NanoSaclay
Laboratoire d'Excellence
en Nanosciences et Nanotechnologies

université
PARIS-SACLAY

INVESTISSEMENTS D'AVENIR

NANOSACLAY ANNUAL DAY

LabEx NanoSaclay:
overview, highlights and future

19/09/2019

http://nanosaclay.fr/

Layout

1/ Overview and 2018 highlights

2/ Budget

3/ Research excellence

4/ Local structuration

5/ NanoSaclay renewal : to come in 2020 and after

université PARIS-SACLAY

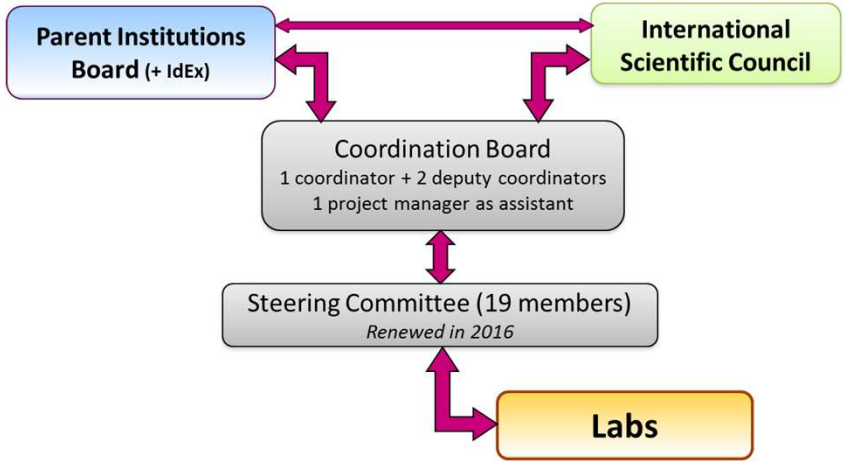
LabEx NanoSaclay: reminders

NanoSaclay: Paris-Saclay multidisciplinary Lab in Nanoscience and Nanotechnologies

- **Missions** in research, valorisation, education
  - Improve local dynamism and creativity in nanoscience
  - Promote **technology transfer**
  - Attract good students in the local nanoscience **training program**

- **Resources**: >30 units, 81 research teams, ~500 scientists
  2000m² of clean rooms + state-of-the-art equipment
  Funding: 11,2M€/8,5 y (2011-2019)

- **Governance**:



Coordination board

S. Palacin, coordinateur

O. Stephan, adjointe

F. Nguyen Van Dau, adjoint

Project manager
L. Krzaczkowski

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LabEx NanoSaclay: reminders

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New coordination board (starting june 2019)


C. Fiorini, coordinatrice


A. Barthélémy, adjointe


A. Bournel, adjoint


H. Remita, adjointe

Project manager (starting sept. 2019)
M.A. Cavrois-Desmier

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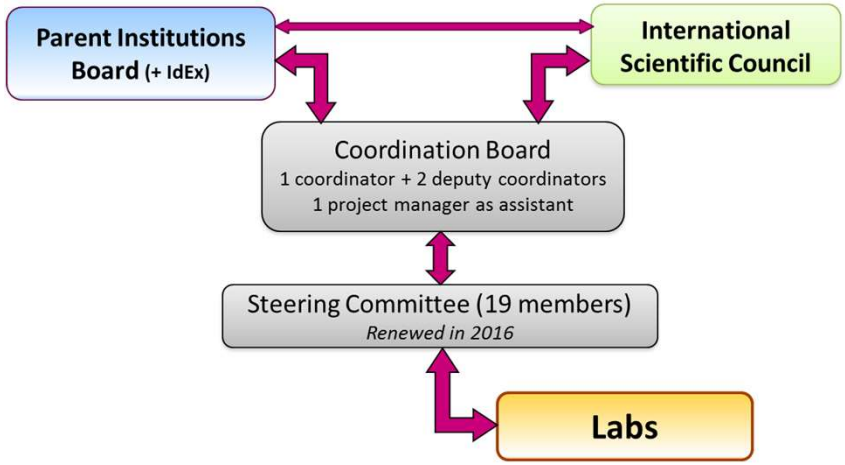

Steering committee: to be renewed at the end of 2019

LabEx NanoSaclay at a glance

Axis	Action	2012	2013	2014	2015	2016	2017	2018	2019 (ongoing)
RESEARCH	Flagships projects	3 flagship projects, bringing together the 3 major communities of NanoSaclay				**4 focused projects in response to specific challenges**			
To improve local dynamism and creativity in nanoscience	Annual calls	7 projects "Emerging" or "platform"	9	7	8 open call with support to PhD	**7**	**11**	**11**	
	Project "reliability of nanos"								
INTERNATIONAL OUTREACH	Open calls					12 projects	24	34	17 *(ongoing)*
VALORISATION	Annual calls (with LabEx PALM)	6 projects in total	7	7	8	**6**	**6**	**9**	**7**
To promote technology transfer	Awareness of valorisation				1 workshop		1 workshop		
	Industry-university meetings				NanoElec		NanoPhot		"Nanos pour le vivant"
FORMATION	Grants	4	2	8	14	**9**	**11**	**4**	**3** *(ongoing)*
	Support to training programs								
To attract good students in the nanoscience training program of UPSaclay	Nanoschool								
	Student Chapter								
	Digital tools					**MOOC nano: preparation**	**MOOC nano: launch**	MOOC nano: 2nd session	MOOC nano: 3rd session **New: ENG**

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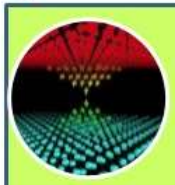

Quantum and Spin-based nanoelectronics

Understand and control charge, spin and their interactions at the nanoscale

120 researchers, 24 teams, 13 labs
820 k€

AXION: Oxides for future electronics

50-60 researchers, 11 teams, 8 labs
784 k€

Leader: Yves DUMONT

Nanophotonics, Nano-objects for energy control

Understand and control the interaction between light and matter at the nano-scale

300 researchers, 50 teams, 17 labs
820 k€

ICQOQS: On Chip Quantum Optic and Quantum Simulation

20-30 researchers, 6 teams, 5 labs
611,2 k€

Leader: Pascale SENELLART

CONDOR: Novel concepts, nanostructured materials, devices and architectures for nanophotonics

10-15 researchers, 4 teams, 3 labs
282 k€

Leader: Fabrice RAINERI

Nano-drugs for the treatment of severe diseases

Evaluate two novel classes of nanomaterials for nanomedicine and theranostics

70 researchers, 9 teams, 6 labs
835 k€

Nanoprotection: New therapeutic approaches for Charcot-Marie-Tooth 1A and brachial plexus lesions.

15-20 researchers, 4 teams, 4 labs (+2 out of the LabEx)
418 k€

Leader: Liliane MASSADE

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1/ Overview 2018: open research call

- **Spirit of the call:**

2012-2014
"emerging projects": highly innovative and/or risky
"platform projects": new tools within the technological platforms, specific measurements

Short projects
Annual budget: 400 k€

Since 2015:
Open call

1- to 3-year projects (support to PhD)
Annual budget: 420 - 540 k€

- **Selection mechanism:**

2 external reviewers / project (evaluation grid)
Final selection and ranking by the steering committee

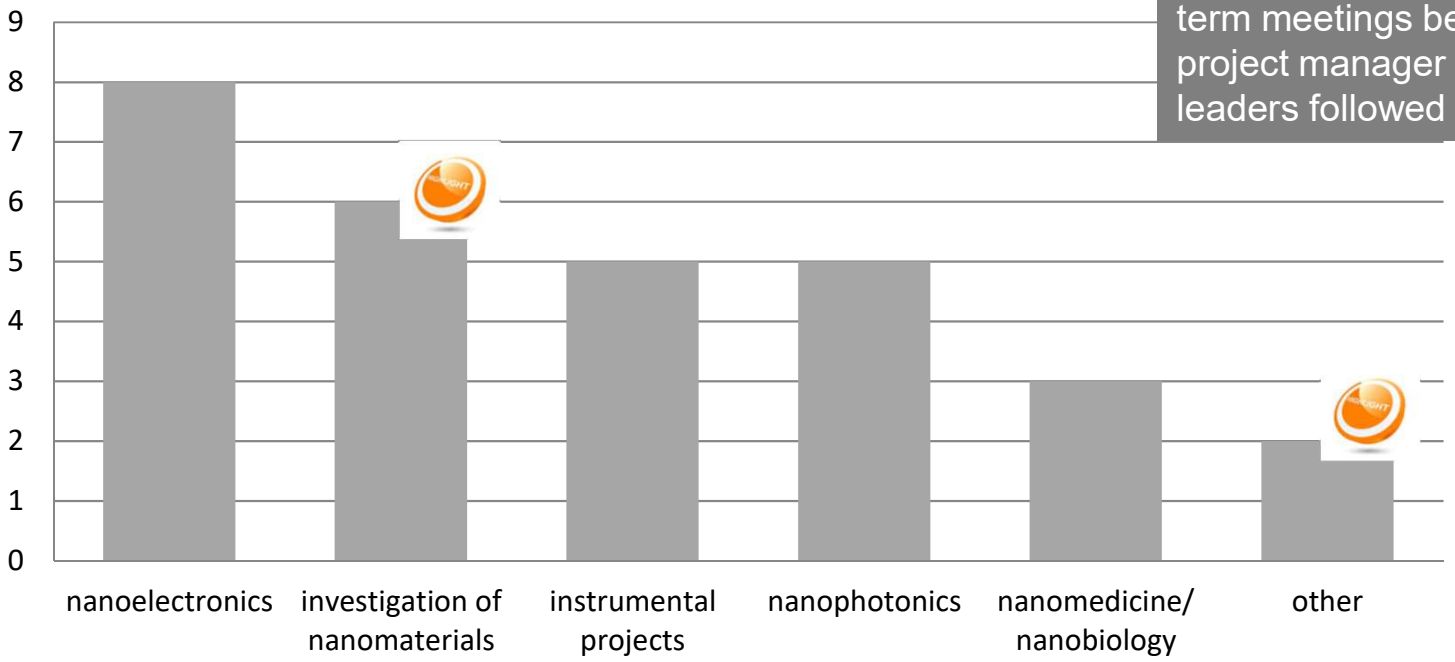
2018 results
25 projects submitted (total budget ~ 1,5 M€)
36 teams involved (23 as leader)
11 projets selected including **1 PhD grant and 1 half-thesis grants**

Engaged: 623,5 k€ (+165k€ / initial budget)

1/ Overview 2016-2018: open research call

- **Topics distribution:**

Follow-up: mid-term and final-term meetings between the project manager and project leaders followed by reports



Kevin Jaouen (NIMBE): Backside Absorbing Layer Microscopy: a new tool for the investigation of 2D materials (HEVEREST project - Open call 2016)

Jian Li (LCP): Fabricating Si NWs based photoelectrodes for solar water splitting (Z-scheme project - Open call 2018)

1/ Overview 2018: “international outreach” call

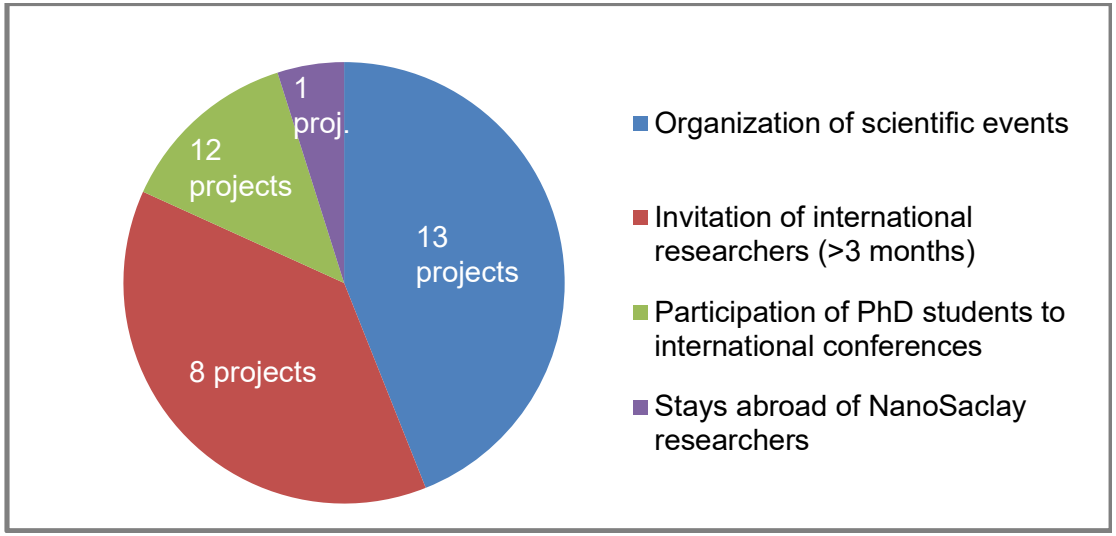
- **Spirit of the call:**

  - Invitation of international researchers (max. 3 months)
  - Organization of seminars of foreign researchers
  - Participation of PhD students to international conferences
  - Stays abroad of NanoSaclay researchers (max. 3 months)
  - Organization of scientific events

Budget: 75 k€ / year
Permanent call

- **Selection mechanism:**
  Evaluation and selection by the steering committee

- **2018 results**
  34 projects supported
  Budget’s distribution:



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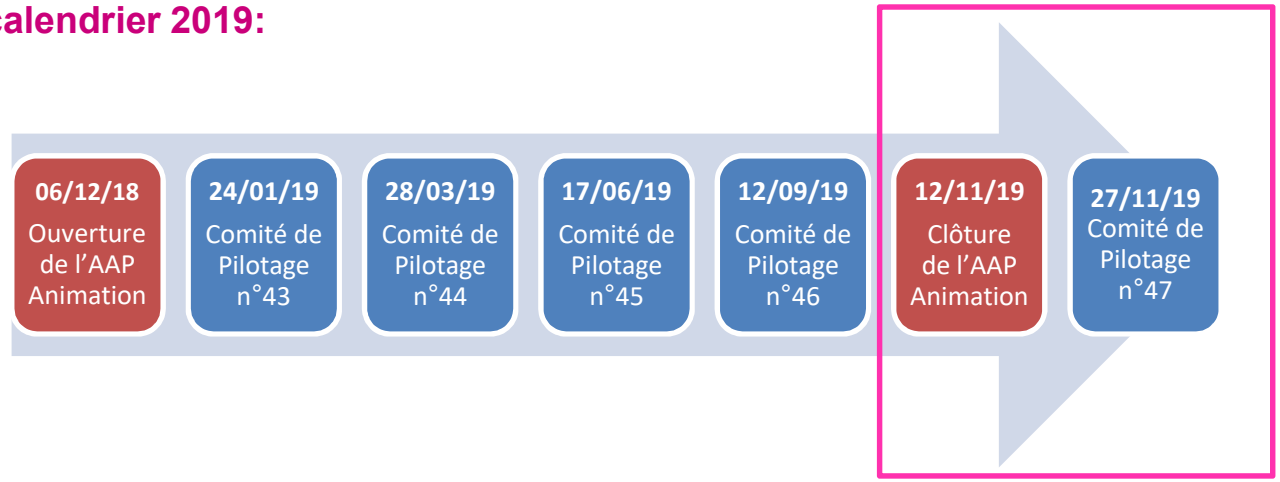
- **Rappel calendrier 2019:**



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1/ Overview 2018-2019: valorization actions

Annual call
Upstream edge of valorization
In common with LabEx PALM
Selection by the innovation board (researchers from both LabEx)

Budget: 350 k€ / year
(NanoSaclay + PALM)

2018 results: 4 projects selected from NanoSaclay teams Engaged: **190 k€** (NanoSaclay only)	
Cartographie locale de la susceptibilité magnétique	
Analyse par LIBS de nanoparticules isolées sous vide	Cesar Alvarez-Llamas (NIMBE) (ALNIV project)
Deposited Resin for Accessible Microfluidic	
Instrument couplant excitation magnétique et détection électrochimique	Pedro González Losada (C2N) (HDE project)

2019 results: 3 projects selected from NanoSaclay teams Engaged: **135 k€** (NanoSaclay only)	
Microscopie électrochimique pour l'Industrie	
Capteurs femtoTesla refroidis transportables	
Valorisation d'imagerie multibande Térahertz par thermoconversion vers l'infrarouge	Arthur Salmon (ONERA) (ValoImhotep2 project)

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Latest value-creation:

NOVECAL — Created in 2018;
Prix i-LAB 2017

LumediX — Created
in 2018

1/ Overview 2018-2019: valorization actions

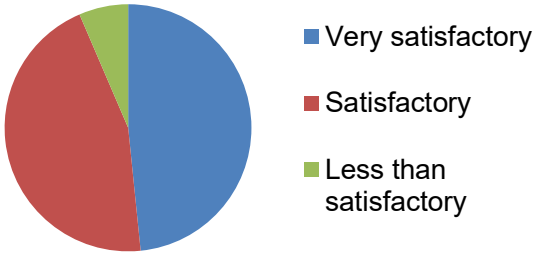
Industry-university meeting: Workshop "Nanos pour le vivant"
18th april 2019, LPS

Flash presentations of 19 researchers
Plenary conference of 5 industrials
Posters

160 attendees

Satisfaction survey:

Quality of the presentations:



- ½ respondents report that they have initiated scientific exchanges with other participants.
- Subsequent meetings planned
- 71% would participate in a new edition (and 23% answered "maybe")

Dr. H. Remita (LCP-UMR CNRS 8000) et Dr. R. Gref (ISMO-UMR CNRS 8214)

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1/ Overview 2018: education actions

- **Grants for high-level students**:

  For students enrolled in the master “nanosciences” (in- and out-coming mobility): **3** in 2018

  Abroad internships for PhD students in NanoSaclay labs: **1** in 2018

- **Training program for Bachelor and Master**:

  Equipment upgrade for teaching platforms (100 students/y)

- **NanoSchool: design of innovative training for general education**

  Building up 5 demonstrators for general public and schools:

  Courses in high schools and in elementary schools

  Training sessions for school teachers

- **Student Chapter:** “nano” section in SCOP

  Visit of CEOs of SPIE as part of the International day of light 2018

  Seminars dedicated to PhD students

  Actions to the general public

- **Animation 2018:**

  Thematic Schools: Physics of Solar cells: from basics to nanoscience

  EXCITONICS for photonics applications

  RJP 2018

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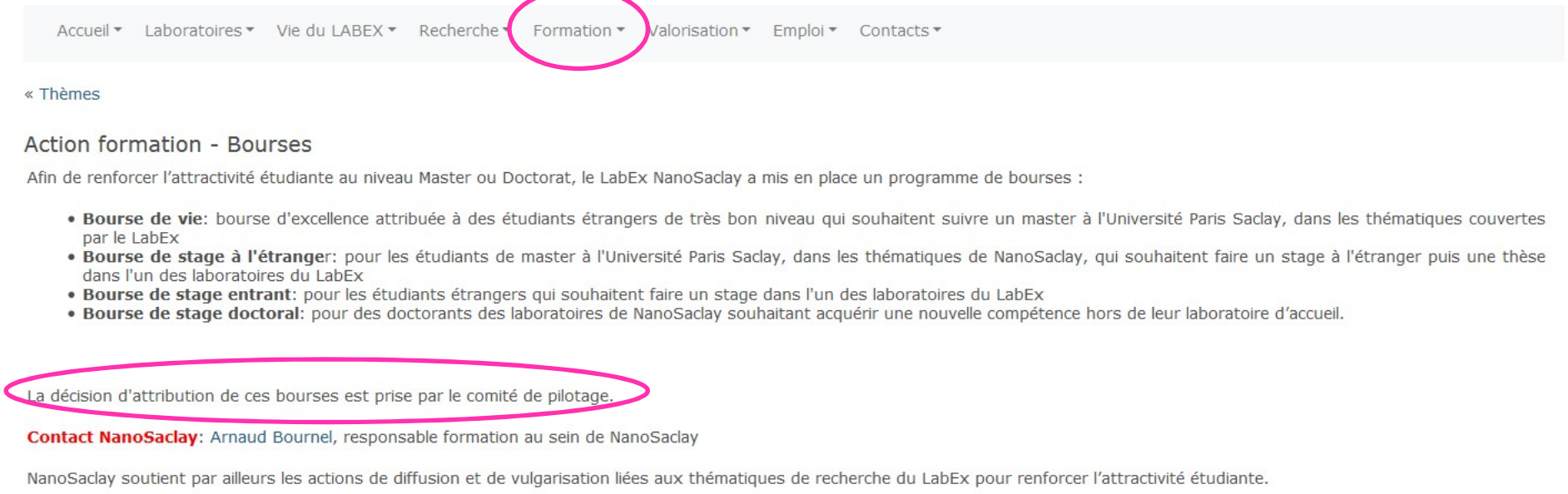
See web site:



Accueil ▾ Laboratoires ▾ Vie du LABEX ▾ Recherche ▾ Formation ▾ Valorisation ▾ Emploi ▾ Contacts ▾

« Thèmes

Action formation - Bourses

Afin de renforcer l’attractivité étudiante au niveau Master ou Doctorat, le LabEx NanoSaclay a mis en place un programme de bourses :

- **Bourse de vie**: bourse d'excellence attribuée à des étudiants étrangers de très bon niveau qui souhaitent suivre un master à l'Université Paris Saclay, dans les thématiques couvertes par le LabEx
- **Bourse de stage à l'étrange**r: pour les étudiants de master à l'Université Paris Saclay, dans les thématiques de NanoSaclay, qui souhaitent faire un stage à l'étranger puis une thèse dans l'un des laboratoires du LabEx
- **Bourse de stage entrant**: pour les étudiants étrangers qui souhaitent faire un stage dans l'un des laboratoires du LabEx
- **Bourse de stage doctoral**: pour des doctorants des laboratoires de NanoSaclay souhaitant acquérir une nouvelle compétence hors de leur laboratoire d’accueil.

La décision d'attribution de ces bourses est prise par le comité de pilotage.

Contact NanoSaclay: Arnaud Bournel, responsable formation au sein de NanoSaclay

NanoSaclay soutient par ailleurs les actions de diffusion et de vulgarisation liées aux thématiques de recherche du LabEx pour renforcer l’attractivité étudiante.

1/ Overview 2018: education actions - **MOOC**

Hugues Cazin d'Honincthun & Jean-Michel Lourtioz

- **Context:**

  7-week free Massive Open Online Course

  3 courses of increasing difficulty: beginner, intermediate, advanced

  Plaftorm FUN: 7th March – 11th Mai 2018

  Support of the Labex to a pedagogical engineer and run costs

  Lots of interventions of NanoSaclay researchers

  162 videos of laboratory experiments and testimonials from nanos. Extract

- **Organization:**

Week 1	• the nano fundamentals
Week 2	• courses on techniques of observation and nanos manufacture
Week 3	• **Nanochemistry:** carbon materials, nanoparticle synthesis and porous solids
Week 4	• **Nanophysics**: around spintronics, nanoelectronics, nanophotonics and nanosensors
Week 5	• **Nanomedicine**, nanobiology and nanofluidics
Week 6	• societal and health issues
Week 7	• the status of training, industry and research

1/ Overview 2018: education actions - **MOOC**

Hugues Cazin d'Honincthun & Jean-Michel Lourtioz

- **Participation**
  >5 500 registered people (>1 000 more than last year)
  People from 66 countries in the world (1/4 outside France)

  27% of registered users have logged in
  12% of learners followed MOOC until the end
  639 people obtained a certificate of success at the end (> 60% correct answers to evaluations)

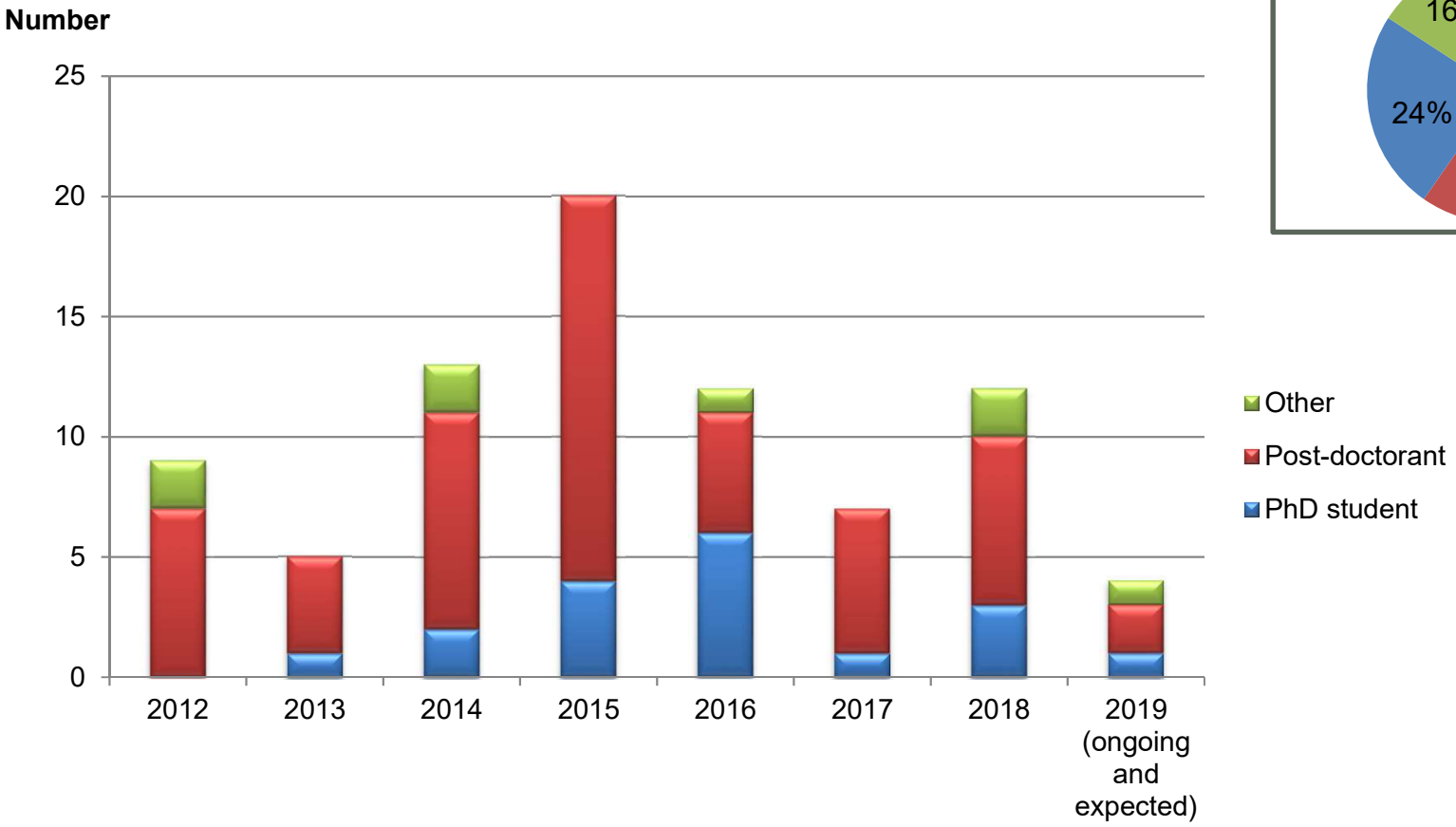
- **High level of satisfaction: >70%**

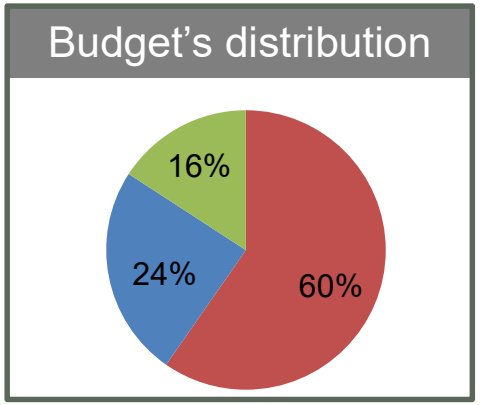
- **Strengths** of the MOOC highlighted in the comments: **content**, **speakers**, pedagogy, **interdisciplinarity**, responsiveness, ergonomics, support

3rd session in 2019, with content available in French and **English**

1/ Overview 2018: human resources

- **Effort for the recruitment of PhD students**





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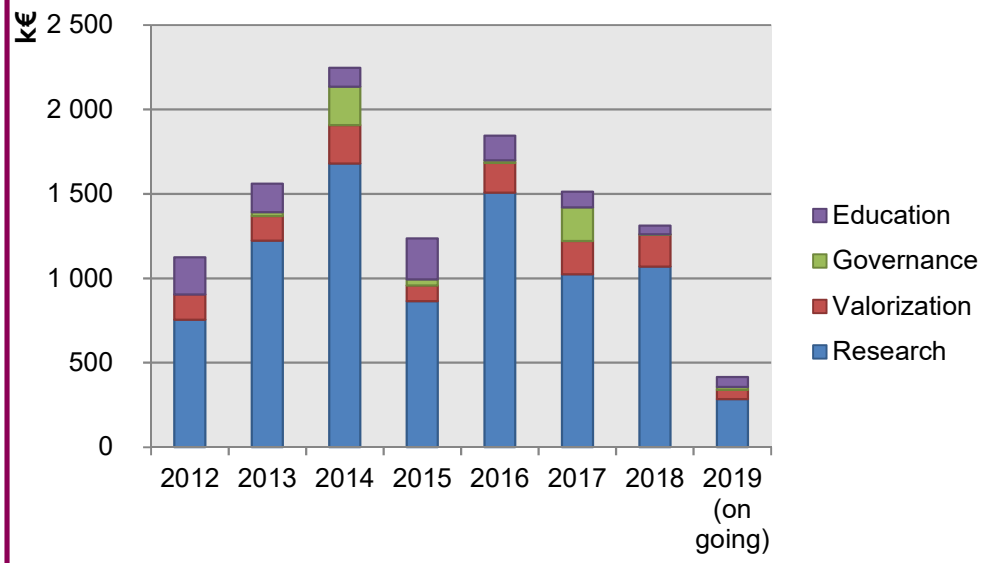
2/ Budget - Commitment

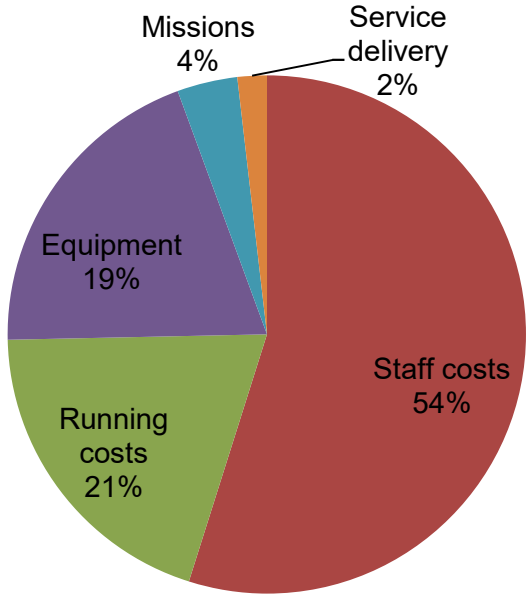
Commitment, end of Aug. 2019: 11 251,1 k€ (101%) (elapsed time: 95%)

- Research: 8 438,5 €
- Valorization: 1 202,5 k€
- Education: 1 088,3 k€
- Governance: 521,8 k€

Rate of commitments by year and by axis



Distribution by type of expenditure



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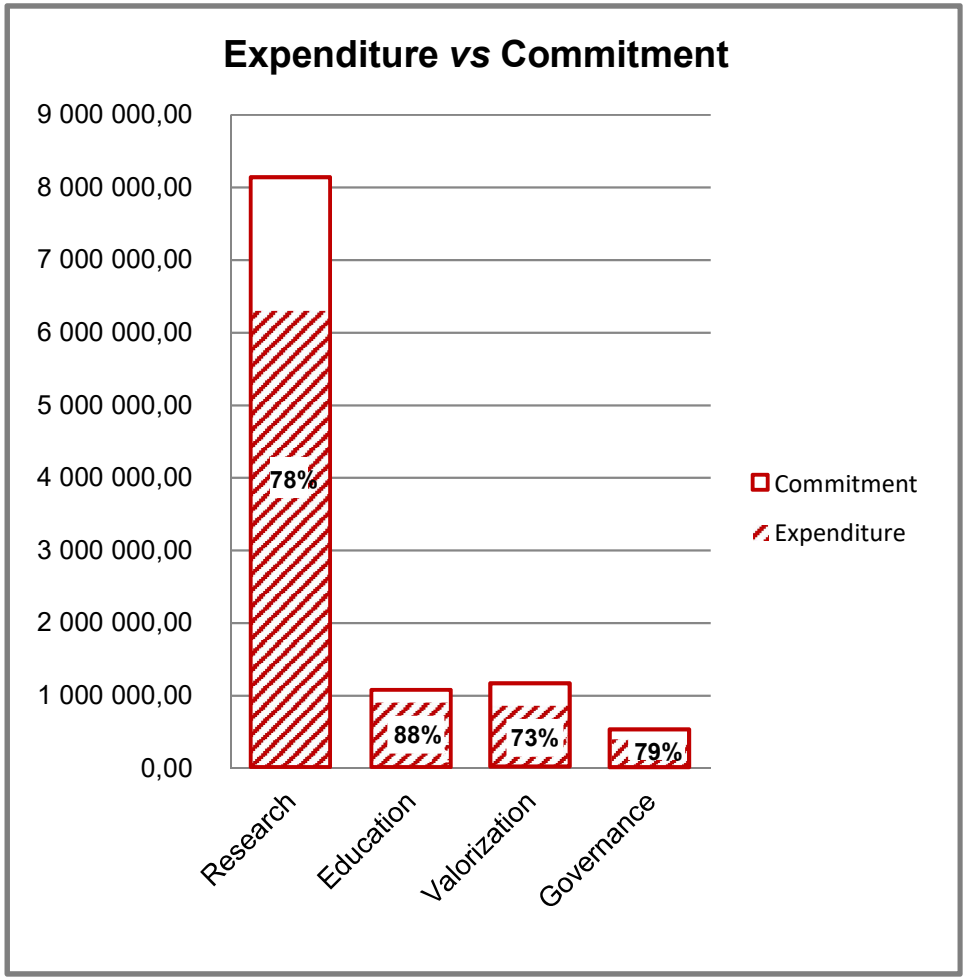
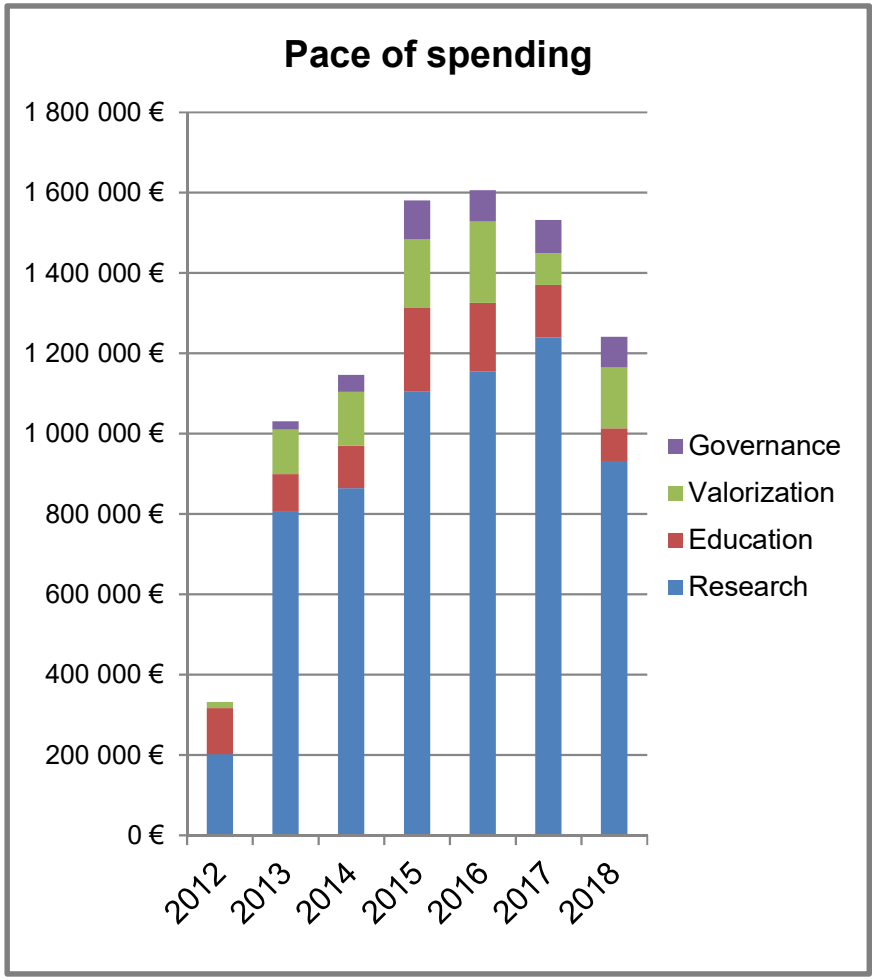
2/ Budget – Expenditure (end of 2018)





Unspent funds (at the end of projects): **> 300 k€** being reintegrated in the NanoSaclay overall budget. Already re-engaged, mainly in the last open research calls.

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2/ Budget – Expenditure (end of 2018)

Eligibility of expenditure: **31/12/2020 except for staff costs** (prolongation until **end of 2022**)

No commitment after 30/06/2020

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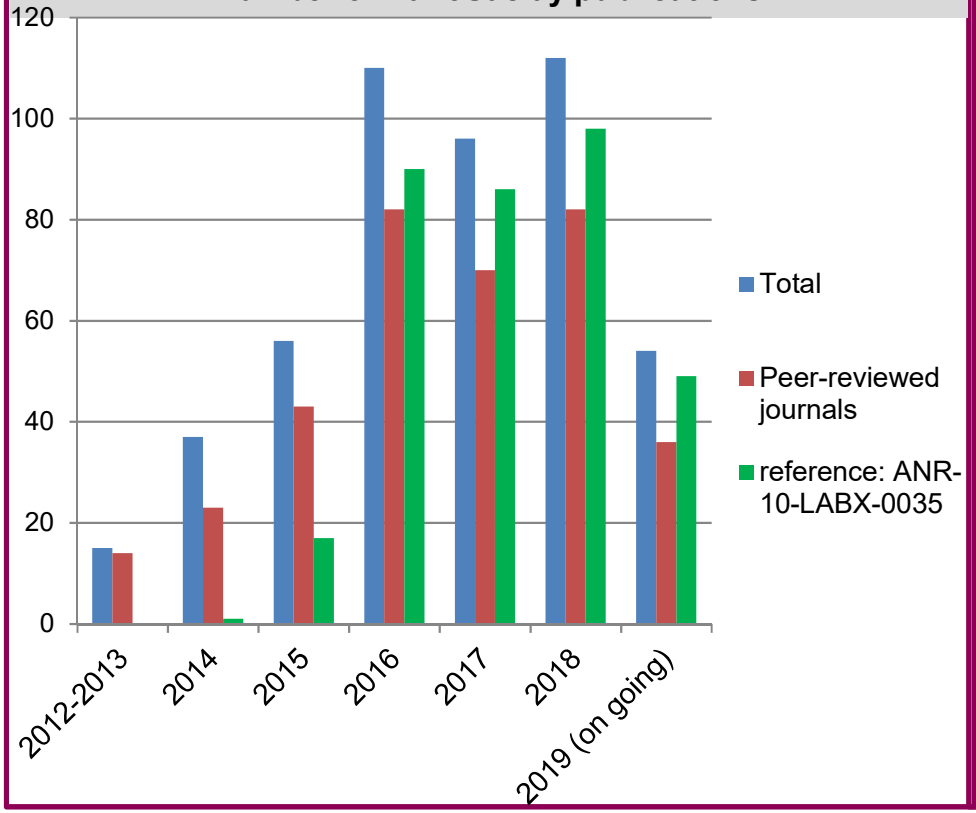
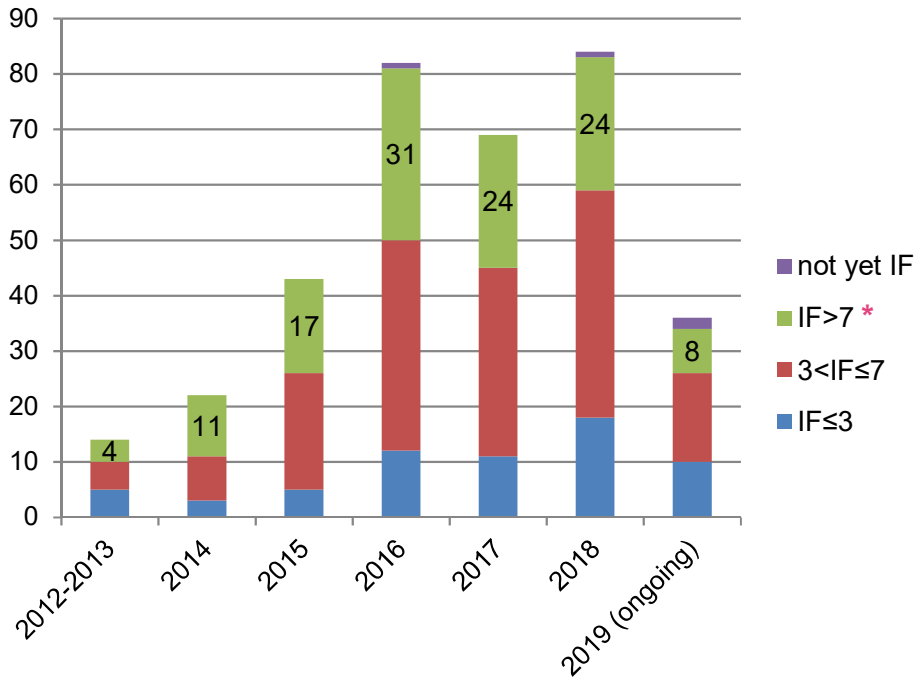
3/ Research excellence

- **2018**: 112 articles including **82 in peer-reviewed journals**
- **Total (2012-2019): 480** articles including **350** in peer-reviewed journals

Number of NanoSaclay publications



Publications according to the impact factor



* 7: NanoScale impact factor

71% in Top 10% journals
37% in Top 10% most cited articles

$\overline{IF}$ (2012 – 2018) = 7,4

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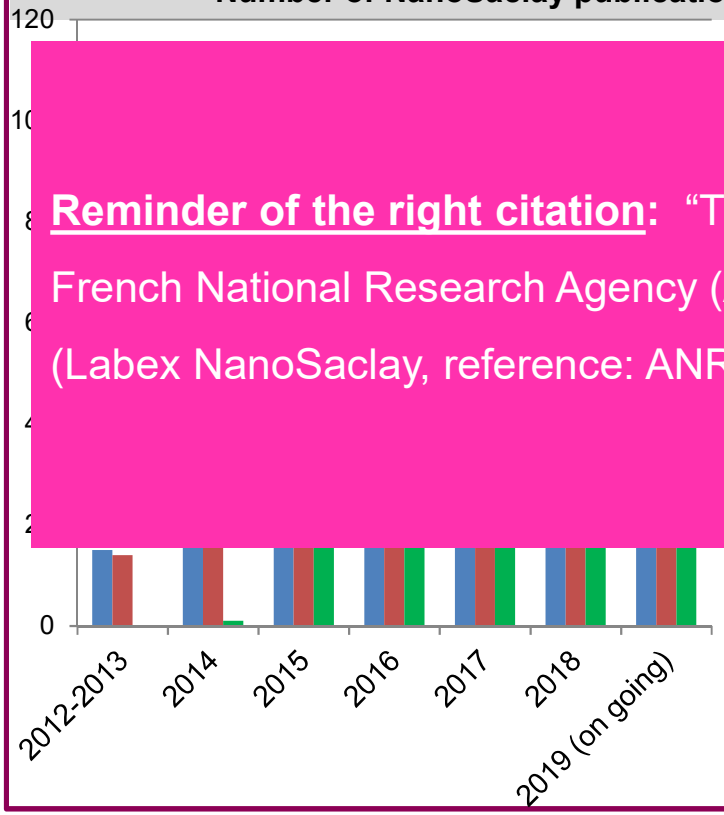

Publications according to the impact factor

* *7: NanoScale impact factor*

Reminder of the right citation: "This work is supported by a public grant overseen by the French National Research Agency (ANR) as part of the "Investissements d'Avenir" program (Labex NanoSaclay, reference: ANR-10-LABX-0035) "

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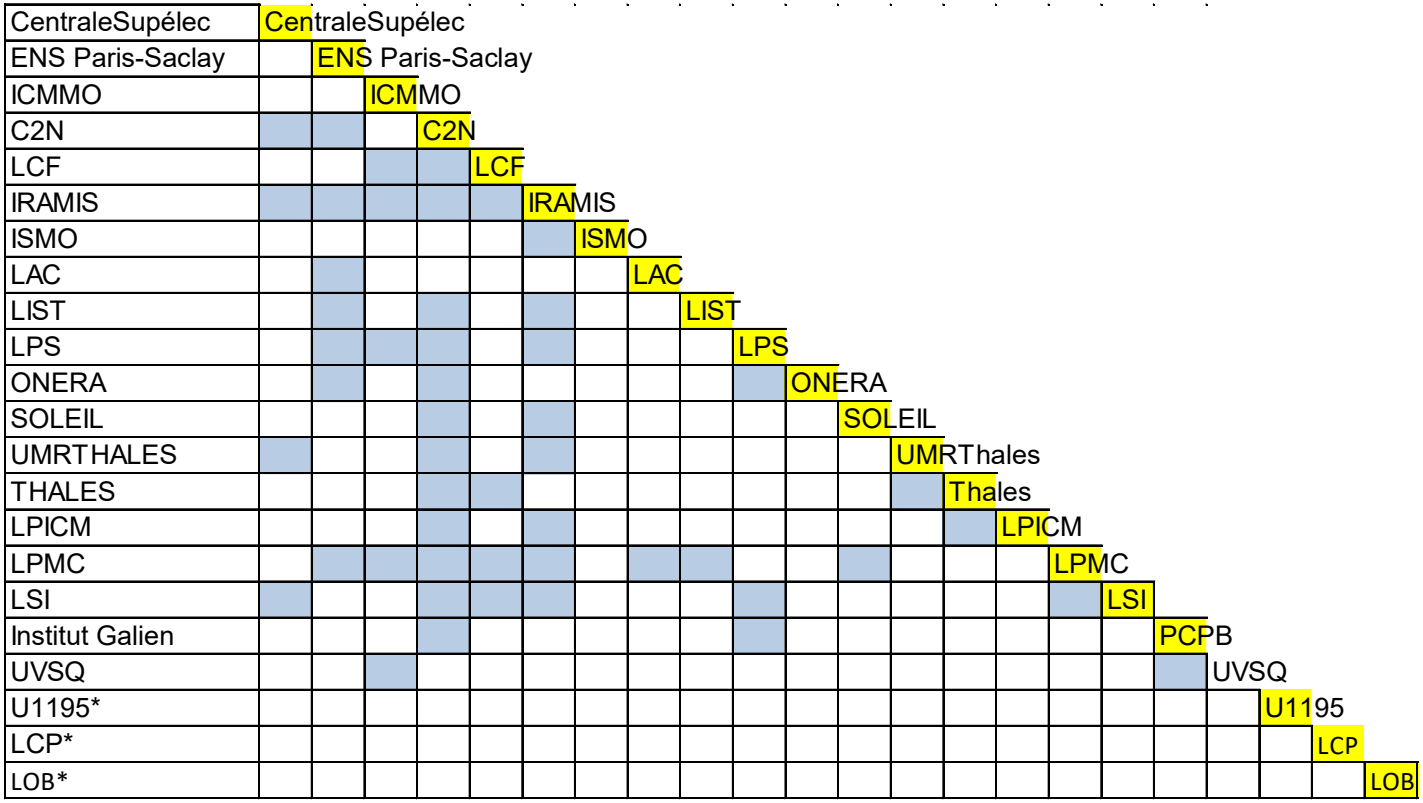
4/ Local structuration

Evolution of collaborations inside NanoSaclay: supported projects and publications

Collaborations in 2010



* laboratories that joined NanoSaclay in 2015

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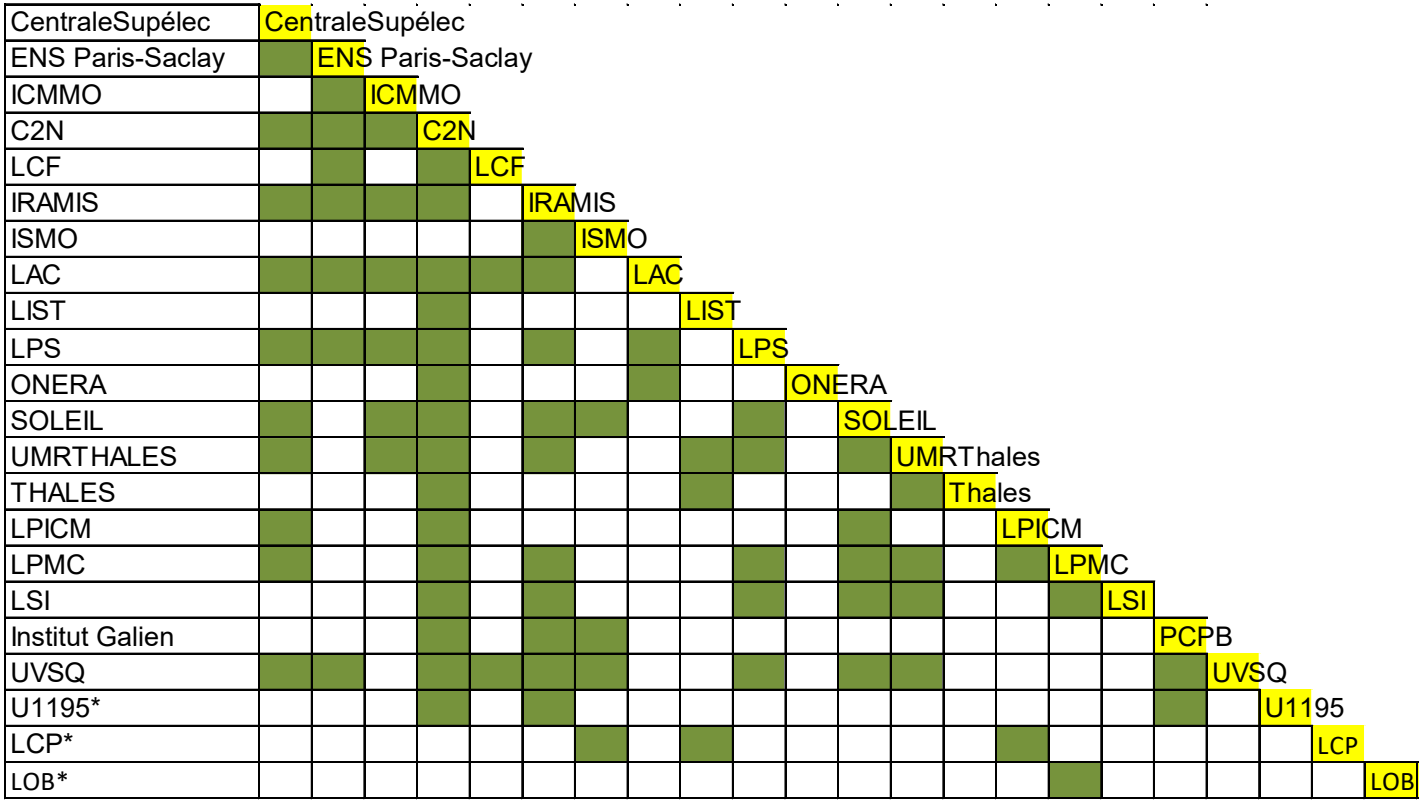
4/ Local structuration

Evolution of collaborations inside NanoSaclay: supported projects and publications

Collaborations in 2010

NanoSaclay joint publications and/or collaborations in selected projects – review mid-2018



* laboratories that joined NanoSaclay in 2015

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4/ Local structuration

Evolution of collaborations inside NanoSaclay: supported projects and publications

Collaborations in 2010

NanoSaclay joint publications and/or collaborations in selected projects – review mid-2018

	CentraleSupélec	ENS Paris-Saclay	ICMMO	C2N	LCF	IRAMIS	ISMO	LAC	LIST	LPS	ONERA	SOLEIL	UMRThales	Thales	LPICM	LPMC	LSI	PCPB	UVSQ	U1195	LCP	LOB
CentraleSupélec																						
ENS Paris-Saclay																						
ICMMO																						
C2N																						
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LSI																						
Institut Galien																						
UVSQ																						
U1195*																						
LCP*																						
LOB*																						

Only a first contact

Collaborations **doubled** when compared to 2010

Type of collaborations	Number
Existing collaborations in 2010	19
Existing collaborations in 2010 and strengthened thanks to the LabEx financial support	31
New collaborations	47
First contact/ potential collaboration	12

5/ NanoSaclay renewal

- **Why an extension?**
  - Based on the **questionnaire** "LabEx NanoSaclay and its extension", Nov. 2017 to Jan. 2018, 109 responses (61%)
  - Support from our International scientific committee and from our institution committee

  - **Strengthen and amplify the federative and structuring action**
    Widen the pooling of equipment / facilities
    Deepen the cross-fertilization effects associated to interdisciplinarity

Amplify the international outreach through the organization of **"Youth" events**: conferences organized by and for doctoral students/post-docs NanoSaclay + European institution with whom to set up collaborations

- **Integration of new teams** **and new units:**

Diamant pour l'électronique, GEMaC	U1195 : Petites molécules de neuroprotection, neurogénération et remyélinisation
Biophysics and Biophotonics, ISMO	
Structure and interactions of nucleic acids, LPBA	UMR IPVF
Laboratoire d'Etude des Eléments Légers, NIMBE	Equipe « matériaux polymères aux interfaces », LAMBE
Ingénierie particulaire et cellulaire à visée thérapeutique, PCPB	
Physique mésoscopique, LPS	

5/ NanoSaclay renewal

Project selected by ANR

Jury's **complimentary** report

Project submitted in sept. 2018

Project selected by the ANR. Jury's **complimentary report - Extract**

3. Overall evaluation

3.a. Major strengths

- Very strong scientific structuration effect on the Paris-Saclay nano community fostering the creation of the UPSaclay Institute of Nanosciences
- Very high quality and international visibility of research
- Excellent equipment and lab facilities
- Very strong knowledge valorisation activity (patents, start ups)
- Excellent cultural environment for advanced training and mentoring of young scientists
- Excellent e-training initiates, such the Nano MOOC, and a strong strategy to reach out to the general public
- Very good alignment with regional and national strategy

3.b. Major weaknesses

There are no major weaknesses.

3.c. Summary opinion and recommendations

Excellent Labex which is laying the ground for the creation of a World class Institute of Nanosciences, with clear potential for significant socio-economic impact.

Knowledge valorisation has room for further development. The proposal could have detailed in a tangible way the present and future initiatives of collaboration with companies. It is unclear whether the patentes filed have generated any revenues.

5-year extension's project accepted in February 2019
Budget : 5,8 M€ gross

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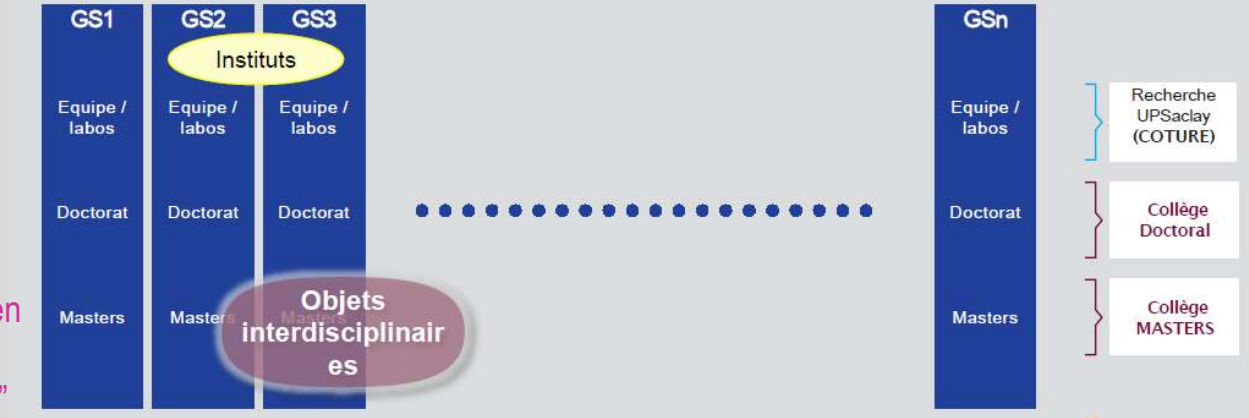
5/ NanoSaclay renewal: integration into UPSaclay

- **Project to integrate into UPSaclay's scientific and strategic policy**
  - NanoSaclay II guaranteed to operate **until the end of 2022**
  - Budget of NanoSaclay II guaranteed **until the end of 2022** (~3/5 of the overall extended budget)
  - Notification towards UPSaclay to guarantee the progress of the new flagships until the end of 2024

Construction of UPSaclay

Articulation between schools and "transverse objects" to be clarified



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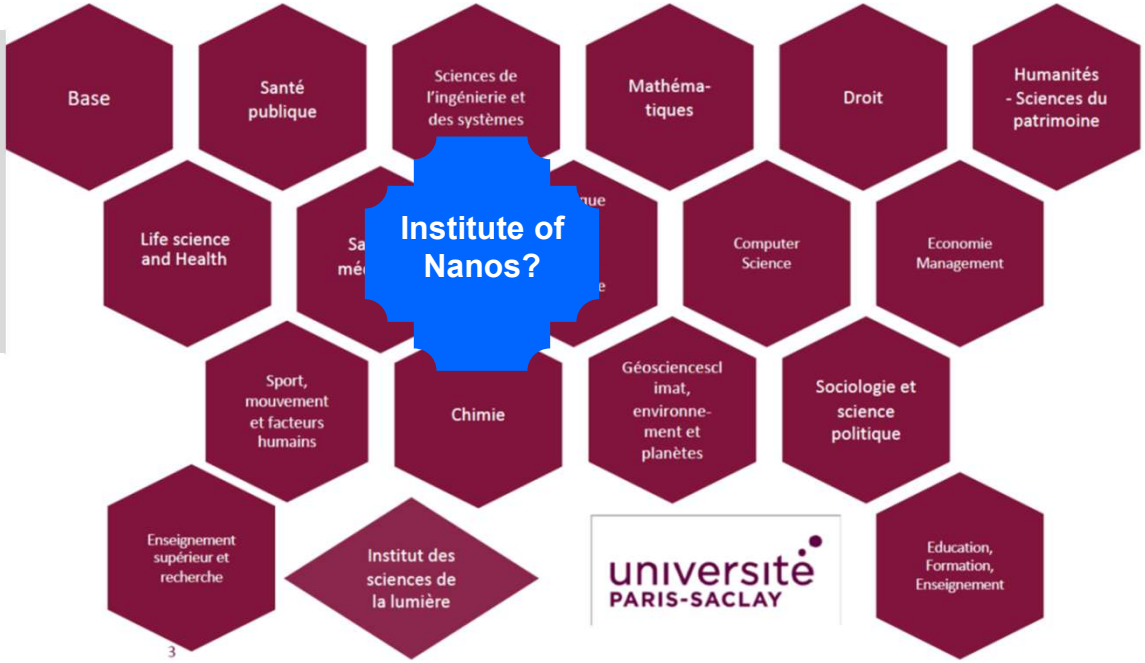
➢ Final output (as written in the extension's project):

Creation of a Paris-Saclay Institute of Nanoscience

as an "interdisciplinary object" transverse to 4 Graduate schools



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➢ UPSaclay: transverse objects -> Call for expressions of interest

5 sept.	12 sept.	18 oct. minuit	21/10 au 10/11
•Ouverture	•Réunion d'information	•Date limite soumission des propositions	•Examen par CoTuRe et CoTuFo + représentants des préfigurateurs GS

5/ From *Labex NanoSaclay* to the "*Institute of nanos*"

Graduate Schools (GS) :

- Sc. de l'ingénierie et des syst.
- Chimie
- Physique
- Santé et médicaments

Spintronics and Nanoelectronics

Nanophotonics, nano-objects for energy control

Nanomedecine for diagnostic and treatment

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Nanomedecine for diagnostic and treatment

Hétérostructures de matériaux 2D : synthèse, caractérisation, contrôle de leurs propriétés physiques et dispositifs associés

Nanosciences pour le vivant : développement de nanosystèmes et outils performants pour le diagnostic et la thérapie

Instrumentation multifonctionnelle à l'échelle nano

Réflexion à poursuivre !

GT AMI NanoSaclay : A. Barthelemy, A. Bournel, G Faini, C. Fiorini, A. Levenson, S. Mura, H. Remita, F. VanDau …
(à compléter)

NB : **16:30- 17:30** *Temps d'échange autour des « objets transverses »*

5/ NanoSaclay renewal: to come in 2020 and after

- **On going**: Call for '2020-2024' Flagships

Framing letter:

- ✓ **Structuring** projects bringing together at least **4 units** of the LabEx
- ✓ Proposition of **8 themes**, based on the proposals of team leaders (consultation end of 2018)

A	Nanomatériaux pour l'énergie
B	Propriétés topologiques dans les nanostructures et matériaux topologiques synthétiques
C	Hétérostructures de matériaux 2D : synthèse, caractérisation, contrôle de leurs propriétés physiques et dispositifs associés
D	Nanosciences pour le vivant : développement de nanosystèmes et outils performants pour le diagnostic et la thérapie
E	Instrumentation multifonctionnelle à l'échelle nano
F	Nouvelles fonctionnalités pour l'électronique de spin
G	Approches alternatives pour le calcul optique utilisant des nano dispositifs
H	Transport thermique à l'échelle nano
/	Autre

- ✓ Call open to topics outside the 8 themes targeted
- ✓ Projects have to include at least **2 PhD grants**, cofounding encouraged

5/ NanoSaclay renewal: to come in 2020 and after

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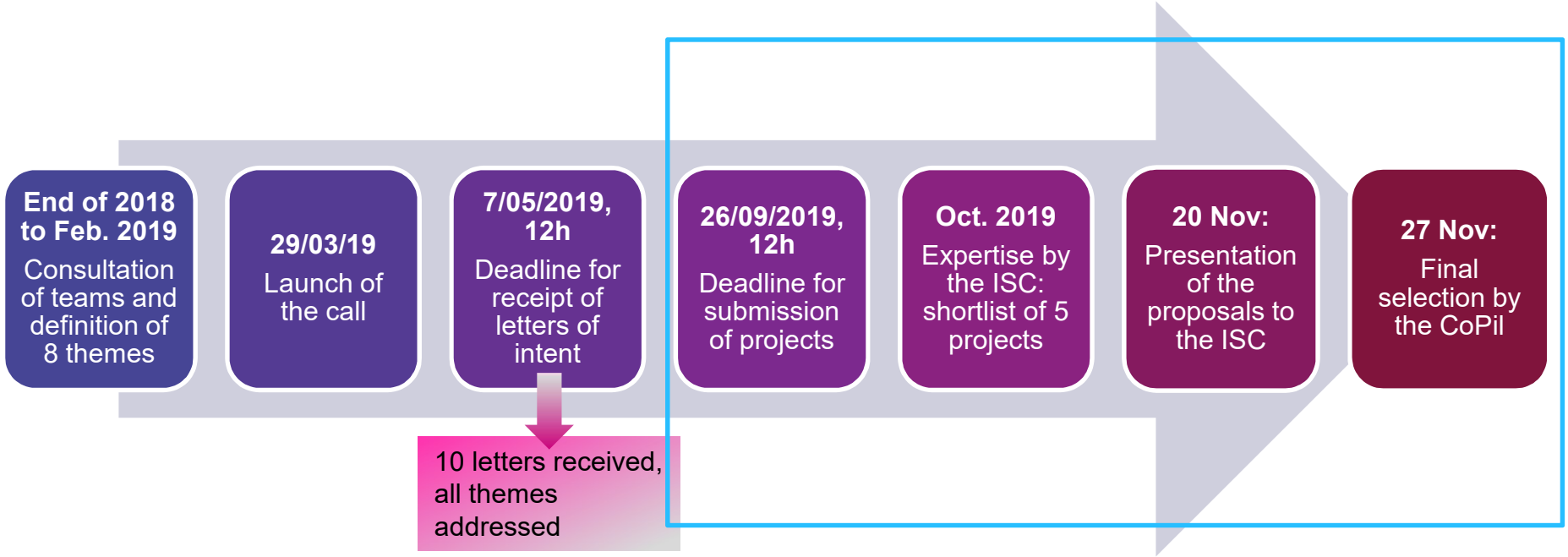

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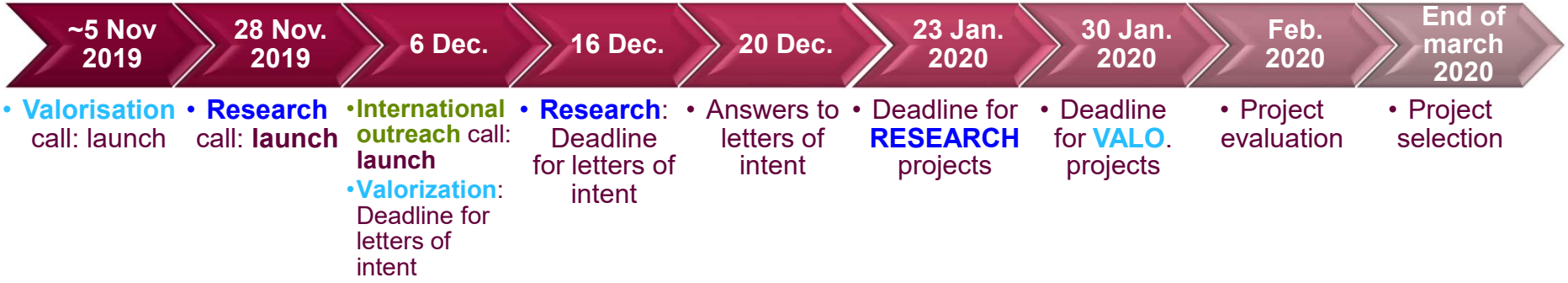
5/ NanoSaclay renewal: to come in 2020 and after

- **To come:** Annual open research call
  Annual valorisation call, in common with PALM
  International outreach call

Provisional timetable for 2020 calls:



- What's new?
  - 2020 open research call with a special incentive for projects focused on quantum physics? (collaborations encouraged with PALM)
  - Call for ideas for future industry-university meetings
  - Youth events to organize

To find out more about NanoSaclay

News, research highlights, events to come, supported projects…:

see the web site http://nanosaclay.fr

Contact: Project manager
Lucie Krzaczkowski
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M.A. Cavrois-Desmier
Marie-astrid.cavrois-desmier@cea.fr

SUPPLEMENTS

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NanoSaclay International Scientific Committee


Atac Imamoglu


Khaled Karrai


Lukas Novotny


Romain Quidant


Vahid Sandoghdar


María José Alonso


Didier Bazile


Simon Benita


Laurent Malaquin


Philippe Lambin


Eugenio Coronado


Burkard Hillebrand


Marcel Mayor


Giorgio Rossi


Alain Fontaine

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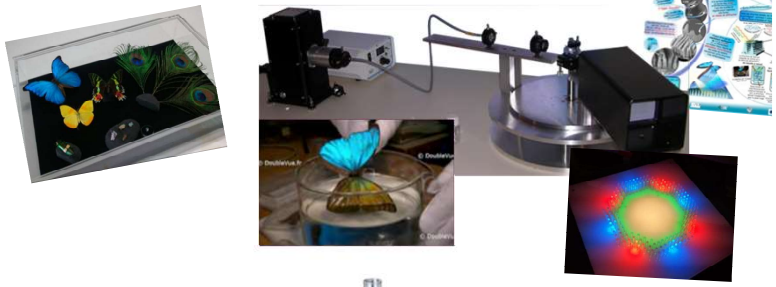
Education: Nanoschool's demonstrators

Goals: Demonstrators as transportable kits, ready for use, versatile for general public and schools
Content: material, consumables, posters, instructions for use, safety data sheets, educational sheets

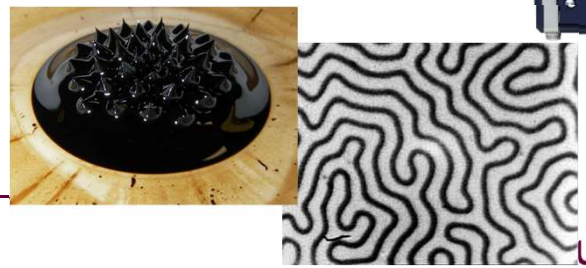


Module 1 : Structural coloration, nanophotonics
Optical properties of natural and artificial periodic structures

Module 2 : Synthesis and properties of Au nanoparticles, nanochemistry
Modification of physical properties of Au at small scales

Module 3 : Photocatalytic activity of TiO2 nanoparticles, Surface / volume
Demonstration of photocatalytic properties of TiO2 nanoparticles

Module 4 : Microscopy techniques
Initiation to microscopy: to see the « nano »



Module 5: From magnet to spintronics
Magnetic structure of materials, observation of magnetic domains

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