEM experiments at JANNuS-SCALP

- ✓Observation of dynamic phenomena during ion irradiation of materials
- ✓Access to low doses : complete kinetics of microstructural modifications

Funding from LabEx P2IO and E&E pole, IJCLab

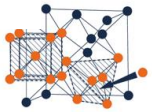
Ion beams for synthesis, modification and analysis of materials

3 ion accelerators, 71 available elements
Energy of the ions : from 50 eV to 11 MeV
Temperature : from -170 to 1000°C

The JANNuS-SCALP platform

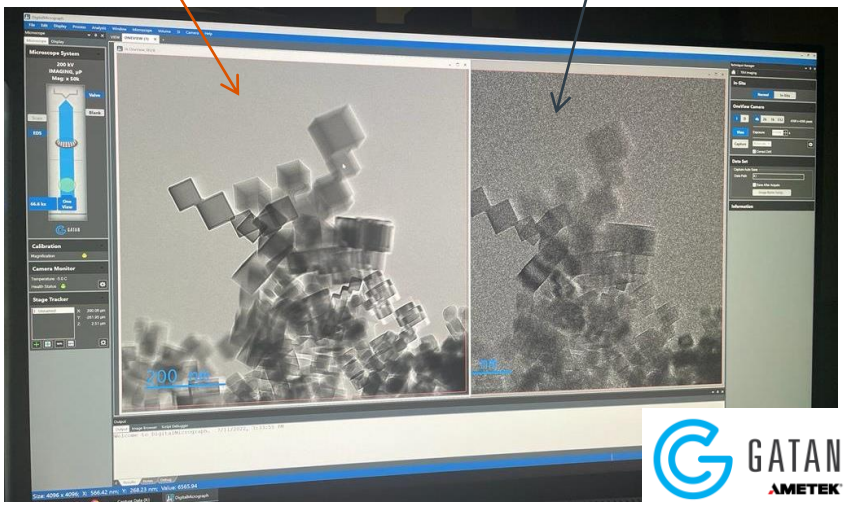
Facility open to
industrials
academics
students

rbides metals glasses alloys ceramics nitrides oxides semiconductors

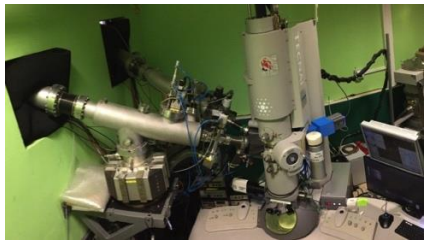


1st image obtained !
One View model 1095
High sensitivity

Similar conditions to former camera



In situ observation of the nano-scale microstructure of materials submitted to one or two ion beams



A unique *in situ* Transmission Electron Microscope (TEM), connected to two ion accelerators

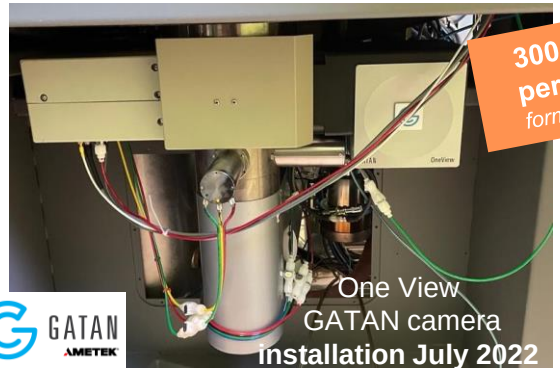
Contact: Aurélie Gentils, Stéphanie Jublot-Leclerc

High resolution high speed camera
for *in situ* TEM experiments at JANNuS-SCALP

IJCLab Irène Joliot-Curie Laboratoire de Physique des 2 Infinis

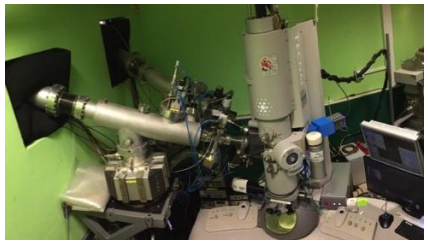
✓Observation of dynamic phenomena during ion irradiation of materials
✓Access to low doses : complete kinetics of microstructural modifications

Funding from LabEx P2IO and E&E pole, IJCLab



300 frames per second formerly 30 fps

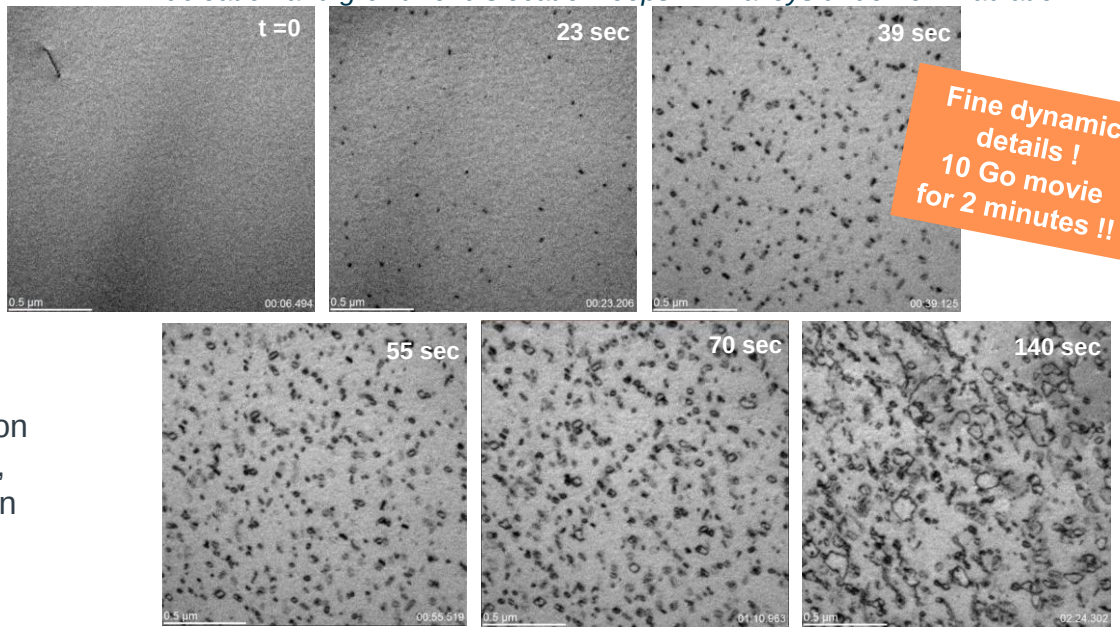
In situ observation of the nano-scale microstructure of materials submitted to one or two ion beams



A unique *in situ* Transmission Electron Microscope (TEM), connected to two ion accelerators

First *in situ* TEM experiment for external users with the new camera performed in September 2022

Nucleation and growth of dislocation loops in Ni alloys under ion irradiation



Fine dynamic details ! 10 Go movie for 2 minutes !!

Contact: Aurélie Gentils, Stéphanie Jublot-Leclerc

THE 4.Φ PLATFORM

4.Φ consists in setting up an integrated mechanical engineering platform. This platform will make it possible to provide our physics community with several digital chain tools: an integrated technical database, a new generation computer-aided design (CAD) software, a digital collaborative platform and a physical open space intended for the reception of partners and students.
Thanks to P2IO, this platform will be completed in 2023 with new equipment: an immersive extended reality room. Equipped with immersive headsets and extended reality software, it will allow scientific mediation actions, but above all it will provide support for detailed design teams.
Thanks to this platform, principles and assembly procedures from our instruments can be tested and integrated numerically before manufacturing.

On-going commissioning (with several technical challenges!)
Target T1-2023

Irfu @

- A **mechanical CAD system** with built-in tools for generative design, topology optimization, 3D dimensioning, realistic rendering
- A **unique integrated database** for project teams, designers, industrial monitoring teams

Construction / deployment: 2023

Open to our partners (2024)

- A **digital platform**: open access to designers, manufacturing companies, academic partners…
- A **physical platform**: a reception open space integrated into Irfu's design office, open to our partners and engineering students

Construction / qualification: late 2023
Operational for users in 2024

P2IO

- An **extended reality room** allowing multi-stakeholder collaborative sharing
- Easy access to **Paris-Saclay fablab** (@ INSTN)

Irfu
ÎledeFrance
250 k€ SESAME grant (36% of total investment)

P2IO
Physique des 2 Infinis et des Origines
74 k€ P2IO funding

RIALTO: Laser Ion Source at ALTO

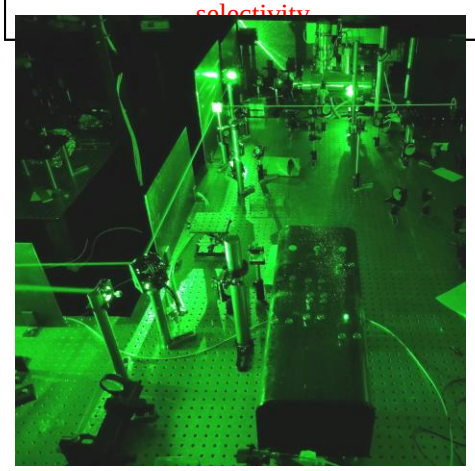
RIALTO : a laboratory for laser ionization scheme development, an ongoing international effort for finding the most suitable and efficient ionization schemes for RIB production and laser spectroscopy at ISOL-type facilities.

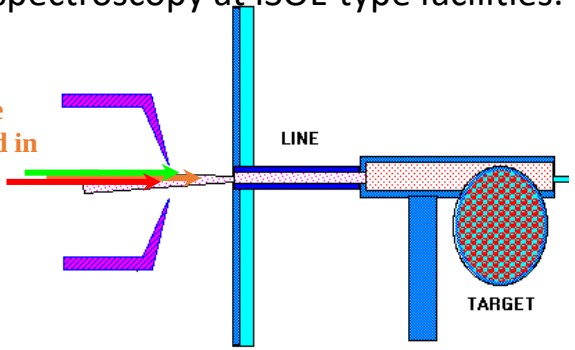
Uranium fission

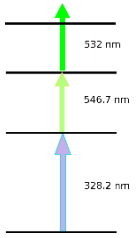
Neutron rich radioactive nuclei beams well separated in mass A

LASER ION SOURCE

Beams of high purity and high selectivity







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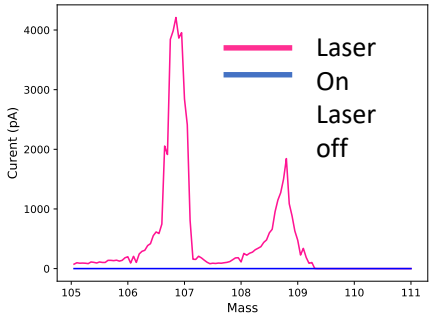

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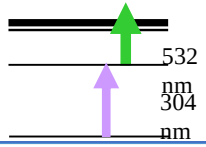
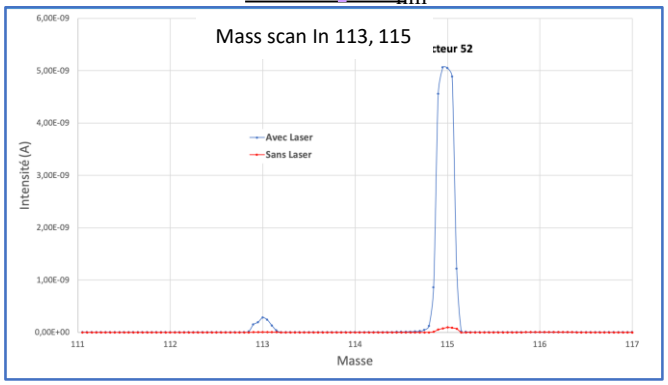




Efficiency : factor of **40-50**/surface ionisation

A new pump laser to increase the robustness and the effectiveness of the laser-ion source. Coupled to the planned upgrade of the RIB production front end and the installation of a target-ion-source unit manipulation robot (FRISAL project), it would help to better respond to the increased requirement of laser produced radioactive beams.

P2IO request for the purchase of a UV output laser (in order to extend the range of elements to be studied): 140 k€
Obtained: 87 k€ complemented by IJCLab

PIGSIE

PLATEFORME D'IRRADIATION GAMMA POUR LES SCIENCES, L'INDUSTRIE ET L'ENSEIGNEMENT

Objectives:

- refurbishment of the COCASE irradiation platform dedicated to long duration low dose rate gamma irradiations but shut down since 2016 due to regulatory obligations, essential for some space missions
- Equipment with a new ^{60}Co source and a new command and control system to enable it to be operated remotely, and to facilitate access
- installation of a gamma spectro-imager allowing a significant qualitative and quantitative improvement in the dosimetry of irradiations
- Potential users: Irfu, LATMOS, IAS, IAP, APC, TRAD, Nuclétudes, 3D Plus

Status:

- **The first phase (call for applications for the recharging of the irradiator) was completed on schedule. Eckert & Ziegler Isotope Products France selected, for a cost slightly higher than anticipated.**
- **The contract was placed by the CEA at the end of May 2022, the first phase (study and written report by the company of the irradiator's reloading) is almost complete.**
- **Unfortunately, the new source must be manufactured in Russia therefore there are great uncertainties about the actual possibility of carrying out this operation, or at least to know the deadlines although the holder of the contract seems optimistic about the final possibility of recharging**
- **The project is therefore currently on hold.**

Rémi Chipaux and François Daly, CEA/IRFU

Call Docs-postdocs 2022: final selection

- *PhDs: 31 proposals received – 13 pre-selected by the CEST – 6+2 selected*

Principal theme	Other themes	Supervisor 1	Supervisor 2	Title	Lab 1	Lab 2	Other labs
I2		SLADKOV Vladimir	BACRI Charles-Olivier	Etude de la complexation des ions lanthanides avec les acides hydroxamiques pour des applications en médecine nucléaire	IJCLab/EE		LRSI, IRSN
S1		OCHANDO Christophe		Constraining the Higgs self-coupling from on-shell and off-shell production with H→ZZ→4 leptons channel with the CMS experiment at the LHC	LLR		
S2		ROBINET Florent	FOGLIZZO Thierry	Recherche non-modélisée d'ondes gravitationnelles avec les détecteurs LIGO, Virgo et KAGRA	IJCLab/A2C	IRFU/DAP	
S3		SULIGNANO Barbara	STEFAN Gheorghe Iulian	Investigation of an innovative method for understanding the limit of mass and charge in the matter.	IRFU/DPhN	IJCLab/PN	
S4		García Muñoz Antonio		New insights into radiative transfer modelling of exoplanet atmospheres	Irfu/DAp		
T1	S3	MINAYA RAMIREZ Enrique	PERROT Luc	PELERIN (Precision Experiments on Low-Energy Radioactive Ion Nuclides)	IJCLab/Accélérateurs		

Reserve list

S2	T2	SUOMIJARVI Tiina	HULL Giulia	Observation de gammas de haute énergie par CTA : l'analyse des données de NectarCAM et l'étude de l'origine des rayons cosmiques galactiques	IJCLab/A2C	IJCLab/Instrumentation	Irfu/DPhP, LLR
S1		MORANGE Nicolas		Etude de la diffusion de bosons vecteurs avec le détecteur ATLAS	IJCLab/PHE		

- *Postdocs : 24 proposals received – 10 pre-selected by the CEST – 3 selected*

Principal theme	Other themes	Supervisor 1	Supervisor 2	Title	Lab 1	Lab 2	Other labs
S3		BLOSSIER Benoit	MEZRAG Cédric	Simulation et Structure Hadronique en 3D (SimSHa 3D)	IJCLab/théorie	Irfu/DPhN	
S4		LANTZ Catherine		Ryugu and Bennu: from Space to the Lab	IAS		SOLEIL
T2		SAUVAGEOT Luc	S. Marnieros / X. de la Broise	Démonstrateur de nouvelle architecture pour les très grandes Matrices de Microcalorimètres en Rayons X	Irfu/DAp	IJCLab	Irfu/DEDIP

Emilie du Châtelet call March 2022

- **Requested : 58,3 k€ / Granted 44,4 k€**

PI	Laboratory	Title	Request type	Financement accordé
Olcyr Sumensari, Asmâa Abada, Damir Becirevic	IJCLab/Théorie	Invisibles Workshop 2022	Workshop	1 500 €
Olcyr Sumensari, Asmâa Abada, Damir Becirevic	IJCLab/Théorie	Invisibles School 2022	Ecole	1 500 €
Elias Khan et Carlos Monoz Camacho	IJCLab/PN	Ecole Joliot-Curie	Ecole	2 000 €
Anatael CABRERA	IJCLab/A2C	Accueil Prof. Mark CHEN	Invitation	6 000 €
Yann Mambrini	IJCLab/Théorie	Accueil de Oleg Levedev et Marcos Garcia	Invitations	2 000 €
Z. Conesa del Valle, L. Massacrier et J. P. Lansberg	IJCLab/PHE	Programme international : Heavy flavours, from small to large systems	Colloque + invitation de 4	3 000 €
Fabian Schussler	Irfu/DPhP	Astro-COLIBRI	Communication	7 000 €
Cateline Lantz, Diane BÉRARD, Raphaël PERALTA	IAS	SpaceBus France	Communication	5 000 €
Émilie Maurice, Christophe Thiebaux, Sylvaine Pieyre	LLR	LudoParticules : Découverte ludique de la physique des particules	Jeu - communication	1 500 €
Jean-Yves Ollitrault	IPhT	Accueil de Matthew Luzum, professeur à l'Universite de São Paulo	Invitation	6 880 €
Thomas PAPAEVANGELOU	Irfu/DEDIP	Invitation Prof. S. E. Tzamarias	Invitation	8 000 €
		Total		44 380 €

Outreach example: SpaceBus

Photo JSL /DR

SpaceBus France goes from city to city directly to meet the public to make discover astronomy thanks to playful animations, animated by professionals of astronomy (researchers, PhD students, engineers).

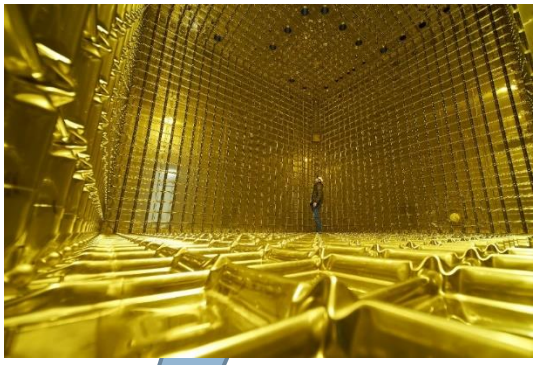
SpaceBus editions financed by P2IO's AO EdC

Emilie du Châtelet call September 2022

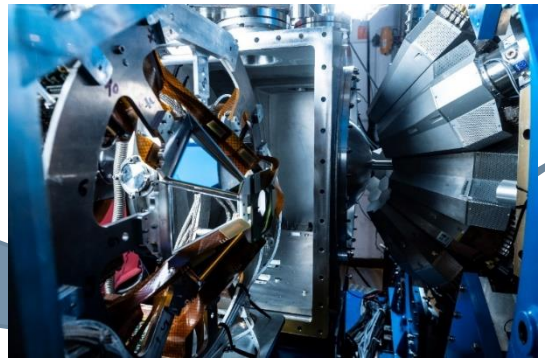
- **Requested : 76,3 k€ / Granted 48,1 k€**

PI	Laboratory	Title	Request type	Granted
Béatrice Ramstein	IJCLab/PHE	Invitations de I. Ciepal, R.I Lalik + mini workshop "Tests of the INCL++ code with p and π beam data and impact for GEANT4 applications"	Invitations + Workshop	9 000 €
Nicolas Delerue	IJCLab/Accélérateurs	Rétrospective sur 150 ans d'accélérateurs	Exposition	5 400 €
Fabian Schussler, Nathalie Besson	Irfu/DPhP	Achat d'une tablette + missions pour manifestations	Manifestations scientifiques	5 450 €
Aurélie Gentils	IJCLab/Energie	Invitation du Dr. Arunodaya Bhattacharya	Invitations	4 000 €
Benoît Blossier, Cédric Mezrag	IJCLab/Théorie, Irfu/DPhN	Ecole « QCD sur réseau et ses applications phénoménologiaues »	Ecole	2 000 €
Yann Mambrini	IJCLab/Théorie	Invitations de Keith Olive et Alexandre Kusenko	Invitations	2 000 €
Philippe Schune	Irfu/DPhP	Invitation du Pr. Marco Schioppa	Invitation	2 000 €
Claude Cabot, Achille Stocchi, David Vernet, Frederico Garrido	IJCLab/PN, IJCLab/Energie	Réalisation et diffusion d'un documentaire sur l'héritage scientifique d'Irène et Frédéric Joliot-Curie, et sur la genèse des laboratoires d'Orsay	Communication	1 225 €
Nicolas Morange	IJCLab/PHE	Inivitation de Brieuc François	Invitation	4 000 €
Frédéric Baudin	IAS	Achat de matériel de projection pour la diffusion des connaissances	Communication	6 000 €
Benoît Tabone	IAS	Programme Core2disk III de 4 semaines	Workshop	3 000 €
Michel Guidal, Guy Wormser	IJCLab/PHE	150 ans Société Française de Physique	Communication	4 000 €
		Total		48 075 €

Outreach



- *Photos of detectors in the physics teaching building (building 625 - hbar)*



Fundings on request 2022

Funding of 2022 and 2023 events

Lab	Project leader	Title	Action	Funding
Institut Pascal	F. Brun, Y. Mambrini, O. Deligny, F. Schussler, F.	Astroparticle Symposium 2022	Attractivity	40 000,00 €
Institut Pascal	F. Brun, Y. Mambrini, O. Deligny, F. Schussler, F.	Astroparticle Symposium 2023	Attractivity	26 207,00 €
IJCLab/PHE	L. Fayard	Higgs Hunting 2023	Attractivity	2 000,00 €
IJCLab/PN, Irfu/DPhP	C. Gaulard, Ph. Schune	Rencontres d'été de l'infiniment grand à l'infiniment petit 2022	Attractivity	20 000,00 €
IJCLab/PN, Irfu/DPhP	C. Gaulard, Ph. Schune	Rencontres d'été de l'infiniment grand à l'infiniment petit 2023	Attractivity	20 000,00 €
IAS	J. Grain	Rencontres Jeunes Physiciens (RJP 2022)	Attractivity	1 000,00 €
IJCLab/PHE	L. Fayard	Evènement fêtant les 10 ans de la découverte du Boson de Higgs	Attractivity	2 500,00 €
Irfu/DPhP	M. Viver, L. Périssé	Physics Tournament 2022	Formation	1 000,00 €
		Total attractivity		**112 707,00 €**
Irfu/DPhN	M. Vandebrouck	Funding for 3 oscilloscopes for the TL Master 2 NPAC	Training	1 986,00 €
IJCLab/PHE	M-H. Schune	Exceptional support for a Russian student to finish his thesis in France	Training	6 000,00 €
IAS	H. Dole	Ecole d'été Paris-Saclay at OHP	Training	5 000,00 €
IJCLab/PHE	S. Kazamias	JUAS 2022	Training	4 500,00 €
IJCLab/PHE	S. Kazamias	JUAS 2023	Training	4 300,00 €
IJCLab/A2C	P. Hello	Ecole d'hiver R4O4	Training	3 000,00 €
LLR	F. Arléo	Ecole QCD Masterclass	Training	1 500,00 €
IAS	M. Vincendon	Stage d'Observation 2023 à l'OHP M2 AA	Training	13 200,00 €
		Total training		**39 486,00 €**

Training actions : PhD thesis prize

- **2021**
  - *Virginia Ajani (Irfu/DAp-AIM): Higher order statistics for cosmology: likelihood development for future surveys like Euclid*
  - *Melih Ozcelik (IJCLab/Théorie): Pseudoscalar Quarkonium Hadroproduction and Decay up to Two Loops*
- **2020**
  - *Janeth Valverde (LLR): New insights on the nature of blazars from a decade of multi-wavelength observations*
  - *David Baudin (Irfu/DEDIP): Développement d'un spectro-imageur CdTe pour application spatiale*
- **2019**
  - *L. Rinchiuso (DPhP): Etude du Centre Galactique et recherche de matière noire avec H.E.S.S.*
  - *M. Owusu-Mensah (CSNSM): Compréhension des premiers stades de formation des nano-précipités (Y, Ti, O) dans les aciers ODS*
- **2018**
  - *Pauline Zarrouk (DPhP): Analyse des corrélations spatiales des quasars et implications cosmologiques avec le multi-spectrographe SDSS-IV eBOSS*
  - *Antoine Lehebel (LPT): Objets astrophysiques compacts en gravité modifiée*
- **2017**
  - *Julia Casanueva (LAL): Control of the gravitational wave interferometric detector Advanced Virgo*
  - *Olcyr Sumensari (LPT): Search for new physics through flavor physics observables*
  - *Mathieu Muniglia (SERMA): Optimisation du pilotage d'un Réacteur à Eau Pressurisée dans le cadre de la transition énergétique à l'aide d'algorithmes évolutionnaires*
- **2016**
  - *Diana Bachiller Perea (CSNSM): Ion-Irradiation-Induced Damage in Nuclear Materials: Case study of a-SiO and MgO*
  - *Noël Martin (IPN): Modes collectifs et hydrodynamique dans la croûte interne des étoiles à neutrons*

The Paris-Saclay AstroParticle Symposium

- **Objective: to bring together the astroparticle community of Paris-Saclay, which was rather dispersed, and to improve its visibility**
- **Taking advantage of the Institut Pascal, which is dedicated to long-term programmes allowing interactions of small groups of researchers.**
- **First session of 4 weeks in 2019 on theory**
  - *Invitation of 10 to 15 theoreticians/week (senior scientists and students)*
  - *open seminars for scientists*
  - *conferences for the general public*
- **The 2020 session was cancelled and merged with the 2021 session in a 6 week event combining theory and experiments**
- **2022 session just finished**

- **The last remaining funds of the Labex were allocated to the session 2023**
- **Organizers: F. Acero, Ph. Brax, F. Brun, O. Deligny, Y. Mambrini, F. Schussler**
- **Other sponsors: P2I, IN2P3 master projet, APPEC and CEA.**

Seminars of general interest SCOPI (with P2I et SPU)

Use of the Labex-2 budget

Prévu dossier de prolongation (M€)				Alloué (k€)		
Action type	Action	Type of funding		2020	2021	2022
OPERATING	Project manager hiring, meeting organization, communication actions	Fixed-term contract salary, travel, sub-contracting…	Salaire project manager jusqu'à fin 2022	76,0		
			Actions communication, outreach au fil de l'eau	16,0	21,5	20,4
EXPLORE	Flagship projects (requesting 0.6 to 1.2 M€)	Equipment, PhD and posdoc fellowships	Flagships 2020	2000,0		
	Emerging projects (requesting 50 to 250 k€)		Projets Emergents		482,7	
	UPSaclay transverse projects					
	Emilie du Châtelet calls	Workshops, invitations, small equipment …	EdC partially taken on Labex 1 leftover	0,0	9,0	36,3
TRANSFORME	Support to platforms including TP platforms	Equipment	100 k€ taken on Labex 1 leftover			250,0
STRUCTURE	Support to multimessenger astronomy and to technological infrastructure	Workshops, visitors, postdocs	Workshop IPa	40,0	20,0	76,2
TRAINING	Training of young researchers	1/2 cost of PhD and postdoc fellowships, trainees	Appel Postdocs et/ou 1/2 thèses	330,0	590,0	708,0
	Support to trainees, teaching tools realization, travels, schools	Small equipment, travel, schools and trainee fellowships	Support récurrent Ecoles, visites étudiants…	22,2	12,8	39,0
TOTAL (without the 8% of management fees)				2484,2	1136,0	1129,9
			Total	4750,00		

- **Some 600 k€ of leftovers from the Labex-1 budget have been used**

3

Conclusions and perspectives

Summary

- **P2IO allowed to:**
  - *Fund emerging ideas and R&D projects (too upstream to correspond to an ANR or ERC project, for example, but which can be precursors for such projects), including projects with applications to other fields,*
  - *Fund "Flagship" projects that structure the whole community and enable it to acquire or increase its international visibility and possibly access other funding,*
  - *Support and develop platforms shared by the Labex laboratories and which can be made available to other communities and industry,*
  - *Fund postdocs, which are essential to maintain our rank in international competition and guarantee scientific recognition commensurate with the resources invested by the laboratories,*
  - *Finance PhD thesis grants and support training through the funding of schools, student visits and practical work platforms,*
  - *Support scientific life by financing visits by foreign researchers, organization of conferences and workshops, and of events for the general public.*

Summary

- **The strengths of the Labex**
  - *Place to gather the Paris-Saclay campus community and foster common actions*
  - *Relative freedom of programming, framed by a clear and visible governance*
  - *Possibility of multiannual programming*
  - *Simplicity for researchers responding to calls for projects*
  - *Management flexibility, which allows a certain reactivity, for example to redirect a budget if difficulties arise in a project or to allocate funding quickly for urgent actions.*
- **The limits of the Labex**
  - *the Labex cannot replace the institutions that finance the permanent staff and the vast majority of the laboratory budget, and therefore define the strategy of the field, often in the context of international collaborations*
  - *Limited temporal visibility*

After the end of the Labex P2IO

The P2IO Labex ends 31/12/2022

- **Some of the funded actions will continue up to the end of 2024**
  - *The two Flagship projects up to the end of 2024*
  - *8 of the 9 Emerging projects*
  - *9 PhD theses, half funded by P2IO, some up to the end of 2025*
  - *5 postdoc projects*
  - *The Paris-Saclay Astroparticle Symposium funded for 2023 and some EdC actions*

➥ **It would be desirable that the follow-up of these projects, both scientific and financial, be ensured within the P2I and Astro Axes of the GS**

  - *Details of this possible follow-up are not yet clear*
  - *The former coordination of the Labex is available to do it in collaboration with the GS Axes, if necessary*

Projects continuing after 2022

Projects	Title	PIs	Laboratories	End of the project	GS axis
BSM-Nu	A change of gear in neutrino physics	S. Bolognesi, A. Giuliani	Irfu/DPhP, IJCLab/A2C	December 2024	P2I
Gluodynamics	Probing the nature of dense gluonic systems	M. Winn, C. Marquet	Irfu/DPhN, LLR	December 2024	P2I
Emerging project (EP) FlarePredict	Prediction of solar flares by deep learning method	A. Strugarek	Irfu/AIM	May 2023	Astro
EP AC-LGAD	Development of an ASIC prototype for the reading of the Roman Pots of the future Electron-Ion (EIC)	C. Munoz, F. Bouyjou	IJCLab/PHE, Irfu/DEDIP	April 2023	P2I
EP ALICE-FT	Realisation of a prototype of a solid target, beam tests at the SPS and study of the impact of the target system on the impedance of the LHC beams for a fixed target implementation on the ALICE experiment at LHC	C. Hadjidakis, K. Pressard	IJCLab/PHE	February 2024	P2I
EP FABACC	Innovative Additive Manufacturing Cooling Methods for Particle Accelerators	T. Proslier, N. Delerue	Irfu/DACM, IJCLab/Acc	January 2023	P2I
EP HRTES-X	Development of detectors based on high resistivity TES (Transition Edge Sensor) for the realization of very large detection arrays in space astronomy	J-L. Sauvageot, S. Marnieros, X. de-la-Broise	Irfu/Dap, IJCLab, Irfu/DEDIP	December 2023	P2I/Astro
EP ML-COLA	Proof of the principle experiment of Machine Learning based online Characterization and Optimisation of a high intensity Laser pulse	V. Kubytski, M. Pittman	IJCLab/Acc, IJCLab/LASERIX	June 2023	P2I
EP Optimed-Beta	OPTIcal microMEgas Detector for β imaging	E. Ferrer-Ribas, Y. Mariette	Irfu/DEDIP, Irfu/DIS	February 2023	P2I
PE PIRATE	Pygmy dIpole ResonAnce neuTron probE	M. Vandebrouck, I. Matea	Irfu/DPhN, IJCLab/PN	March 2023	P2I

PhDs and postdocs after 2022

Supervisors	Title	Laboratories	PhDs	End of the contract	GS Axis
O. Sumensari, S. Descotes-Genon	Solutions of the Flavour Problem through Effective Theories	IJCLab/Théorie	I. Plakias	December 2024	P2I
N. Ysard, M-A. Miville-Deschenes	The diffuse galactic light: EUCLID looking through the interstellar veil	IAS, Irfu/DAp-AIM	A. Rymar	December 2024	Astro
E. Ferrer-Ribas, T. Papaevangelou	Neutron and Beta imaging with Micromegas detectors with optical readout	Irfu/DEDIP	R. Cools	December 2024	P2I
A. Corsi	Probing the hard-core of nucleon-nucleon interaction in the atomic nuclei	Irfu/DPhN	A. Lagni	December 2024	P2I
V. Sladkov and Ch-O. Bacri	Study of the complexation of lanthanide ions with hydroxamic acids for nuclear medicine applications	IJCLab/EE	S. Lam	December 2025	P2I
C. Ochando	Constraining the Higgs self-coupling from on-shell and off-shell production with H->ZZ->4 leptons channel with the CMS experiment at the LHC	LLR	A. Petkovic	December 2025	P2I
B. Sulignano, G. Lulian Stefan	Investigation of an innovative method for under-standing the limit of mass and charge in the matter	Irfu/DPhN IJCLab/PN	J. Bequet	December 2025	P2I
E. Minaya Ramirez	PELERIN	Irfu/DAp	S. Morard	December 2025	P2I
T. Suomijarvi, G. Hull	Observation of high energy gammas by CTA: analysis of NectarCAM data and study of the origin of galactic cosmic rays	IJCLab/A2C IJCLab/Instru	C. Dubos	December 2025	P2I
Supervisors	**Title**	**Laboratories**	**Post-doctoral fellows**	**End of the contract**	**GS Axis**
A. Leite, Ph. Lanièce	Towards Clinical Implementation of Advanced Microdosimetry and Radiobiology for Hadron Therapy	IJCLab/Santé, ALTO		December 2023	P2I
D. Lacroix	Turning Towards Quantum Machine Learning	IJCLab/PN	Y. Beaujeault-Taudière	December 2023	P2I
B. Blossier, C. Mezrag	Simulation and hadronic structure in 3D (SimSHa 3D)	IJCLab/Théorie Irfu/DPhN	J.M. Morgado Chavez	December 2024	P2I
C. Lantz	Ryugu and Bennu: from Space to the lab	IAS	M. Mahlke	December 2024	Astro
J-L. Sauvageot, S. Marnieros, X. de la Broïse	New architecture demonstrator for very large arrays of X-ray microcalorimeters	Irfu/Dap, IJCLab/A2C		December 2024	P2I/Astro

Perspectives

- **The interests of the non-consumable endowment to the Labex will go to the GS. Part of it will be allocated to the research actions of the P2I and Astro Axes (see presentations on Thursday afternoon).**
- **The P2IO coordination and CODIR hope that**
  - *the momentum created by the Labex can continue within the Axes, in particular regarding the structuring of the communities and leveraging effect*
  - *Multiannual programming will be possible in order to finance ambitious large scale projects, although probably of lesser magnitude than in P2IO*
  - *The evaluation procedures by the Axes will take into account the experience of the Labex, maybe reducing the number of calls*
  - *The simplicity and flexibility of the day-to-day management will be kept*
  - *Transverse actions between P2I and Astro will continue (e.g. the Astroparticle Symposium)*
  - *The actions related to training will continue in the GS*