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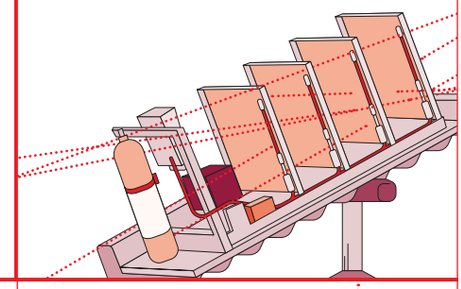

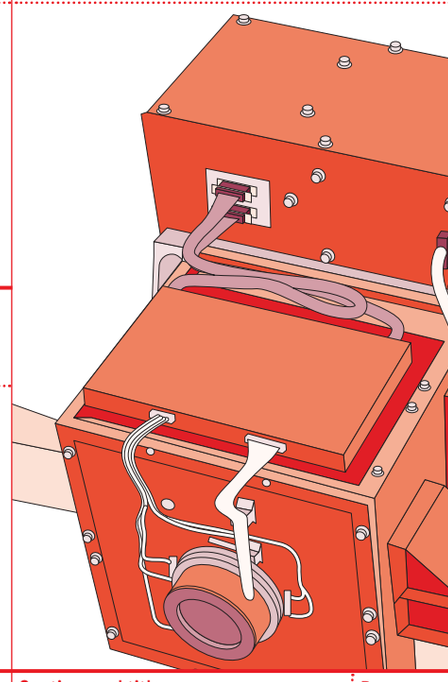

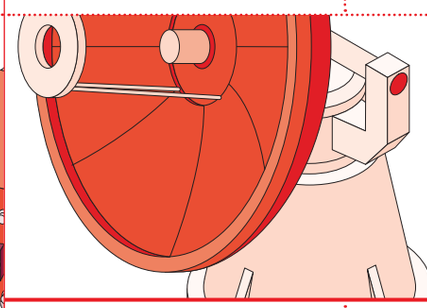

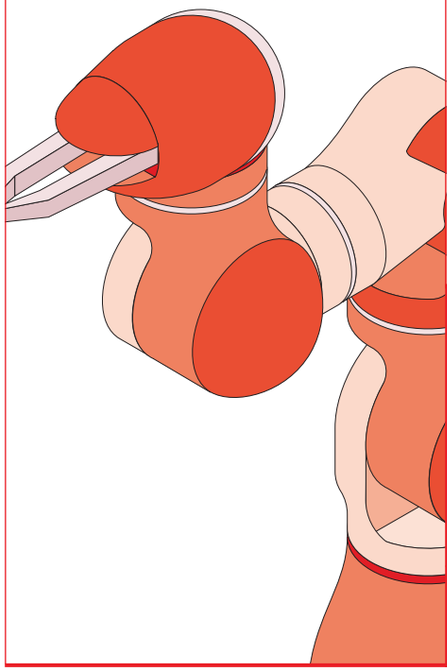

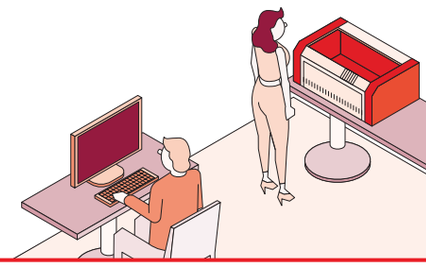

université PARIS-SACLAY

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IT HAPPENED

FEBRUARY – MARCH

Date	Place	Host
19.02-16.03	Design Spot	Université Paris-Saclay

Description

DESIGN OBSERVER

Following the Pompidou Center and the Gobelins Gallery, it was the Design Spot of Université Paris-Saclay's turn to host the exhibititon of the 2008 Design Observer Stars, in partnership with APCI, the French Agency promoting industrial design.

designspot.fr/evenements/observeur-du-design-2018/

MARCH

Date	Place	Host
22	Centrale-Supélec	Université Paris-Saclay

Description

STUDENT ENTREPRENEURSHIP DAY

Université Paris-Saclay organized the Student Entrepreneurship Day for teams of students, doctoral students and young graduates of member institutions of the PEPITE PEIPS (Entrepreneurship, Innovation Paris-Saclay), carrying a start-up creation project.

www.universite-paris-saclay.fr/fr/actualite/journee-entrepreneuriat-etudiant-2018-de-luniversite-paris-saclay

Date	Place	Host
22	Campus Paris-Saclay	Université Paris-Saclay

Description

EQUALITY WEEK

As part of the International Women's Rights Day, Université Paris-Saclay organized its third week of equality on the theme of diversity among sectors, courses and careers, in collaboration with students and staff members.

www.universite-paris-saclay.fr/fr/evenement/les-metiers-ont-ils-un-sexe

APRIL

Date	Place	Host
5	EDF Lab Paris-Saclay	EDF

Description

HANDIVERSITY CONFERENCE

A wide variety of topics were covered during the Handiversity conference, ranging from territories, infrastructures, culture and disability, training, insertion and employment, and more. The event was an opportunity to publicize and promote research and innovation projects related to disability or with a universal design approach.

www.universite-paris-saclay.fr/fr/handiversite2018

DON'T MISS OUT

JUNE

Date	Place	Host
6-9	IUT Cachan	IUT Cachan and the Robotic Menagerie

Description

CRASH HACKATHON 2018 – AS PART OF THE CACHAN ROBOTICS FESTIVAL

www.festivalrobotiquecachan.fr/edition-2018/competitions-robotiques/hackathon-crash-2018/

Date	Place	Host
8, 18, 28	Cachan	Université Paris-Saclay

Description

INAUGURAL LESSONS BY THE UNIVERSITÉ PARIS-SACLAY CHAIRS

– Daniel Mercure, June 8
– Suzanne Higgs, June 18
– Gregory Starr, June 28

www.universite-paris-saclay.fr/fr

Date	Place	Host
From 15	Université Paris-Saclay	Université Paris-Saclay

Description

TRAVELING EXHIBITION OF PROMINENT PHOTOS

//huit.re/En_vues

Date	Place	Host
24-29	Berges de Seine, Seine-Port (77)	Genmed, France génomique, CEA, UEVE, IFB, INRA, CNRS

Description

GÉNOPOLE SUMMER SCHOOL

www.genopole.fr

Date	Place	Host
29	Centrale-Supélec	Université Paris-Saclay

Description

UNIVERSITÉ PARIS-SACLAY DOCTORAL GRADUATION CEREMONY

www.universite-paris-saclay.fr/fr

JULY

Date	Place	Host
4-6 / 8-13	CNRS Gif-sur-Yvette	Labex SPS

Description

INTERNATIONAL CONFERENCE "SACLAY PLANT SCIENCES" FOR THE FUTURE

– Saclay Plant Sciences International Summer School, July 8 to 13

Date	Place	Host
16-21	Toulouse	The Center for Bits and Atoms (MIT), The Fab foundation

Description

FAB 14 # FABRICATING RESILIENCE

– Fab 14 + FAB City Summit, from July 11 to July 13 (Paris)
– FAB 14 + FAB distributed, July 14 and 15, Paris-Saclay: "Scientific research"
– FAB 14 Toulouse, from July 16 to July 20 (location to be confirmed)
– FabLab Festival on July 21

www.fab14.org/

© UPSaclay

In this seventh issue of *L'Édition*, you will find out how cyber-physics and basic science are shaping the factories of the future, why a microsatellite in freefall defies the law of gravitation and the different world-class master's programs we offer international students. Some of our areas of excellence will be familiar to you and others less so, as the core of Université Paris-Saclay's research is so vast: 275 laboratories representing thousands of teams and some 10,000 researchers and professors providing multidisciplinary academic excellence.

"275 laboratories representing thousands of teams and some 10,000 researchers who provide a multidisciplinary knowledge of excellence."

A recent example is our new institute, DATAIA, dedicated to data science and artificial intelligence. Its kickoff meeting took place a few weeks ago. DATAIA enables France's new strategy on artificial intelligence to benefit from the momentum generated by experts from Université Paris-Saclay and its partners.

In March, an international jury monitoring our development also gave an extremely encouraging report and described how Université Paris-Saclay is a "game changer" with the concentration of talents that drive it and the presence of cutting-edge technology platforms on site, with a high profile and international influence.

Our perimeter has changed. It now brings together, in an ambitious and effective project, institutions whose leaders know the strength of our collective and how to mobilize it.

Gilles Bloch,
President of Université Paris-Saclay

Members of Université Paris-Saclay

AgroParisTech · CentraleSupélec · CNRS · CEA · école normale supérieure paris-saclay · Inria · Institut d'optique Graduate School · IHES · INRA · Inserm · ONERA · Université de Versailles St-Quentin-en-Yvelines · Université d'Évry · Université Paris Sud

Keywords
PhD students, Bachelor, Climate

Title

International Master's Degrees: Originality Unites

With Paris-Saclay's International Master's degrees, knowledge and expertise transcend frontiers. These multilingual courses bring together innovation and a global outlook.

There are nearly 40 international master's degrees at the Université Paris-Saclay. "We are unique in this respect," says Elisabeth Dufour-Gergam, head of training at the university. For each degree, the university and its partner institution are joined by foreign institutions with which partnerships have been signed and French schools such as AgroParisTech or CentraleSupelec.

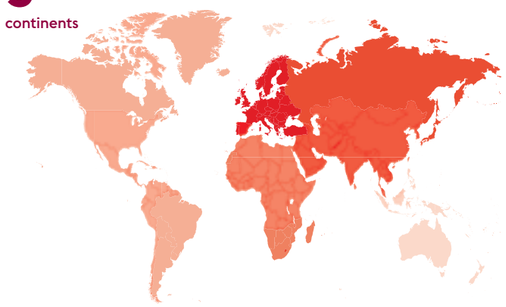
Among the courses on offer are the Master 1 in Food Innovation and Product Design (FipDes). This course is taught in English by 65 professors and research professors, and 10 research centers and seven incubators are involved. It was implemented by a consortium bringing together UPSaclay and AgroParis Tech, but also the Dublin Technology Institute, the Federico 11 de Naples University in Italy and Lund University in Sweden. Another example is the M2 Industrial and Medical Applications of Radiations, which was set up in partnership with the Adama Mickiewicza de Poznan University in Poland and the Universities of Genoa and Porto, under the leadership of Paris-Sud.

"Our aim is to offer high-quality training and new curriculums in-line with our desire to be selective, explains E. Dufour-Gergam. This selectivity is backed up with state-of-the-art technological equipment to train students to meet the challenges of the 21st century".

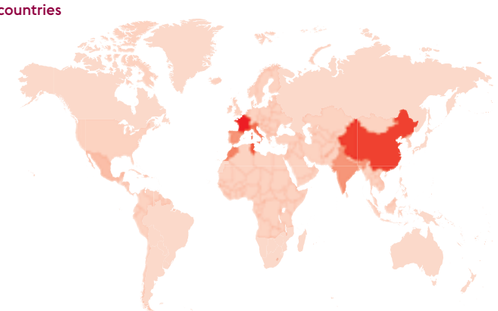
STUDENTS' COUNTRIES OF ORIGIN

The students in second year master's degree come from

5
continents



55
countries



Europe 123: France 8, Italy 12, Spain 9, Portugal 4 and 17 from 14 other countries

Asia: China 47, India 9, Lebanon 7, Iran 4, Vietnam 4 and 13 from 9 other countries

Africa 46: Tunisia 18, Marocco 11, Algeria 4 and 13 from 11 other countries

South America 8: Columbia 4 and 4 from 3 other countries

Central America 7: Mexico 5 and Guatemala 2

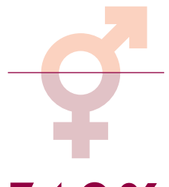
North America 3: from 3 different countries

Oceania 1

DIVERSITY:

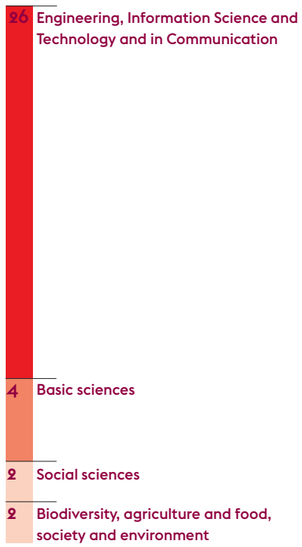
272 students in second year master's degree, of which 95 are women and 177 men

65.1 %
men



34.9 %
women

34 INTERNATIONAL MASTER'S DEGREES:



Title

The Paris-Saclay Campus: a "Little World" in Itself

© JLS

Shamim Karimi and Miguel Renom, students in international masters at Paris-Saclay University.

"Greece, China, Germany, India…" The list of student nationalities enrolled in the first year of the Master Human Computer Interaction and Design course, reads like a list of the United Nations. Shamim is Iranian-born and Miguel, who is in his second year Master Interactions, is Uruguayan. They both arrived on the Paris-Saclay campus at the beginning of the fall of last year.

Never having studied abroad before, Miguel describes his student life as a "global experience". He says that it is very rewarding to meet people from the four corners of the earth and that the courses themselves are a revelation. "In my country, there can be anywhere between 100 to 200 students in a university amphitheater but at UPSaclay, there are only 50 or so. This means that each of us can directly interact with the professors during a class." Shamim says that she admires the professionalism and availability of the teaching staff. "They are the best in their domain but they remain open-minded and take into account our ideas too." "And, we have access to very specific and specialized teaching," adds Miguel. Even though Shamim found the language barrier difficult to begin with, especially with the French, she says that the university organized different events to help students get to know each other better. Both Shamim and Miguel were also happy to discover state-of-the-art machines during their practical classes. Perhaps they learned the following expression from one of their fellow German students: "wie Gott in Frankreich leben", or literally "live like a god in France". Or like a master's student at Paris-Saclay?

Title

A New "Fundamental" Bachelor's Degree

UPSaclay and ENS Paris-Saclay will offer a new bachelor's degree starting in October 2018. Set up by the two institutions, the third year (L3) of the degree will focus on fundamental physics. This is a logical progression to the collaboration begun in 1988 between the university and the ENS and which has already produced two other L3S, one in chemistry and the other in life sciences. Half of the credits for this degree will be obtained during shared courses while the other half will correspond to a specific course proposed by each of the two universities.

Title

A Privileged ACCES to Climate Change Issues

Climate change is becoming a critical issue and is increasingly in the headlines. But talking about this subject requires proper scientific background. To address this need, the UVSQ and the Ecole Supérieure de Journalisme in Lille have jointly created a distance-learning master's degree called ACCES (Appréhender les changements climatiques, environnementaux et sociaux). This comprehensive "toolbox" allows journalists, communicators and students on initial training courses to analyze climate information and put it into perspective. It will also allow them to characterize the extent of climate change and to better explain advances in scientific research in this domain.

Keywords
Mentoring, Initiations

Title

Mentoring: a Sure Win

Mentoring is a rewarding experience in so many ways, it enables you to get to grips with teaching methods, pass on your knowledge and meet new people. Not to mention that it can help for your diploma!

Mentoring has been in place for several years at the ENS "but it really started to be valued when the new degrees were implemented in 2016," explains Caroline De Sa, vice-president of study and student life at ENS Paris-Saclay. And for a good reason: teaching has now become a sought-after skill for *Normaliens* and mentoring can be validated as part of a degree. Twenty to thirty students at the school have decided to do this.

Two different forms of mentoring exist at ENS. The first is in-house, student-to-student mentoring. "A *Normalien* can help a fellow *Normalien* who needs refresher training when transferring to a new course, for example", says C. De Sa, "or a student having difficulties understanding a particular subject will be supported by one of his classmates." The second applies to non-ENS students, in-line with one of the school's founding principles – being open to the world. For example, schoolchildren and high-school children from partner institutions in Cachan, Gentilly or Palaiseau, can benefit, as can students studying for a degree at the Institut Villebon-George Charpak. Another example: students at the Institut National du Sport de l'Expertise et de la Performance (INSEP), an institution for future high-level athletes (who need tutoring because of the time they have to spend "away from their books" during training and sports competitions).

It goes without saying that student mentors are not left to fend for themselves. "They are provided with training in work techniques and motivation, and learn about different teaching tools," explains C. De Sa. A coordinator is also available to help them set up activities if needed.

It is win-win partnership for both parties. Tutored students not only receive invaluable support during their studies, but – thanks to their mentor – they also discover ENS and thus the possibility of pursuing their studies in the scientific field. "As for the mentors, they gain their first real experience in teaching and are able to meet students from different backgrounds to their own," says C. De Sa. A win-win system that could extend to other institutions of Université Paris-Saclay.

Title

Information Technology is Fantastic

© Syda Productions

Digicosme, the laboratory of excellence (LabEx) in digital science, has formed a partnership with the town hall in Bures-sur-Yvette in Essonne. As part of extracurricular time (TAP), volunteer scientists are introducing primary school pupils in the city to computing science. Through a recreational approach, quite different to the one they are used to, the scientists show the children that information technology is in fact a science like any other. The operation has been such a success that other town halls in the Versailles region are now candidates.

Title

Coming Soon: Inauguration of the New MISS Building

© JM Daubourg

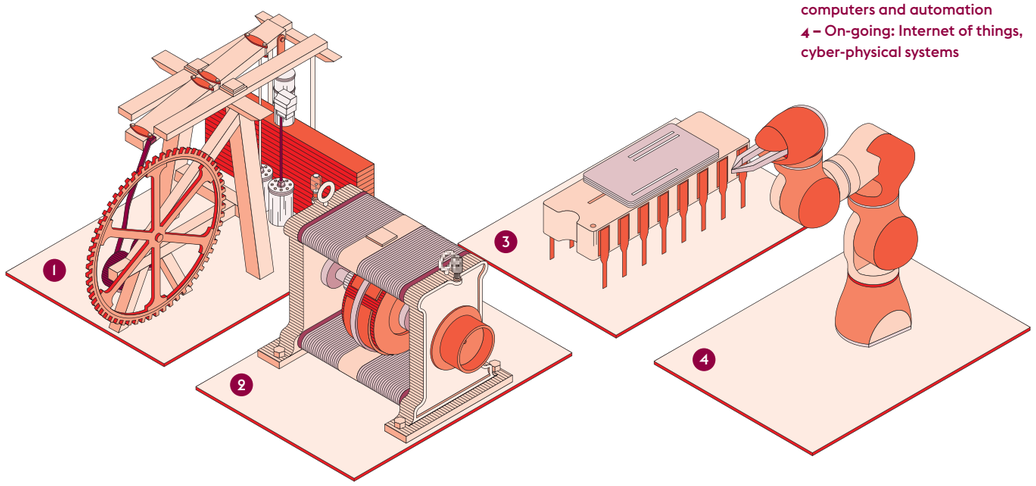
The Maison d'Initiation et de Sensibilisation aux Sciences (MISS), supported and funded by the Region Île-de-France, Diagonale (COMUE Paris-Saclay), Université Paris-Sud and CNRS is "THE" place of appointment of young people aged 8-15 and their teachers to rub happily in science. From grade 2 to grade 3, they experiment, wonder, marvel at workshops designed by researchers or teacher-researchers and led by doctoral students.

Molecules to cook, Mathematics and Botany, Bubbles and Mosses… After 2 years of animations outside the walls, the classes are welcomed since last December in a splendid building of 900 m² renovated by the architects of the agencies Cléris + Daubourg and Klapisch_Claisse.

Illustrations on the right page and page 18:
Djilian Deroche

Title

Cyberphysics for Tomorrow's Factories



1 – Early 19th century: Mecanization, water to steam power
2 – End of 19th century: Mass production, electiricity
3 – Mid 20th century: Electronics, computers and automation
4 – On-going: Internet of things, cyber-physical systems

What will the factory of the future look like? Versatile, safe and flexible enough to adjust to the demands of a changing market, it will focus on improving the quality of production and automating physically demanding repetitive tasks. This digitalized environment will process data in real time, thus optimizing production flow, stock management and energy consumption. And last but not least – it will be environmentally friendly too.

Industry is undergoing a real revolution in the 21st century thanks to new technologies that are bringing about profound change. Researchers at UPSaclay are playing their role in this revolution through their work on cyberphysical systems (CPS). "We already use these systems on a daily basis," explains Laurent Fribourg, who is a researcher at CNRS and ENS Paris-Saclay. "They can, for instance, control the speed of our cars or the temperature of the buildings in which we live. In industry, they can help optimize energy networks and reduce power consumption." All in all, they allow for reliable and safe automation, and can process large quantities of data in real time.

Automatic Pilot for a Digital Factory

"They function like automatic pilots such as the ones long employed in civil aviation," says L. Fribourg. In CPS, physical and software components are deeply entwined, and each operate on different spatial and temporal scales. They interact with each other in a multitude of ways that change with context, thus allowing them to perform complex tasks. "A calculation program in an airplane, for example, enables it to land safely in foggy weather by detecting radar signals emitted from the runway."

CPS might soon be directly used in factories – to collect objects, distribute electricity, 3D print, and assist operators, to name but a few. There are so many tasks that they will be able to perform in an automatic way! Miniaturization of today's processors, sensors and actuators together with increased computing and memory speeds are now allowing computer programs to assimilate lots of different types of data and consequently carry out dozens of varying tasks.

Collaborative and Interdisciplinary Research

These technologies rely on many different scientific disciplines such as mathematics, automatics and computing. Researchers from different fields at UPSaclay are thus working hand in hand to create CPS and rise to the challenges that their development entails. CPS are programmed to act on physical phenomena as diverse as energy consumption, temperature variations and object motion, and they are able to analyze these phenomena from data received by sensors, such as those that measure temperature or speed, for instance. This data is interpreted by artificial intelligence algorithms and allows the CPS to adapt to their environment in real time.

Several laboratories are involved in this research, including the Laboratoire Spécification et Vérification (LSV) at the ENS Paris-Saclay, the Laboratory of signals and systems (L2S) at Centralec-Supélec and CEA LIST Institute. These laboratories are taking part in different DigiCosme projects and are collaborating with UPSaclay partners like the Ecole Polytechnique and the Thalès and Safran research centers.

Reliable, Accurate and Strong

Researchers still need to overcome a certain number of technical problems when developing CPS for industry. Algorithms interact with a physical system so that it adapts to a certain type of behavior, with a high level of reliability and safety. One scientific challenge is to be able to control the interactions between many algorithms all operating at the same time on the same platform," explains Antoine Girard, researcher at CNRS and L2S.

> **"We already use cyberphysical systems on a daily basis to control the speed of our cars or temperature in buidings."**

Another hurdle that has to be addressed is being able to control mechanisms that are becoming increasingly complex, such as robotic arms. "Today's algorithms pilot systems are defined by a dozen or so variables. In the future, they will have to be able to control several hundreds of these variables with equal efficiency," says A Girard.

A Precious Ally for Workers

Another important challenge is how to adapt this technology to human beings. The scientific advisor at LIST, Jean-Noël Patillon, says: "The factory of the future will be socially responsible and will allow operators to work in better conditions." For many tool-based tasks (for example, welding and sanding), manual know-how will remain unrivalled, but to allow people to work in safer conditions and avoid carrying out arduous tasks, researchers are developing collaborative robots (or cobots).

These precious allies adapt to the human form and are strong enough to move heavy loads, for example. "Equipped with force and movement sensors, the data is then analyzed by programs running in real time. A cobot is able to calculate and predict when a worker is likely to perform a strenuous and repetitive manual task and accompany him or her during this task," explains J-N Patillon. Thanks to technological progress, robots are already able to reproduce simple movements, such as polishing metal or road surfacing with tarmac. There is no doubt, cobots are already making their debut in industry today and they will be working alongside us in the factories of the future.

Publications

· S. Tarbouriech, A. Girard, L. Hetel, Control subject to Computational and Communication Constraints, 2018.

· L. Fribourg et R. Soulat, Control of Switching Systems by Invariance Analysis: Application to Power Electronics, *Wiley-ISTE*, 2013.

Portrait

Antoine Girard

Algorithms interact with the physical system so that it has the desired behavior. How can we master the interaction between the many algorithms running simultaneously and control systems controlled by several hundred variables?

Antoine Girard, director of research at the Laboratory of Signals and Systems (CNRS, CentraleSupélec, Université Paris-Sud), works mainly on the analysis and control of dynamic hybrid systems. CNRS Bronze Medal laureate, junior member of Institut Universitaire de France (IUF), Girard was also awarded an ERC Consolidator Fellowship.

» focus

Towards Optimal Use of Energy

In industry, electrical transformers are giving way to integrated circuits that are controlled by CPS. These circuits are smaller, with better output and flexibility, and are enabling the digital factory to optimize energy use. Electricity, in fact, involves very rapid phenomena – current can change in just a thousandth of a second, for example. Accurately controlling this current is a challenge that can now be overcome thanks to the mathematical techniques invented at LSV and L2S.

Publication · A. Le Coënt, J. Alexandre dit Sandretto, A. Chapoutot et L. Fribourg, Control of Nonlinear Switched Systems Based on Validated Simulation, SNR'16, *IEEE Computer Society Press*, 2016.

» focus

Managing the Complexity of Systems

Controlling the complexity of CPS to make them more robust and reliable is the goal of the L2S' CODECSYS project. "Here, we are optimizing the computing operations carried out by the CPS so that we can entrust them to a single platform that handles the interactions between the different data it receives." Researchers use mathematical models that ensure best task sequencing. These models can even take into account uncertainties in operation execution timing.
CPS are having to deal with ever increasing amounts of data, researchers therefore need to rethink their programming practices. Thanks to the European project PROCSYS, they are now inventing a new computing language that might be useful for collaborative robots, for example, since it is better adapted to the machine interface.

» focus

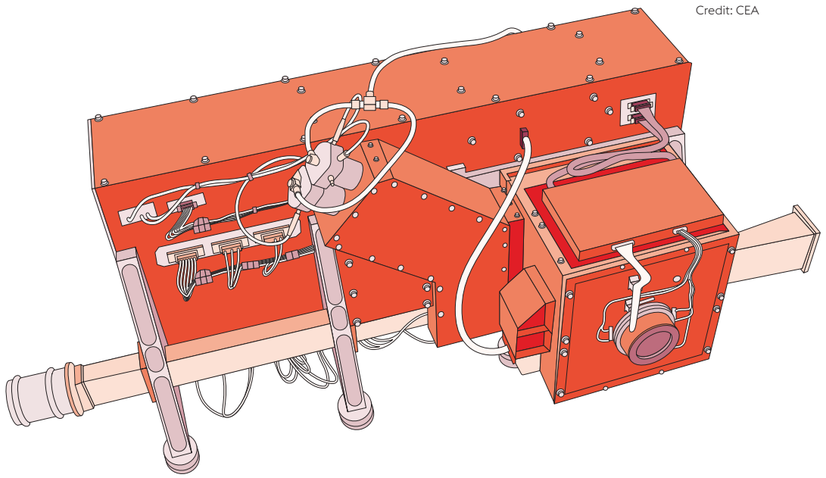
Collaborative Robots: Complementarity with Humans

Collaborative robots are programmed to adapt to human movement. Thanks to algorithm learning techniques, they are able to process the data transmitted by sensors and produced by computer models (for example, ones that simulate shock or contact).
Now CPS Researchers are aiming to improve the learning capacity of these robots and their goal is to refine human mechanical models and develop new, more efficient, mathematical architectures. This research will hopefully allow for a real synergy between robots and humans in tomorrow's digital factories.

Keywords
Astrophysics, Planetary systems, Relativity, Dark Energy

Title

Our little wonders scrutinize space



The cosmic muon telescope of the ScanPyramid project, radiographing the pyramid of Giza (Egypt).

Credit: CEA

Compact and ingenious, highly sophisticated instruments, to which many researchers and students from Université Paris-Saclay contribute, reveal some secrets of space. From planetary systems to the structure of the Universe, COSIMA, COSISCOPE, CIVA, MICROSCOPE and Euclid have in common to be highly sophisticated instruments that are small in size.

COSIMA is the first-ever probe to have followed a comet (67P/Churyumov-Gerasimenko or "Tchouri" for short). It landed Philae, the small robot lander. This mission ended in September 2016, delivering information on its target.

COSIMA collected the dust ejected by Tchouri and photographed it thanks to its micro-camera COSISCOPE, developed at the Université Paris-Saclay (Institut d'Astrophysique Spatiale-IAS). The instrument then analyzed some of this dust by mass spectrometry.

COSISCOPE, which is managed by Yves Langevin of the IAS, allowed for the identification of nearly 40,000 cometary dust particles. The pictures reveal that these are similar to interplanetary dust collected in the Earth's upper atmosphere. The particles contain aggregate structures that are as small as 14 microns in size, with diameters that can reach 1 millimeter.

Important Information on how Life Originated on Earth

This instrument might even provide us with important information on how life originated on Earth. "According to the TOF-SIMS data, the particles of cometary dust contain a carbonaceous material that has a macromolecular structure," explains Donia Baklouti of the IAS. "This material represents roughly half of the mass of each particle, which is between 0.05 and 1 mm in size."

"The carbonaceous matter that comets (such as Tchouri) might have brought to a young Earth, and which is thought to have played an important role in the origins of life on our planet, might essentially have been in this complex macromolecular form," she adds.

A Mission that Puts Einstein to the Test

Another scientific challenge led by a team of the UPSaclay: the microsatellite Microscope. 303 kilograms of technology that will "defy Einstein", according to the Centre National d'Etudes Spatiales (CNES), or rather test the equivalence principle with the highest sensitivity ever. This principle is at the heart of Einstein's theory of relativity and states that inertial and gravitational mass are equal. One of the consequences of this principle: a feather and a hammer fall at the same speed in the vacuum...

The mission, which was launched in April 2016, takes advantage of the fact that orbiting satellites are in free fall towards the Earth and acceleration measurements can reach the highest sensitivities.

"A violation of this principle would challenge the Standard Model of Physics and would indicate that a new interaction is at play," explains Manuel Rodrigues, head of the ONERA project for MICROSCOPE. "On the contrary, a non-violation of the principle would confirm the Standard Model. The stakes are huge."

An 85 Million Kilometer Free Fall

The first analyses from the instrument confirm, with a precision of 2.10^{-14} , that objects indeed free fall at the same rate in vacuum. These results were achieved with just 10% of all the data available, corresponding to 1,900 "useful" orbits, which is equal to a free fall of 85 million kilometers! Microscope's ultimate aim is to improve its performance thanks to data from 1,900 more orbits, some of which are already available or underway.

This technological wonders open new windows to the Universe.

Tracking Down Dark Energy

Another instrument being developed by researchers at UPSaclay is called Euclid. Its goal is to shed light on dark energy – this mysterious energy thought to make up 68% of the Universe and which might be responsible for its accelerating expansion. This energy can be explained by the version of Einstein's theory of general relativity that contains his famous "cosmological constant". The problem is that we do not understand why the cosmological constant is there, and why it should have exactly the right value to cause the observed acceleration of the Universe.

Scheduled for launch in 2020, Euclid will map a large portion of the "dark" sky, that is, the part that is free from contamination by light from our Galaxy and our Solar System. This will be accomplished thanks to a 1.2-meter diameter mirror telescope containing two small instruments of less than 100 kg. The first is a high-quality panoramic camera that takes pictures in the visible part of the spectrum, based on 4 cm wide CCD. The second is a near-infrared spectro-imager that will accurately measure the distance to galaxies by mapping their redshift. This is the increase in the wavelength of light to the red part of the spectrum as an object moves away from the observer.

The mission will thus be able to "look back" in time to as early as 10 billion years ago, to a moment when the expansion of the Universe had just begun to accelerate. This should help physicists better understand this acceleration, which might have been caused by the appearance of dark energy – in turn created perhaps by modifications in gravity itself.

Could the data collected by Euclid and the other missions described in this article lead to radical changes in the laws of modern physics? Or on the contrary, will they confirm these theories so that they stand even stronger? One thing is certain, these highly sophisticated devices will help us to answer these questions in the years to come.

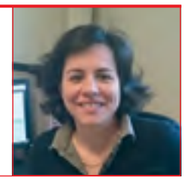
Publications

· Anaïs Bardyn, Donia Baklouti *et al.*, Carbon-rich dust in comet 67P/Churyumov-Gerasimenko measured by COSIMA/Rosetta, *Monthly Notices of the Royal Astronomical Society*, 2017.

· P. Touboul, G. Métris et M. Rodrigues, Microscope Mission: First Results of a Space Test of the Equivalence Principle *et al. Phys. Rev. Lett.* 2017.

Portrait

Donia Baklouti



These wonders of technology could even give us information about the role of comets in the appearance of life on Earth.

Donia Baklouti is a researcher and a teacher at Paris-Sud University, specialist of the chemical composition of astrophysical objects.

» focus

The CIVA Cameras on Rosetta

The Comet Infrared and Visible Analyser (CIVA) cameras were developed by Jean-Pierre Bibring's team at UPSaclay and colleagues at the Laboratoire d'Astrophysique in Marseille. These instruments produced a panoramic image of Philae's landing site as well as stereoscopic images. They also took microscopic images of the comet material in the visible and infrared parts of the spectrum. What do the most recent quantitative analyses of these images reveal? First, the size distribution of particles at the nucleus of Tchouri resolved by CIVA is very different to those of particles in the "coma" of the comet (analyzed by other instruments on Rosetta). The "coma" is the nebulous envelope that surrounds the comet's nucleus and forms when the comet passes close to the Sun during its highly elliptical orbit. These small grains, measuring between millimeters and centimeters might be residues of the beginning of our Solar System, which indeed started out as dust particles in protoplanetary nebulae – clouds of gas and dust that gave rise to stars and planets. The particles then collided and agglomerated to form planetesimals – the building blocks of planets.

» focus

"Nanosatellites" Student Projects

An innovative and exciting learning tool from the IUT of Cachan (Institut universitaire de technologie) helps its students to design and construct a satellite structure. An example of such a project is Eyesat, a nanosatellite developed by CNES that is studying zodiacal light in the Milky Way. "Another example is SOLAR/SOLSPEC," says Mustapha Meftah of Latmos (laboratoire atmosphères, milieux, obs ervations spatiales). "This instrument, on the International Space Station, has already allowed us to measure solar spectrum irradiance with high precision." Such measurements are important for fundamental solar physics studies, atmospheric photochemistry and even for research on Earth's atmosphere and climatology. "We now hope to set up projects with students at UPSaclay that are related to this research theme. To do this, we are looking to develop programs based on using nanosatellites and setting up mission centers. It's quite ambitious!"

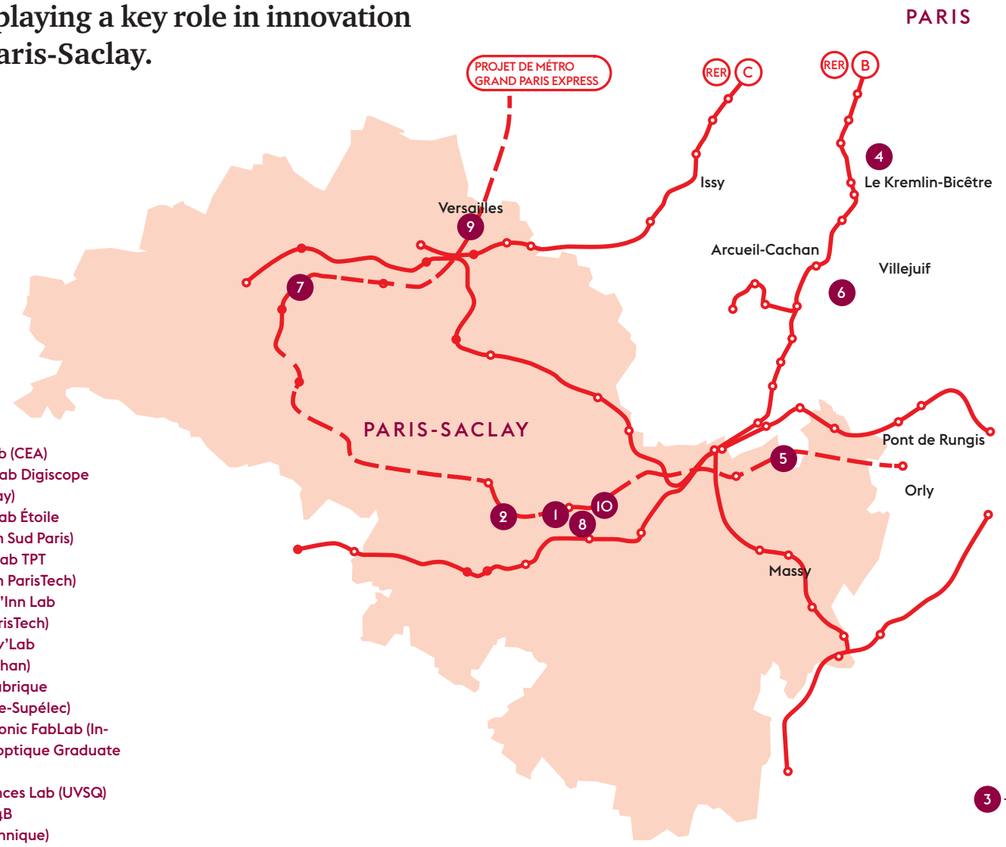
Publication · M. Meftah *et al.*, SOLAR-ISS: A new reference spectrum based on SOLAR / SOLSPEC observations, *Astronomy and Astrophysics*, 2017.

Keywords
Creation, Engineering, Prototypes, Training

Title

FabLabs: Creating, Prototyping, Sharing

FabLabs, hybrid and exciting workplaces at the crossroads of research, experimentation and entrepreneurship, are playing a key role in innovation at Paris-Saclay.



1 – CoFab (CEA)
2 – FabLab Digiscope (UPSaclay)
3 – FabLab Étoile (Telecom Sud Paris)
4 – FabLab TPT (Telecom ParisTech)
5 – Food'Inn Lab (AgroParisTech)
6 – Innov'Lab (IUT Cachan)
7 – La Fabrique (Centrale-Supélec)
8 – Photonic FabLab (Institut d'optique Graduate School)
9 – Sciences Lab (UVSQ)
10 – X-F4B (Polytechnique)

10
is the number of active FabLabs at Paris-Saclay in April 2018

www.universite-paris-saclay.fr/fr/les-fablabs

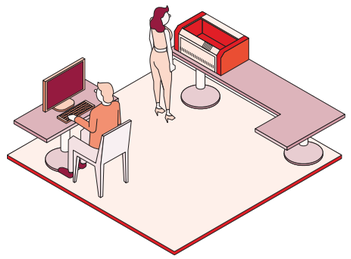
2
are open to the public: FabLab Digiscope and FabLab TPT

A FabLab is innovative, open and collaborative

where we
– use digital tools
– prototype objects
– share knowledge

where we meet
– designers
– artists
– builders
– students

– engineers
– researchers
– teachers
– businessmen
... and anyone who wishes to experiment and bring an idea to life.



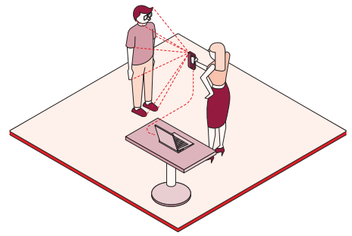
A distributed and chartered community

Pushing the door of a FabLab is to enter a shared prototyping space accessible to all where there are 3D printers, digital milling machines, laser cutters, but also paper pencils or playdough. Everything is designed to produce objects, demonstrators, machines, products in small series or unit. Each FabLab has its specificity, depending on the laboratory or university to which it is attached: digital manufacturing, design, agrifood, optics, mechanics... Everyone responds to a precise charter – that of MIT, condition *sine qua non* to bear the name "FabLab". This seven-point charter provides a practical framework that is also ethical and social. The FabLabs are all driven by fabmanagers guaranteeing the development of the FabLab and the user support.

www.labfab.fr/charte-fablab/

A Stepping Stone for Startups

For a future entrepreneur, spending time in a FabLab is ideal for developing an idea, testing it before being confronted to the market. For example, Tassiopée was developed, in part, at the Food'Inn Lab on the AgroParisTech campus in Massy. This startup, which has won a number of competitions, has created a new alternative to conventional plastic cups – an edible coffee cup made from a crispy, water-resistant biscuit. Another example: during Docteur'Preneuriales' first session, a team of doctorate students worked on a connected helmet designed for visually-impaired swimmers. The startup is in the process of being created. At the Université Paris-Saclay, the start-upers have a network of 10 "FabLabs and digital fabrication facilities ", which, as indicated by Romain di Vozzo FabManager of the FabLab Digiscope "have become an indispensable link in the chain of innovation and Entrepreneurship on the UPSaclay".



A Workplace Incorporated into the Curriculum

FabLabs provide a new way of learning – by "tinkering", testing and exchanging ideas. They now appear in the curriculum of most of the courses at Paris-Saclay. For example, Télécom ParisTech students will gain experience in the school's FabLab (TPT). The same is true for students from the Cachan IUT. "Making a prototype is important – to find out if your ideas can translate into real-world objects," explains Matthieu Barreau, professor in mechanical construction, involved in the Innov'Lab. "The new generation of highly connected students do not give enough importance to real, hands-on design."

The approach can be interdisciplinary as for UPSaclay's Docteur'Preneuriales. This course encourages doctorates to innovate and learn business skils. Likewise, students of the UPSaclay's Master EIT digital are taking courses in "digital manufacturing" within the FabLab Digiscope.

Diversifying Workplaces

There are different types of FabLabs. Some are small infrastructures that only design and produce a limited series of objects, while others, such as the Innov'Lab at the IUT de Cachan, cover several thousand square meters and house huge machines. Innov'Lab specializes in mechanical engineering, electrical engineering and information technology, and provides students, engineers and researchers with the resources to create prototypes. It is also open to industrial manufacturers eager to develop their projects in a more creative environment. Although it is still difficult to imagine what FabLabs will look like in the future, there is no doubt that these hybrid workplaces are evolving rapidly.

Event: Fab14, 11-20 July 2018

On the programme of the 14th international Gathering of FabLabs, workshops and conferences organized in three times and several places in France: Fab14 in Toulouse, FabCity in Paris and FabDistributed which brings together several hotspots, including the hotspot "scientific researches" at the Université Paris-Saclay. The event is placed this year under the theme of resilience and it is Romain di Vozzo, fabmanager of the FabLab Digiscope, who ensures the coordination of FAB14, a leadership revealing the priority given to the FabLab dynamics at the Université Paris-Saclay.

FAB14: www.fab14.fabevent.org/#about
FAB14 Distributed by: www.distributed.fab14.org/

Intervention of

Volny Fages

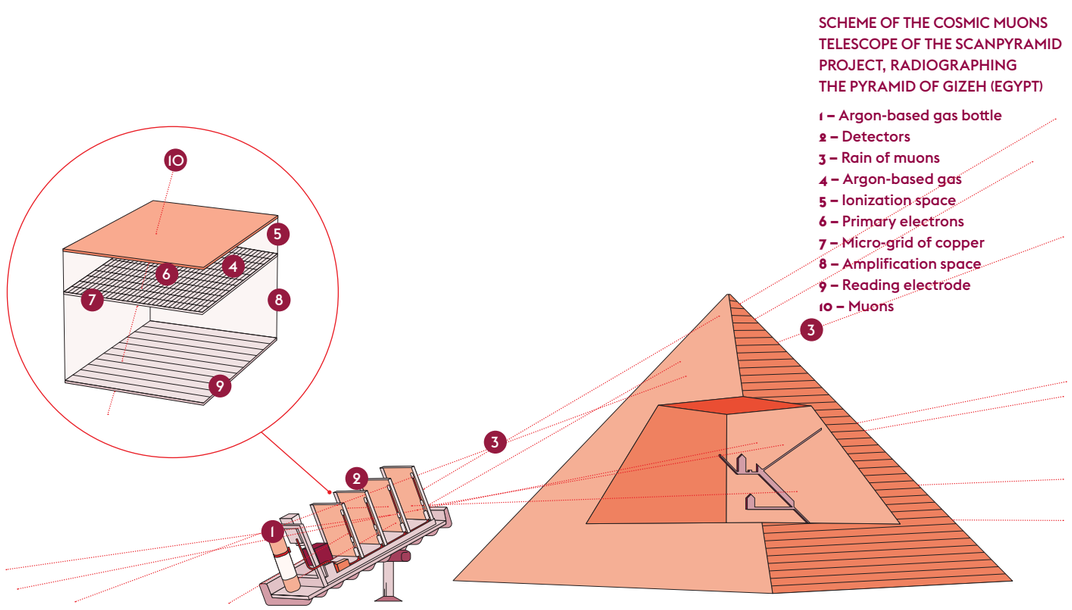
« Our preliminary results show that, for the moment, these workplaces are struggling to achieve their ambitious goals. The people taking part in FabLab projects are already very much at home with machines and fabrication technologies. The courses being offered have also yet to attract a wider following. However, one area in which the Labs might have an important impact is on our definition of work. An active involvement in these Labs is an informed choice and inherently implies a constantly renewed interest in the work that is being carried out and social interaction. For example, many of the people who work in FabLabs or hackerspaces are engineers who are happy to rediscover what it really means to be an engineer thanks to their hands-on experience, knowledge-sharing and bringing real-world projects to fruition. They may have forgotten all this as a full-time employee in a company, where their day-to-day activities are often more about management than manufacturing techniques or design. »

Researcher and teacher at the Département Sciences Sociales (ENS Paris-Saclay), Co-chairman of the research project entitled "Fablabs, Innovation and work".

Keywords
Heritage, Synchrotron Radiation, Dating Methods, Digital, Spectrometry

Title

Research Techniques of the Future Shed Light on the Past



State-of-the-art technologies developed for research purposes at the Université de Paris-Saclay are at the service of the mysteries of the past: a fossil, a mythical violin, the Chauvet cave, the pyramids of Egypt… What secrets will our new technologies unveil?

It sounds like a piece of bossa-nova music, yet IPANEMA is very much a French scientific instrument. And it won't take you to the famous beach but to the Institut photonique d'analyse non-destructive européenne – a European platform, unique in the world, set up by CNRS and the French Ministry of Culture. This platform, which is conveniently situated next to the synchrotron SOLEIL in Saint-Aubain on the Paris-Saclay campus, was inaugurated in 2013 but has been active since 2007. Together with the C2RMF (Centre de recherche et de restauration des musées de France) in Paris, it also helps coordinate France's involvement with the E-RIHS (European Research Infrastructure for Heritage Science), a European research infrastructure dedicated to the study of natural and cultural heritage.

"There are several large centers in the Paris region that are working on historical, archeological and paleontological materials," says physical chemist Loïc Bertrand, SOLEIL researcher and head of IPANEMA. Paris is specialized in the observation and analysis of collections; the center in Nanterre is more focused on archeology; and the one in Cergy-Pontoise on design. Saclay's specializes in developing and operating physical, mathematical and chemical tools.

Historical Mysteries Come to Light

One of IPANEMA's activities is its "involvement in research programs that make use of synchrotron radiation", he explains. Be it imaging fossils or studying materials such as paint or ceramics. "These are complex or heterogeneous materials, and we adapt our approach as is necessary" The idea is simple – to obtain the maximum amount of information from a sample and reveal historical mysteries using X-rays, UV or infrared light. The SOLEIL synchrotron facility has a beamline specially dedicated to historical materials. "In our laboratories, we are also developing photonic techniques devoted to this research," says L. Bertrand.

An Ancient Amulet Reveals its Secrets

These state-of-the-art techniques have allowed to lift the veil on many a historical sample. One example is the oldest-ever metallic tool dating back 6,000 years! Thanks to the new full-field photoluminescence imaging approach, this small wheel-shaped amulet from Mehrgarh (modern-day Pakistan) has revealed its precious secrets. "The object had corroded and we were unsure as to how it had been made," recalls L. Bertrand. Thanks to the new studies, the researchers discovered that it had in fact been manufactured using a lost-wax process (a technique used to make duplicate metal objects). This was a completely new casting method in its day and made use of very pure copper for the first time rather than the traditionally used arsenical copper.

Flattened fossils are also difficult subjects. "These structures were compressed under sediments during the process of fossilization and are like very thin sheets of paper," explains L. Bertrand. It is therefore very difficult to study them without destroying them. In 2014, researchers at IPANEMA, the Muséum National d'Histoire Naturelle and the synchrotron SOLEIL developed an innovative new technique called synchrotron X-ray fluorescence spectral raster-scanning. "This technique has enabled greater understanding of anatomical features in the fossils and the environment in which they had been preserved," explains L. Bertrand. Indeed, the researchers successfully analyzed three fossils dating back to the Cretaceous period, around 100 million years ago, without the need for any prior delicate sample preparation. They were thus able to distinguish between very hard (skeletal-like) elements and fossilized soft tissues. The same team has also succeeded in analyzing the anatomical characteristics of a sample of fossilized fish, obtained from a unique specimen.

Legendary Stradivarius varnish mystery is solved

Until now, no one knew what the varnish used by the most famous of all violin makers, Stradivari, who died at the end of 18th century, was made of. "At the time, there was a lot of talk as to possible recipes, and why his varnish seemed so much better," says L. Bertrand. UPSaclay researchers recently solved this mystery by analyzing Stradivarius violin samples containing both wood and varnish using infrared light at the SOLEIL synchrotron facility. Two seconds of such synchrotron analysis is equivalent to eight hours of classical observations in the laboratory. The results from the experiments revealed that Stradivari in fact applied oils similar to those commonly used by painters of the same epoch. The secret of the legendary varnish that has fascinated musicians, violin-makers, historians and scientists alike since the beginning of the 19th century is a secret no more!

> **Two seconds of such synchrotron analysis is equivalent to eight hours of classical observations in the laboratory.**

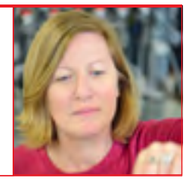
In little more than 10 years, IPANEMA has proved itself to be an important player on the international scene. And the researchers involved have shown that science and humanity can work together hand in hand to reveal the magic and wonder of a historical object or a work of art.

Publication

· L. Bertrand, C. Gervais, A. Masic et L. Robbiola, *Paleo-inspired systems: Durability, sustainability and remarkable properties. Angew. Chem. Int.*, November 2017.

Portrait

Lucile Beck



« You have to explore the past to understand how to preserve humanity. »

Lucile Beck, research engineer, Head Director of the Laboratoire de Mesure du Carbone 14 (CNRS, CEA, IRSN, Ministry of Culture, IRD)

» focus

Digital Technology Helps Unravel the Past

Jean-Claude Yon, head of the Centre d'Histoire Culturelle des Sociétés Contemporaines (CHCSC) at the l'Université Versailles-Saint-Quentin (UVSQ), is used to combining history with state-of-the-art technology. In 2014, as part of the centenary celebrations of the Centre des Monuments Nationaux (CMN), a researcher from his team designed an innovative online adventure game highlighting certain monuments managed by the CMN. This was a new way of encouraging young people to take an interest in our cultural heritage. Among ongoing projects at the Centre is a remarkable trans-Atlantic online dictionary of cultural history in four languages. "This dictionary will allow us to showcase our audiovisual sources, and map out how culture is transmitted across different regions of the world!" says J-C Yon. By the end of 2018 more than 200 notes and a dictionary of French editors from 1800 to 1914 will also be available online thanks to the DEF 19 project. The UVSQ will be responsible for the digital computing tools being developed, which will be compatible with the BNF (Bibliothèque Nationale de France) and the National Archives and thus allow researchers to establish an extensive database. "We will be able to exchange data and in this way encourage dialogue between researchers!" enthuses J-C Yon. In his eyes, digital technology changes things profoundly. "It enables us to explore new subjects," he says, "and to reconsider our research subjects. It is like we are now seeing in 3D as opposed to 2D before."

» focus

Dating Objects to Better Understand Them

**"It is quite natural for us to be working on dating," says Lucile Beck, head of the Laboratoire de Mesure du Carbone 14 (LMC14) national platform. The laboratory's financial bodies (CEA, CNRS, IRD, IRSN, Ministry of Culture) sends samples for analysis. They are prepared on the Gif-sur-Yvette CNRS campus and accelerator mass spectrometry measurements are then carried out at the CEA center in Saclay. "We date between 2000 to 3000 samples a year," explains L. Beck. These have recently included, for example, 200 samples for the Chauvet Grotte and several wooden Egyptian musical instruments for an exhibition at the Louvre-Lens. "We were not only able to date these objects, we have also found that we can differentiate between original pieces and those that were restored at a later date."
At the moment, LCM14 is working with the Louvre on Greek and Egyptian lighthouses. Could there be illuminating revelations in store here?**

» focus

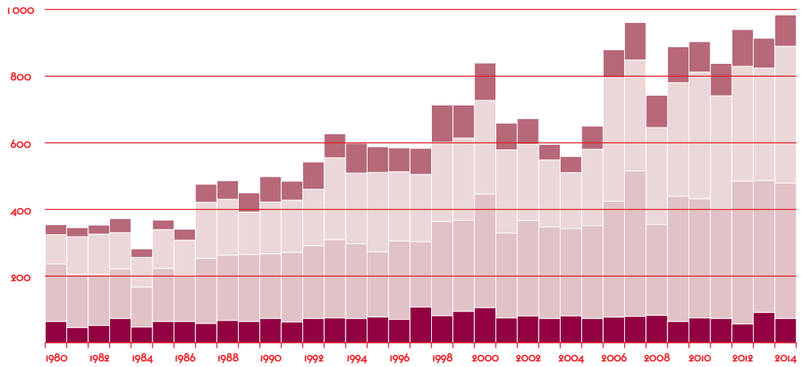
The Secret of the Pyramids

"Since the 1990s we have been developing 'home-made' sensors that have gradually become ever more sophisticated," explains Sébastien Procureur, chief scientist at CEA's Institut de Recherche sur les lois Fondamentales de l'Univers (IRFU). In 2016, S. Procureur and colleagues joined forces with a Japanese team to work on the ScanPyramids project, which aims to non-invasively study the interior of the pyramids in Egypt. Their secret weapon is a technique called muography. "Muons are like electrons, but heavier, and they can pass through matter and inform on density," says the researcher. Used on the Cheops Pyramid, muography has enabled the team to detect hitherto unknown cavities. "We found two at the end of 2016 and another one in 2017, just above the Grand Gallery," adds S. Procureur. Dreamers rest assured – there are still many more mysteries to discover on these sites.

Publication · K. Morishima *et al.*, Discovery of a big void in Khufu's Pyramid by observation of cosmic-ray muons, *Nature*, 2017.

Title

Climate Change and Extreme Phenomena – a Chaotic Situation



Geophysical events (earthquakes, tsunami, volcanic activity)

Weather phenomena (storms)

Hydrologic events (floods, land slides)

Climatological events (extreme temperatures, droughts, forest fires)

Source: © 2015 Munich Re, Geo Risks Research, NatCatSERVICE. As of January 2015

Climate change is modifying meteorological averages but what about extreme values? Will the heat waves, rains, storms and other cyclones be more intense and more frequent? The study of these extreme phenomena is essential to better face the tumultuous decades that lie ahead.

The rise in the amount of greenhouse gases in the atmosphere has led to an average increase in global temperatures of 1 degree since the beginning of the industrial era and a rise in sea levels of roughly 3 mm per annum. There is no doubt now that these changes are upsetting our planet's climate balance. Earth's natural regulation system is being modified, and exchange processes between the atmosphere, oceans and continents are evolving. "Although it is scientifically impossible to attribute all extreme phenomena to climate change, we can unequivocally say today that it is an important aggravating factor," explains Pascal Yiou, climate scientist and mathematician at the Université Paris-Saclay (Laboratoire des sciences du climat et de l'environnement – CEA / CNRS / Université Versailles Saint-Quentin), which is dedicated to climate studies.

Tropical Cyclones

"It is almost certain that extreme hot weather conditions will become more common on daily and seasonal scales in most continental regions," says Robert Vautard, who is also a researcher at the LCSE and a specialist in climate analysis and modeling, as well as in extreme events. The work of the IPCC (Intergovernmental Panel on Climate Change) points to a decrease in the number of overall cyclones worldwide associated with an increase in the number of intense cyclones. These cyclone tracks may change in the future, even though it is impossible to precisely describe these phenomena with current models. This is because a number of local and temporary conditions are involved, as for any weather phenomenon. For example, the heat wave that hit France in 2003 was due to a combination of a specific atmospheric circulation and a very dry ground surface. "Nevertheless, several studies have shown that the probability of such a heat wave occurring has increased by a factor of at least two because of human-related climate change," says R. Vautard.

Asian Monsoons

An extreme weather event is one in which factors like temperature, wind strength and rainfall, are at the extreme of the range that has been observed historically. But it is also defined by the impact it has on society and ecosystems. A heatwave, for example, can be characterized by elevated temperatures, but also by the number of associated deaths. Likewise, a storm can be described by elevated wind strengths, but also by the damage it causes to infrastructures. "This concept associated with extremes is known as climate risk," explains Jean-Paul Vanderlinden, researcher and professor of economy at the Université de Versailles Saint-Quentin-en-Yvelines and head of CEARC (Cultures, Environnements, Arctique, Représentations, Climat) of the Observatoire de Versailles Saint-Quentin.

In fact, climate risk is a combination of three factors: climate hazard, exposure and vulnerability. An extreme climate event will thus have a different impact depending on the geographical, economic and societal structure of a region. "For example, highly populated coastal areas subject to monsoons are particularly at risk," says J-P Vanderlinden, "and entail movement of populations. Climate change will further increase inequalities between less well-prepared regions and those with the possibility to adapt. The political and public challenge here is to reduce this vulnerability."

Cevenol Storms

A warmer ocean leads to increased evaporation. This means that more water is circulating in the atmosphere causing heavier rainfall when the weather conditions are right – often thousands of kilometers away. Such causal links are not easy to characterize, however, and much research is required. The LSCE is working, for example, on the well-known "Cevenol episodes", which are violent and highly-localized storms accompanied by torrential rainfall – over the Cevennes – that occur when the hot and humid air of the Mediterranean meets the masses of cold air from the Atlantic. The probability of exceeding high thresholds (of 300 mm of rainfall per day), as was seen in Autumn 2014, has tripled in 65 years (1). "It is difficult to explain these trends without evoking the effects of human-caused climate change and anything that we can observe and characterize is useful for testing our climate models."

> **"Climate risk is a combination of three factors: climate hazard, exposure and vulnerability."**

The Case of Rogue Waves

Rogue waves, relatively large and spontaneous ocean surface waves that form far out at sea for reasons that are not fully understood, are roughly twice the size of surrounding waves. Since they appear suddenly, they are a threat to ships and can cause severe damage. Will these extreme waves become more frequent with climate change? This is one of the issues being studied by Frédéric Dias, researcher at the ENS Paris-Saclay, who is working on mathematical models at University College Dublin. He recently published a study on Irish waters that casts doubt on certain previously held theories. Providing all necessary precautions were taken when analyzing the models, he believes that these extreme waves will probably decrease in the future. This conclusion is based on predictions of wind speed that should reduce by the end of the century, as should the average height of the waves themselves.

Publications

· Pascal Yiou, Julien Cattiaux, Aurélien Ribes, Robert Vautard and Mathieu Vrac, Recent Trends in the Recurrence of North Atlantic Atmospheric Circulation Patterns, *Complexity* 2018.

· J.-P. Vanderlinden *et al.*, Theoretical working paper: social articulation of extreme event attribution. *EUCLEIA Deliverable*, 2015.

· L. O'Brien, E. Renzi, J. M. Dudley, C. Clancy et F. Dias, Catalogue of extreme wave events in Ireland: revised and updated for 14 680 BP to 2017, *Nat. Hazards Earth Syst. Sci.*, 2018.

Portrait

Pascal Yiou

"The great challenge of studying extreme events is to anticipate phenomena that have not yet taken place."

After a thesis in applied mathematics, he is interested in climate variability. He obtained an ERC fellowship to study the statistical properties of atmospheric circulation recurrence in the statistical team of the Laboratoire des Sciences du Climat et de l'Environnement (CEA-CNRS-UVSQ).

» focus

Series and Storm Data

Another project that the LCSE is working on is the World Weather Attribution (2), an international initiative to analyze and present the possible effects of climate change on extreme weather phenomena. "The goal is to react quickly and provide clear information that can be efficiently communicated, while taking into account grey literature". J-P Vanderlinden is thus working on both modeling and real-time characterization to this end. He is working with Météo France on the magnitude of the storms of January 2018, correlating these events with those that occurred in the past and simulating future events. "Our objective today, beyond fundamental research, is to bring data out of the laboratory to the attention of decision-makers and therefore help society to take action, to be better prepared for the impacts of climate change, and particularly to the impacts of extreme events."

» focus

Harmful Seasonal Variations in Ocean Acidity

Roughly 25% of CO_2 emission caused by human-related activities is absorbed by the oceans. This absorbed gas is therefore not available to contribute to the greenhouse effect and the dissolved CO_2 molecules increase the acidity of oceans, something that adversely affects marine biodiversity. This acidification, and especially its seasonal variations, is being closely monitored. According to a study by researchers at LSCE-IPSL (CEA-CNRS-UVSQ), these variations may increase by two-fold by the end of the century because of climate change. Nine climate models (of which two are French) confirm this result. The disparities in pH between winter and summer will be especially difficult for corals and shell-forming organisms in tropical and sub-tropical regions because they do not have the ability to adapt to such large fluctuations.

Publication · Lester Kwiatkowski et James C. Orr, Diverging seasonal extremes for ocean acidification during the twenty-first century, *Nature Climate Change*, 2018.

» focus

Université Paris-Saclay, an Important Contributor to IPCC

For thirty years, the Intergovernmental Panel on Climate Change (IPCC) has been providing detailed assessments of the global state of scientific, technical and socio-economic knowledge of climate change, its causes, potential impacts and trends in climate change and repair strategies.
Climatologists from Université Paris-Saclay contribute to IPCC assessments at different levels of the organization: co-chairs, coordinators and chapter authors, journal editors. They are attached to the Laboratoire des sciences du climat et de l'environnement (CEA-CNRS-Université de Versailles St-Quentin) and to the Laboratoire de météorologie dynamique (CNRS-ENS-X-Université Pierre et Marie Curie), laboratories federated by the Institut Pierre-Simon Laplace.

Section

SEEN FROM ABROAD

Journal

information age

Title

AI CAUSES NEW CHALLENGES FOR RESEARCH ETHICS AT UNIVERSITIES

The acceleration of knowledge and the emergence of new technologies, such as artificial intelligence (AI), has provoked new ethical questions and requires universities to approach research ethics differently. This is the view of Professor Sylvie Pommier, director of Doctoral Research at Université Paris-Saclay.

"International, world-class universities have a responsibility to train and advise researchers on projects that have an impact on people," said Pommier. "In some areas, especially in technology, there have been advancements that impact society differently and we must adapt our advice to protect scientific integrity."

www.information-age.com/ai-research-ethics-universities-123470203/

Journal

IDG CONNECT

Title

ONLINE VOTING PRESENTS CYBERSECURITY CONUNDRUM

A team of mathematicians from Université Paris-Saclay's University of Versailles, Inpher, Gemalto and CEA LIST have developed what they say is one of the world's most secure electronic voting systems. Inspired by existing platforms, the researchers have come up with a simple, transparent scheme that confirms the correctness of the final election result, guarantees privacy and allows verifiability.

www.idgconnect.com/abstract/27497/online-voting-cybersecurity-conundrumData%20-Privacy%20and%20Security

Journal

epm CONNECTING PHARMA

Title

RESEARCH REVEALS NEW THERAPEUTIC APPROACH FOR PAH

New research from scientists at the Université Paris-Saclay has revealed a novel approach to the cessation of arterial deterioration in pulmonary arterial hypertension (PAH) patients.

PAH is a disease that is characterised by changes to the pulmonary arteries that go from the heart to the lungs. A currently available treatment for PAH is a drug called a vasodilator, which is used to relax the muscles in the blood vessels causing them to dilate. However, this treatment is not a cure and patients eventually end up requiring a lung transplant.

www.epmmagazine.com/news/research-revealsnew-therapeutic-approach-for-pah/

Journal

WALL STREET JOURNAL

Title

THE MORNING RISK REPORT: BAKING ETHICS AND INTEGRITY INTO RESEARCH

The Université Paris-Saclay in France formed a council to train every Ph.D student and supervisor in research ethics.

Risk & Compliance Journal talked to Professor Sylvie Pommier, the university's director of doctoral research, who said the council is a place for researchers to exchange views, share experiences and get advice on how to preserve the scientific integrity of their work.

www.blogs.wsj.com/riskandcompliance/2018/02/12/the-morning-risk-report-baking-ethics-and-integrity-into-research/

Journal

SelectScience
The Fastest Way to Expert Opinion

Title

INDUSTRY NEWS: ANCIENT MATERIAL REVEAL INNOVATION FOR THE FUTURE

From Roman concrete and synthetic fossils, ancient materials are inspiring the creation of innovative systems and devices at Université Paris-Saclay.

How can archaeological objects or fossils transform to resist degradation for millennia or even millions of years? Could scientists and engineers learn from these processes to design new modern materials? Those questions are at the heart of the research interests of an international team led by Loïc Bertrand, Director of the IPANEMA European Research Platform on Ancient Materials at Université Paris-Saclay.

www.selectscience.net/product-news/ancient-materials-reveal-innovation-for-the-future?artid=45276&preview=1

Seen from

Suzanne Higgs

Professor Suzanne Higgs in discussion with professors Nicolas Darcel and Daniel Tomé of Paris-Saclay University (AgroParisTech).

« I am a Professor in Psychology at the University of Birmingham (UK) with research interests in eating behaviour. There is a long history of excellent research on eating behaviour in Paris which continues today at the University of Paris-Saclay. I have been privileged to be able to work with this group during my Jean d'Alembert fellowship. The exchange of ideas and culture has been very fruitful and has cemented a bond that will continue beyond my fellowship for future collaborations. »

As a recipient of a Jean d'Alembert Chair, Professor Suzanne Higgs, psychologist specializing in nutrition, worked three months at the Université de Paris-Saclay (Laboratoire Physiologie de la nutrition et du comportement alimentaire – INRA / AgroParisTech).

Keywords
Sports, Diversity, Friendliness

Title

Larger, Better Sports Facilities

© J. Khrist

The “Plaine des Sports” inaugurated two synthetic football pitches on the 29th of March. But this is only the tip of the iceberg of this ambitious project. The sports complex, located in the Moulon district, will ultimately include two rugby pitches, a 400-metre running track and an athletics field. A multi-sport training center will also house no less than four gymnasiums as well as a 13-meter-high climbing wall, a fitness room, and four covered tennis courts. The complex will be built in several stages – the training center is scheduled for 2020 and a swimming pool will be installed and completed by 2022.

© Jean-Guervilly et Françoise Mauffret, associated architects

Title

Diversity and Equality: a Significant Cause

© Université Paris-Saclay / Catel

To celebrate International Women’s Day, which falls on the 8th March each year, the Université Paris-Saclay held its third Equality Week. The theme chosen for 2018 was “Gender Diversity in University Courses”, and an exhibition on “Do Trades Have a Gender?” was held. The university published a booklet containing statistics and information highlighting gender inequalities for the occasion. But the problem of inequality cannot of course be solved in a day or in a week, and actions to combat sexual harassment 365 days a year were put in place, as were communication campaigns to raise public awareness of gender stereotypical behavior.

Title

The Point F: a place to meet new people

It was set up in the 1960s to train technicians wishing to become engineers. It once also housed the administrative police school. Today, The Point F, which is situated in the heart of the Paris-Saclay campus, is writing a new chapter in its history. The EPAPS (The Public Planning Authority) of Paris-Saclay has partnered with the Grand Reservoir, a designer of innovative urban spaces, to transform the 5,000 m² site into a vital hub for campus life. It will be a place to get together with friends and colleagues, learn, share, work and enjoy cultural activities. The site, which will also boasts restaurants and residential areas, should open this summer.

STUDENTS

We congratulate the fifteen finalists of the "My Thesis in 180 Seconds"competition from Paris-Saclay C. Canet-Jourdan, R. Choutki, V. Estrade, A. Ferré, C. Filosa, A. Joly, C. Lazarus, A. Marronnier, V. Ollier, C. Pinard, C. Sivelle, R. Tomi-Tricot, A. Virzi and in particular Amicie de Pierrefeu, Jury Prize, and Elise Bordet, Public Prize, who will represent the colors of the University for the national final.

Find their portraits in the MT180 special issue of L'Edition!

Raphael Lopes, a former doctoral student at the Charles Fabry Laboratory, received the Daniel Guignier Prize from the French Physical Society for his thesis work in quantum atomic optics.

Congratulations to Marina Gruet and Adrien Langenais, ONERA doctoral students, who each received a CNES Young Researcher Award.

Marie Christine Dheur, PhD student in *Quantum Optics* at IOGS, received the CNano Thesis Award for her work. Among other things, she published an article in Science: *Anticoalescence of bosons on a lossy beam splitter.*

RESEARCH

Ghislaine Dehaene-Lambertz, pediatrician and Research Director at the Institut Frédéric-Joliot (NeuroSpin) has just received the CNRS silver medal for her research on the brain mechanisms of babies and young children in learning.

Professor Yves Meyer of the Mathematics Center and their applications (ENS Paris-Saclay), winner of the Abel Prize for Mathematics in 2017, received the Lars Onsager 2018 Medal. He gave a lecture on "The real benefits of irregular sampling"at the ceremony.

Pierre Ladevèze, Emeritus Professor at the Laboratory of Mechanics and Technology (ENS Paris-Saclay), will receive the Gauss-Newton 2018 Medal, at the opening of the World Congress WCCM 2018 in New York, for his contribution in the field of digital mechanics.

The Baillet-Latour Prize 2018, which this year rewarded research in the field of cancer, was awarded to two Inserm professors: Laurence Zitvogel from Paris-Saclay University and Guido Kroeme from Paris-Descartes University. The scientists were rewarded for their research on the mechanisms of cancer immunosurveillance.

BUSINESS

The young start-up Neosper from the e-health field with its "navigation system to support orthopedic surgeons in the preparation of interventions" is the winner of the 8th edition of the Start-Up Digital Trophy, November 2017.

The French start-up Damae Medical is the winner of the "Paris Boston MedTech Award", presented by City of Boston and the Greater Boston Chamber of Commerce, November 2017. Its mission is "to put the power of biophotonics at the service of new opportunities in the field of medical imaging and diagnosis".

Enovasense designs and develops innovative technology for thickness control of all types of industrial coatings. They received the "Materials and Processes of the Future"awards and the "Crush" from the SKF-Atos Industry Challenge of the Future in November 2017.

The start-up Eikosim uses digital image correlation technology to more easily converge digital simulation and physical tests. It won the Deeptech prize at the Techinnov 2018 Salon of the Chamber of Commerce and Industry of Essonne.

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WORTH READING

THE CONVERSATION

The origins of permaculture
By François Léger (UPSaclay) and Kevin Morel (U. Catholic Leuven)

Born in Australia in the 1970s, the permaculture movement has spread around the world. Although its audience has long remained confidential, it has now an attracting increasing interest.

The emotion, Achilles heel of artificial intelligence
By Jacques Baudron (UPSaclay)

Will technological advances transform artificial intelligence (AI) from weak to strong? This article gives the opportunity to come back to the principles of artificial intelligence and imagine the future.

www.theconversation.com/

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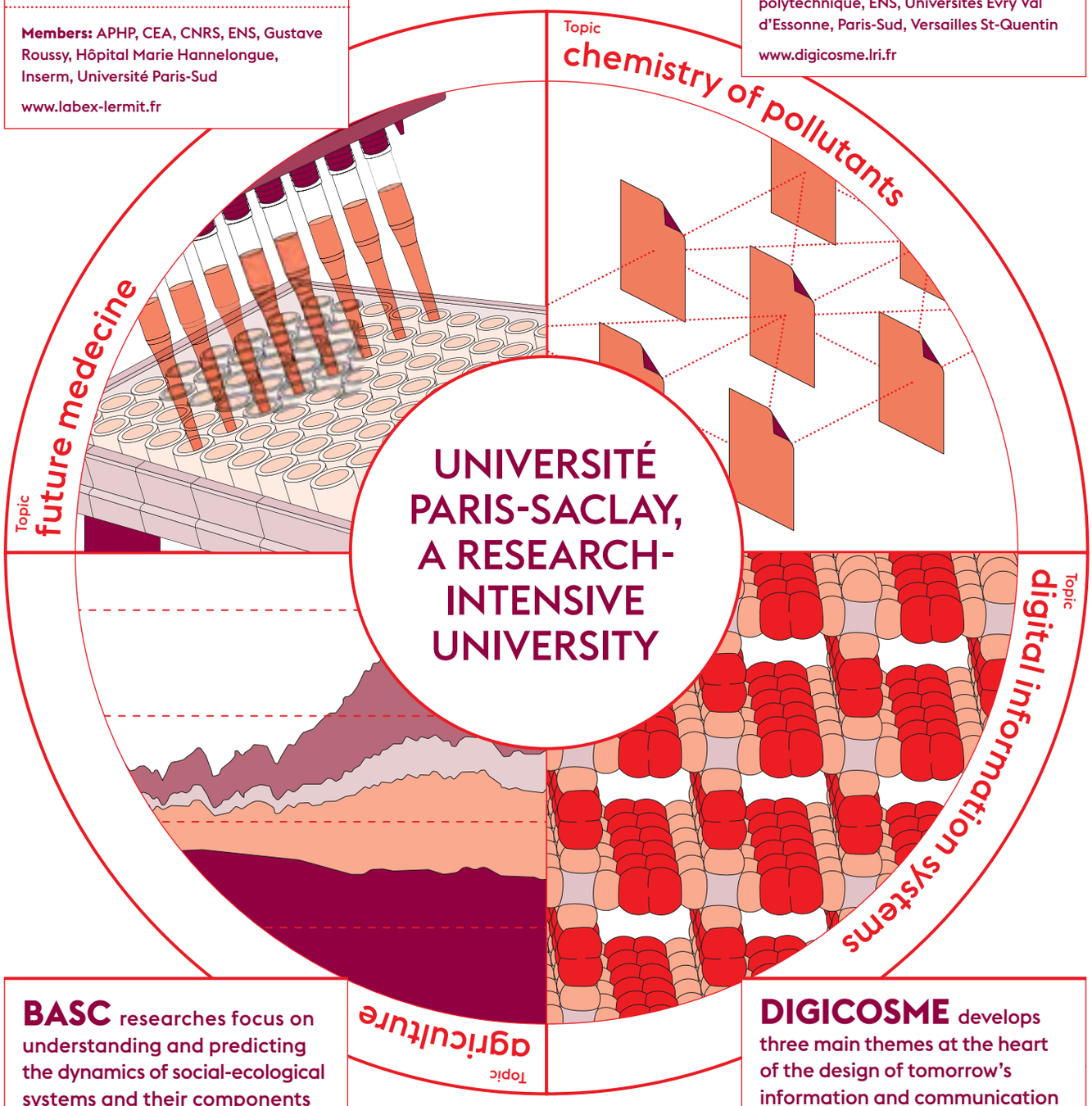

BASC researches focus on understanding and predicting the dynamics of social-ecological systems and their components in the context of global change.

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Université Paris-Saclay is involved in twelve laboratories of excellence that are the result of the creativity and collective dynamics of all the researchers and lecturers who create excellence in their research on a daily basis.