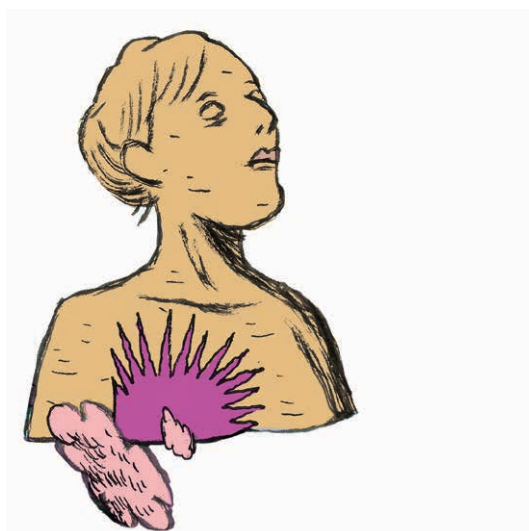


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L'Édition



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Prizes & awards

at Université Paris-Saclay

For the sixth consecutive year, Université Paris-Saclay has maintained its place in the top 20 of the world's best universities in the Shanghai Ranking. In the 2026 edition, it ranks 13th worldwide and first in continental Europe, confirming year on year its position as a world-class research-intensive university.

Researchers



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Henri Kagan, professor emeritus at Orsay Faculty of Sciences of Université Paris-Saclay, was awarded the **2026 Nobel Prize in Chemistry**, jointly with the Japanese scientist Kenso Soai, for the discovery of non-linear effects and autocatalysis in asymmetric organic synthesis and his research on autocatalysis in organic chemistry. Carried out at the Institute of Molecular Chemistry and Materials of Orsay (ICMMO - Univ. Paris-Saclay/CNRS), this work played a decisive role in the development of asymmetric catalysis, an efficient and selective synthetic method which today helps to produce molecules that are essential for the development of medicines, amongst other things.



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Jacqueline Bloch, director of research at the Centre for Nanoscience and Nanotechnology (C2N - Univ. Paris-Saclay/CNRS/Univ. Paris Cité) and professor at the École Polytechnique, has been awarded the **2026 Gold Medal of French National Centre for Scientific Research (CNRS)** for her pioneering work on polaritons, which are hybrid particles resulting from the coupling of light and matter.

Three scientists from the Université Paris-Saclay community have been awarded the **2026 CNRS Silver Medal**:

Patricia Bouyer-Decitre, research director at the Laboratory of Formal Methods (LMF - Univ. Paris-Saclay/ENS Paris-Saclay/CentraleSupélec/Inria/CNRS);

Sophie Henrot-Versillé, research director at the Laboratory of Physics of the Two Infinities - Irène Joliot-Curie (IJCLab - Univ. Paris-Saclay/CNRS/Univ. Paris Cité);

Delphine Marris-Morini, professor at the Centre for Nanoscience and Nanotechnology (C2N - Univ. Paris-Saclay/CNRS/Univ. Paris Cité).

Catherine Brenner, research director at the Metabolic and Systemic Aspects of Oncogenesis for New Therapeutic Approaches laboratory (METSY - Univ. Paris-Saclay/Gustave Roussy/CNRS) and scientific director of a cellular metabolism assessment platform, has been awarded the **2026 Lifetime Achievement Award** by the International Cell Death Society (ICDS) in recognition of her entire career.

André Torre,

professor of economics at the Université Paris-Saclay and research director at the Sciences for Action and Development: Activities, Products, Territories laboratory (SADAPT - Univ. Paris-Saclay/INRAE/AgroParisTech), has been awarded the **ERSA (European Regional Science Association) Prize in Regional Sciences** for his research into local relationships and territorial development processes.



© Christophe Peus

Hong Wang,

a mathematician and permanent professor at the Institut des hautes études scientifiques (IHES, or Institute for Advanced Scientific Studies), affiliated with the Alexander Grothendieck Laboratory (LAG - Univ. Paris-Saclay/IHES/CNRS), has been awarded the **Fields Medal**, widely regarded as the world's most prestigious honour in mathematics. She received the award for her outstanding work, including the resolution, with her co-author Joshua Zahl, of Kakeya's conjecture in three dimensions - a problem that had remained unsolved for over a century.

Students

Four PhD students were honoured at the final of the **Starthèse Start'up Pitch-ID** regional competition, organised by the Maison du doctorat (Doctoral Centre) of Université Paris-Saclay as part of the deep-tech entrepreneurship programme run by the university innovation cluster (PUI) Innovation Alliance Université Paris-Saclay:

Romain El Andaloussi,

a PhD student at the Industrial Agrobiotechnologies Research and Development Unit (URD ABI - Univ. Paris-Saclay/AgroParisTech), won the **Grand Prize** and the **People's Choice Award** for his Bloom Ingredients project, which uses precision fermentation to offer a healthy alternative to texturising additives;

Tristan Bilot,

a PhD graduate from the Interdisciplinary Laboratory of Numerical Sciences (LISN - Univ. Paris-Saclay/CentraleSupélec/Inria/CNRS), has won the **Impact Prize** for Doberman, his cybersecurity project which utilises a novel foundational model to protect critical infrastructure;

Aldric Labarthe,

a PhD student working on a thesis co-supervised by the Borelli Centre (Univ. Paris-Saclay/ENS Paris-Saclay/CNRS/Univ. Paris Cité/Armed Forces Health Service) and the University of Geneva, has won the **Audacity Prize** for his Glync project, which aims to model metabolic relationships between organs using a PET scan to detect diseases holistically;

Lisa Lallemand,

a PhD student at the Charles Fabry Laboratory (LCF - Univ. Paris-Saclay/Institut d'Optique Graduate School/CNRS), has been awarded the **Creativity Prize** for her AleD-X project, which is based on a new laser pumping system designed to generate energy through continuous nuclear fusion.

Companies and projects

Five start-ups founded by alumni or prominent figures from the Université Paris-Saclay community have been named winners of the **i-Lab 2026 innovation competition** organised by the French government through France 2030:

DETERA Therapeutics,

co-founded by Daniel Gillet, research director and head of the Chemical Biology Laboratory in the Department of Medicines and Health Technologies (MTS - Univ. Paris-Saclay/INRAE/CEA), has been recognised for its **RENACARE** project. The start-up is developing a renal therapy designed to target the causal mechanism of a rare kidney disease known as crescentic glomerulonephritis (CGN), which can lead to irreversible loss of kidney function;

Karavela,

co-founded by Alexis Thual, an alumnus of the Master's programme in Mathematics, Vision and Learning (MVA) at ENS Paris-Saclay, uses magnetic resonance imaging to study the human brain and build a very large dataset, enabling algorithms to be trained to model brain dynamics;

Pharm From Forest,

founded by Jonathan Sorres, a PhD graduate in chemistry from Université Paris-Saclay, has been recognised for its **INHASA** project, which aims to develop a new antibiotic to combat severe infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA), using molecules derived from the plant biodiversity of Réunion Island;

Seegenio,

co-founded by Romain Devrue, an alumnus of Université Paris-Saclay and AgroParisTech, has been recognised for its **OPTIGEN** project. This project aims to improve the accuracy and applicability of its egg sexing technology, designed to determine the sex of eggs as early as the fourth day of incubation, in order to prevent the destruction of unmarketable chicks in the poultry industry;

Zeonyx,

founded by Benoît Boureau, a graduate of Université Paris-Saclay in pharmacy, has been recognised for its **Nanozeoxy** project. This project aims to develop a technology based on nanozeolites capable of delivering oxygen and gadolinium to hypoxic tumours, in order to make them more sensitive to radiotherapy.

The start of the academic year brings with it a host of ideas, projects and changes that breathe life into our university and contribute to its development.



Editor's letter

© Corinne Hameau

The start of the academic year is much more than just a return to teaching and research activities. Every year, it brings with it a host of ideas, projects and changes that breathe life into our university and contribute to its development. This academic year is no exception. In fact, it marks the successful completion of projects that began several years ago, starting with the reopening of the Breguet building at CentraleSupélec, on the Moulon plateau campus in Gif-sur-Yvette. Following three years of renovation work, the architectural complex now houses the headquarters of Université Paris-Saclay, as well as new spaces for teaching, research and innovation.

As you can read in this latest issue of our journal *L'Édition*, this reopening also marks the launch of the Université Paris-Saclay Health Centre. Managed by the Student Health Service (SSE), it enables the university to expand the range of health, prevention and wellbeing services available to our students. Through the creation of this new facility, our university reaffirms its commitment to providing ever-better support for its student community and to continuing to improve students' living and study conditions, in line with its strategic priorities.

In terms of education, this new academic year also marks the start of a new chapter with the roll-out of BrevetAI, the educational programme led by the DataIA Institute, the artificial intelligence research and education institute of Université Paris-Saclay. Based on an active and engaging approach to learning, this tool aims to familiarise everyone with artificial intelligence and its concepts. Having been rolled out in 2025 to students and staff at the university, BrevetAI is now available to all French higher education institutions, businesses and the general public.

Every year, October is marked by a global campaign to raise awareness about breast cancer, which accounts for more than 60,000 new cases in France each year. In these pages, *L'Édition* invites you to meet research teams from the Université Paris-Saclay community who are exploring new avenues for improving treatments against this cancer and its most aggressive forms. This new issue also highlights another public health concern: the ubiquity of per- and polyfluoroalkyl substances, better known as PFAS or "forever chemicals". Whilst some scientists are investigating the accumulation of these toxic compounds in the environment, others are seeking to better understand their behaviour and their effects on human health.

As a nod to the 2026 edition of the *Fête de la science*, which focused on the theme of "*Saveurs savantes*" (Scientific flavours), you will also find in these pages a feature on taste – a multi-sensory experience far more complex than one might think. Finally, another article takes you on a journey to the frontiers of quantum physics, looking back at the work of physicist Michel Devoret – a PhD graduate of Université Paris-Saclay (formerly Université Paris-Sud) – who, alongside his colleagues John Clarke and John Martinis, was awarded the Nobel Prize in Physics in 2025.

I hope you enjoy reading *L'Édition*, and I look forward to welcoming you back for the next issue in February 2027!

Camille Galap,
President of Université Paris-Saclay.



BrevetAI

A fun educational programme to familiarise everyone with artificial intelligence

The BrevetAI programme, which is run by the DataIA Institute – the artificial intelligence research and education institute of Université Paris-Saclay – is an innovative educational initiative designed to familiarise people with the key concepts of artificial intelligence and its societal implications. The programme is available in two tracks, “discovery” and “advanced”, and is now accessible online to everyone.

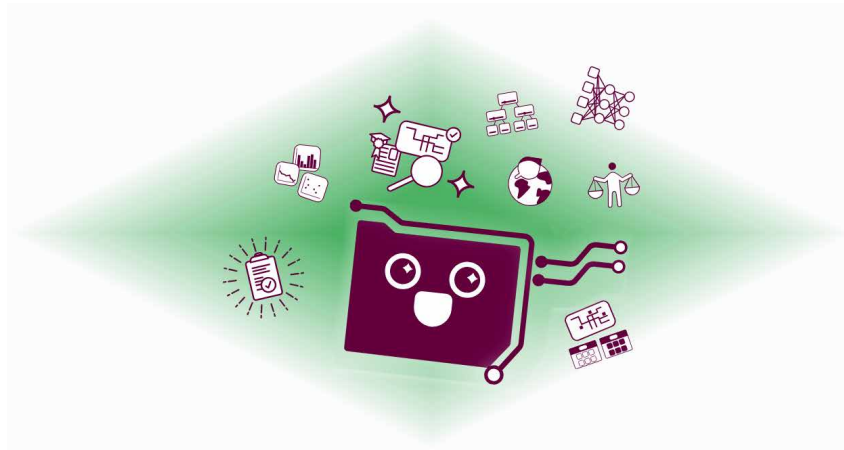
What is a model? How does artificial intelligence (AI) learn? What legal framework exists for the development and deployment of this technology? At a time when AI is becoming an ever-greater part of our daily lives, some questions are becoming essential to grasping how this technology is used and understanding the issues at stake. This is how the BrevetAI came about. It is an innovative educational programme led by the DataIA Institute – the artificial intelligence research and education institute of Université Paris-Saclay – and developed by ENS Paris-Saclay.

BrevetAI forms part of the SaclAI-School project, a winner of the *Compétences et métiers d'avenir* (CMA, in English “Skills and Professions of the Future”) call for proposals launched by the French National Research Agency (ANR) in autumn 2022, which aims to develop a broad, ambitious and innovative educational programme centred on AI. In just a few years, this project has already led to a wide range of initiatives aimed at making AI and data science education more widely available to the student community (see the article published in *L'Édition* No. 24). However, one of SaclAI-School's objectives is also to develop new educational tools that are accessible to a diverse range of audiences. This is where the BrevetAI comes in.

Fostering an understanding of AI without any prerequisites

The BrevetAI is a project that aims to foster an understanding of AI, its key concepts and the associated societal challenges amongst all audiences. “The aim was to create an educational programme capable of reaching an audience with no particular interest in AI and no prior knowledge,” explains Laurent Oudre, a professor at ENS Paris-Saclay who led the project. To achieve this, a strategy was adopted: to make learning “as fun as possible”, using a learning-by-doing approach.

“Unlike a traditional course, which takes a very top-down approach with videos and text, this programme relies mainly on interactive activities that let you play around with algorithms and data, and thus engage with the concepts in a slightly different way,” explains Laurent Oudre. Launched in 2022, the design of the programme was carried out by an interdisciplinary team comprising IT and AI specialists, as well as developers and educational engineers from the Department of Pedagogical Innovation (DIP) at Université Paris-Saclay (see the article published in *L'Édition* No. 30).



“We worked on scripting the activities to create an interactive sequence that truly engages the learner and gives them the opportunity to grasp the concepts at their own pace,” confirms Charline Potier, a pedagogical engineer at the DIP and a member of the BrevetAI team. In the first lesson, for example, it is through a simple cycle route that the learner discovers the concepts of algorithms and instructions. The concepts of models and parameters are illustrated through a basketball throw, whilst a field of tulips is used to explain how AI learns.

“Each activity is guided by a small educational agent – in the form of a computer chip – which provides instructions and explanations to link back to the concepts set out in the worksheets,” continues Charline Potier. At the end of each course, an assessment is offered based on the same principle, through an interactive activity, a quiz or a role-play exercise.

A programme available in two tracks

BrevetAI comprises four modules: how AI works, AI tasks, AI in practice, and finally the societal challenges of AI. However, it can be undertaken in two different tracks: the “discovery” track, which includes the two main courses (averaging ten hours of study), or the “advanced” track, which comprises all the courses (averaging twenty hours).

“The discovery option introduces the key concepts of AI and covers the important ideas needed to understand everything we read in the news about AI. It also presents vital information on the environmental, ethical, regulatory and societal challenges posed by AI,” summarises Laurent Oudre. “The advanced programme is designed for those who want to go a step further.”

Once the assessments have been completed and regardless of the programme chosen, the course can lead to the award of ECTS credits for students on degree programmes that have incorporated the BrevetAI into their curriculum. It is also possible to obtain a micro-certificate, which is available to everyone.

Now available on FUN MOOC

Launched in 2025 on the eCampus platform, the BrevetAI now has its own website available in French and English. Initially rolled out within Université Paris-Saclay, the educational programme reached a new milestone in September 2026. Thanks to a partnership with France Université Numérique, the BrevetAI is now available free of charge to anyone wishing to study independently via the FUN MOOC platform. Since the start of the 2026/2027 academic year, public and private higher education institutions, as well as businesses, have also been able to implement the programme within their own environments via an annual access licence or subscription.

At the same time, a fifth course is currently being developed on the topic of generative AI, covering how it works, its limitations, its impact on society, and so on. It will be incorporated into the BrevetAI during 2027. **E.F.**

<https://www.brevetai.fr/en>

DU PCSO

A stepping stone to giving scientific ambitions a second chance

The institutional degree Preparation for Science Courses of Orsay (in French, *diplôme universitaire Préparation aux cursus scientifiques d'Orsay* – DU PCSO) is a programme that offers high school graduates and students wishing to change their course of study, a refresher course in science, enabling them to progress to further scientific or technical studies.

Educational orientation is an important stage in the journey of secondary school pupils, but it comes at an age when it is not always easy to define one's aspirations and future career plans with any precision. As a result, pupils may discover an affinity for science or a scientific career without having followed a path that would have enabled them to consider this route with confidence. At Université Paris-Saclay, there is a solution to this situation: the institutional degree Preparation for Scientific Courses of Orsay (in French, *diplôme universitaire Préparation aux cursus scientifiques d'Orsay* - DU PCSO). This one-year programme offers a refresher course in science, enabling students to progress to further scientific or technical studies.

"The DU PCSO is aimed at all non-science high school graduates, that is to say, pupils who have taken a general baccalaureate with no or only one scientific speciality, technical or vocational baccalaureate holders, as well as students wishing to switch their academic path towards the scientific field," explains Karine Bocchialini, a lecturer who has co-led the programme with Christophe Lefebvre since 2020. The diploma is also available, via continuing education, to people wishing to resume their studies in the scientific field.

Each intake comprises between 120 and 135 people, who are selected on the basis of their application, following submission via the Parcoursup platform or through the continuing education department. *"For the 2026–2027 academic year, we received over 600 applications in the first round,"* recalls

the co-coordinator. Whilst the candidates' academic background is a crucial criterion in the selection process, motivation is another key factor. This is because the DU PCSO is a challenging programme.

↓ **A fast-paced course**
Each week comprises twenty-five hours of teaching, plus the same number of hours of independent study. *"The pace is very intense,"* confirms Karine Bocchialini. *"In just one year, students must cover the content of the final two years of secondary school in three scientific subjects: mathematics, physics and chemistry."* These three subjects form the core of the programme, which is supplemented by additional modules, to be chosen between biology or mathematics and physics.

"In our programme, we go even beyond the final year of secondary school so that those who are going to pursue scientific studies are a step ahead at the start," continues the lecturer. Hence, the importance of having a clearly defined study plan when applying for the DU PCSO. *"If students lack genuine motivation and a clear plan for the future, it is very difficult for them to keep up with the pace of the programme and succeed."*

Throughout the year, each cohort receives support from the teaching staff and Valérie Hortaut, the programme's academic secretary. Class councils are also organised to monitor each student's progress and ensure that their results are in line with their intended career plans. Those who wish to do so may be referred to the Department for Education and Success (DFR) of Université Paris-Saclay and its unit

specialising in career guidance and professional integration (OIP), in order to re-assess their plans.

"We support them as much as possible," says Karine Bocchialini, who also emphasises the importance of *"class spirit"* in students' commitment and success.

↓ **"A true sense of solidarity"**
The DU PCSO programme brings together groups with a high degree of social diversity, thanks to the variety of profiles selected. Recent high school graduates are mixed with young people who have already completed a few years of study, as well as older individuals who already have professional experience, or even families to care for. *"A true sense of solidarity develops naturally within the cohorts, where everyone has something to offer one another."* Former students of the DU regularly come to share their experiences and personal journeys with the new cohorts.

"The PCSO programme has truly been a stepping stone for me. It gave me the foundations and the confidence I needed to envisage a career path that, just a few years ago, would have seemed out of reach," explains Maïa, a former student with a baccalaureate in Management Sciences and Technologies (STG) who returned to higher education at the age of 36 and is now pursuing a degree in dentistry. *"The PCSO gave me the scientific foundations – and much more besides – to go on to pursue my career goal of becoming an agri-food engineer,"* says Léa, a student from the 2020–2021 class who has joined AgroParisTech.

Due to the rigour of the programme, the success rate among students is around 50%. However, 70 to 80% of them go on to pursue further studies in science. Some go on to study medical sciences, like Maïa; others enrol in a preparatory class to gain entry to engineering schools, like Léa; whilst others pursue a science degree or a university technology degree (BUT). *"It's a qualification that opens many doors, provided students remain motivated right to the end,"* concludes Karine Bocchialini. **E.F.**

www.universite-paris-saclay.fr/formation/diplome-universitaire/du-pcso-preparation-aux-cursus-scientifiques-dorsay



Professional training

Université Paris-Saclay offers three career-oriented degree programmes to provide training for emerging professions

Université Paris-Saclay has obtained registration for three new qualifications in the National Register of Professional Certifications (RNCP). Based on the France compétences guide to emerging professions, these qualifications cover strategic fields such as blockchain, low-carbon energy and electric vehicle batteries, thereby confirming the university's ability to offer training programmes aligned with the transitions currently underway.



In response to ongoing technological, environmental and societal changes, new professions are emerging, whilst others are undergoing profound transformation. While these changes create new career opportunities, they also require the development of appropriate skills. Professional training programmes play a key role in supporting these developments by providing the opportunity to acquire the knowledge and expertise that are in demand in the labour market.

In this context, Université Paris-Saclay has taken another step forward in developing its continuing education programmes. Indeed, it has secured the registration of three qualifications in the National Register of Professional Certifications (in French, *Répertoire national des certifications professionnelles* - RNCP): "blockchain solutions designer and developer", "technical quality controller for carbon-free energy installations and equipment" and "electric and hybrid vehicle battery technician, specialising in maintenance, dismantling and recycling". All three qualifications share a common feature: they appear on the list of emerging professions published by France compétences, the French national authority responsible for professional training and apprenticeship.

Adapting the offer of qualifications to market developments

Several times a year, France compétences updates a list of professions considered to be undergoing significant change or emerging, in line with the France 2030 Plan. The aim is to accelerate the alignment of certification provision with skills needs and labour market developments. Any organisation wishing to do so may then submit proposals for certification schemes relating to one of these professions, in order for them to be registered in the RNCP. This is precisely the approach the university has followed over the past year.

"These are the first three RNCP titles registered by Université Paris-Saclay in terms of professional certification," emphasises Miriam Saliba Said, training engineer and project manager within the university's Lifelong Learning Department (DFTLV). "We chose these three professions because they were not yet part of our overall education programme and because they draw on technical skills and strategic areas in which the university is already active."

For the technical quality controller qualification, Université Paris-Saclay is in fact leading the Campus of Professions and Qualifications of Excellence (in French, *Campus des métiers et des qualifications d'excellence* - CMQE) Sustainable Energy (read the article in *L'Édition* No.25), which is specifically designed to meet the skills and qualification needs of the low-carbon energy sectors. Similarly, for the electric battery technician qualification, the university is leading the Hydrogen and Advanced Energy System Technologies (HTASE) project, which was selected under the *Compétences et métiers d'avenir* (CMA, in English "Skills and Professions of the Future") call for proposals and aims to develop skills in the hydrogen and battery sectors.

The first cohort in November 2026

Submitting each of the certification proposals took the DFTLV team several months of work, which was rewarded by the registration of the three titles, first in November 2025, then in February and April 2026. With all three titles registered, Miriam Saliba Said and her colleagues can turn their attention to the next phase: designing the training programmes for each title. The first certification to be launched is the professional title of blockchain solutions designer and developer, with its first cohort starting in November 2026.

"This represents around three hundred hours of teaching, divided into five skill modules," explains the training engineer. Part of the programme had already been developed through a shorter course, the Executive Certificate for blockchain developer, which covers two of the five modules making up the qualification, for a total of 94 hours. The remaining modules still needed to be developed. The DFTLV was supported by industry professionals as well as academic staff, including Sylvain Conchon, who was responsible for validating the course content from a technical and pedagogical perspective.

To adapt to the profiles and needs of learners, the qualification is available through continuing education, work-study programmes or via the Recognition of Prior Learning (RPL). Learners can also undertake the full qualification or enrol in individual skill modules, allowing them to access funding through their Personal Training Account (in French, *Compte personnel de formation* - CPF).

Two further titles planned for 2027

The two other titles currently being developed will be launched in 2027. Like the first one, the title of electric vehicle battery technician is already covered by an Executive Certificate comprising two skill modules and 98 hours of training, compared with over 250 hours for the new qualification. However, no such programme currently exists for the title of technical quality controller for carbon-free energy installations and equipment. This qualification therefore needs to be designed from scratch, with support from lecturer Sylvain Franger and Bruno Daracq, director of the CMQE Sustainable Energy.

"The registration of each title gives us a three-year accreditation. We therefore have three years to prove our worth and demonstrate our ability to train professionals who can successfully integrate into their respective sectors," concludes Miriam Saliba Said. E.F.

<https://www.universite-paris-saclay.fr/choisir-sa-formation-continue>

Science à la coque

Exploring sciences at Lumen over a lunch break

Science à la coque (science in a nutshell) is a monthly series of thirty-minute lectures held at Lumen, in Gif-sur-Yvette. Following a 2025–2026 season that attracted more than 500 attendees, the initiative is back with ten new sessions covering a variety of scientific topics, aiming to make sciences accessible and build bridges between research, society and the territory.

Thirty minutes to explore a scientific topic with an expert in the field during the lunch break. This is the promise of *Science à la coque*, a series of mini-lectures organised by the Paris-Saclay Urban Community (CPS) and Lumen – the university library, innovation centre and cultural space located on the Moulon plateau in Gif-sur-Yvette. Launched in October 2024, the initiative has now become a regular event held once a month, from 12.30 pm to 1 pm, in the Lumen auditorium. *“It was the scientific culture team at the Paris-Saclay Urban Community that initiated the project. Over time, we have formed a partnership and are now involved in planning the events,”* explains Aboubacar Maiga, project manager for events, culture and science at Lumen.

Each session highlights a different theme, featuring a twenty-minute presentation followed by a ten-minute discussion with the audience. *“That’s quite a short time.”* But that is precisely the aim: *“The idea is to give people the chance to discover a topic during a break, before getting on with their day.”* The lunchtime slot was no coincidence either. *“We’ve found that it suits students very well – they’re our main audience, although the mini-lectures are open to everyone,”* continues Aboubacar Maiga.

↓ **From cats to extraterrestrial matter**
During the 2025–2026 season, more than five hundred spectators attended the *Science à la coque* events, which covered a wide range of topics. The organising team is committed to showcasing a wide variety of scientific disciplines, including the humanities and social sciences, whilst exploring topics of interest to a broad audience through talks by specialists.

In previous editions, the mini-lectures have explored topics such as music therapy, extraterrestrial matter, heritage studies and even cats’ ability to understand human signals. The latter topic, which featured Caroline Gilbert, a professor of ethology at the École nationale vétérinaire d’Alfort (ENVA), *“was a huge success; we filled the auditorium,”* smiles the project manager.

The sessions also addressed complex topics with significant societal implications, such as chemical submission with Jean-Claude Alvarez, a professor of pharmacology at Université de Versailles – Saint-Quentin-en-Yvelines (UVSQ), and dyspraxia in children with Caroline Huron, a researcher in cognitive sciences and a psychiatrist. *“Depending on the topics, we’ve noticed that the audience is quite varied. For the event on dyspraxia, the audience*

consisted mainly of families and parents, many of whom likely live on the Plateau or nearby.” Current events have also inspired certain sessions, such as the one organised with Frédéric Auchère, an astronomer at the Institute of Space Astrophysics (IAS – Univ. Paris-Saclay/CNRS), who came to reveal the secrets of solar eclipses to an audience eager to hear every tip on how to view the eclipse on 12 August 2026.

“The diversity of topics is one of the distinctive features of Science à la coque,” emphasises the CPS team, led by Fatma Tajani, scientific and cultural partnerships officer. *“The aim is to introduce people to research in all its diversity, whilst giving scientific knowledge a tangible impact on society.”*

“The aim is to introduce people to research in all its diversity, whilst giving scientific knowledge a tangible impact on society.”

— Fatma Tajani

↓ **Ten brand-new events for the third season**
For the 2026–2027 season, the team at Lumen and the CPS is offering a programme of ten brand-new events. The first two, held in September and October, explored the topics of joints and osteoarthritis, followed by art therapy and mental health, to coincide with the Paris-Saclay autumn marathon and mental health awareness week, respectively.

Over the coming months, the mini-lectures will explore science outreach through books, the observation of microquasars in astronomy, and online manipulation. They will also highlight key issues for the territory, such as adapting agriculture to the challenges posed by climate change. *“These events demonstrate the CPS’s commitment to making scientific culture a tool for dialogue between local residents and regional stakeholders, by shedding light on topics that form part of local life and current concerns,”* emphasises the CPS team.

In June 2027, Lumen will have the pleasure of welcoming Alain Baraton, the renowned head gardener of the Trianon and Marly gardens, for a talk on the great gardeners of the Château de Versailles. *“This will be one of his final lectures before he leaves the Château de Versailles,”* notes Aboubacar Maiga. It will be a great way to round off this third season of *Science à la coque*.

For those who were unable to attend the previous talks, there is some good news: they will soon be available on the YouTube page of the Université Paris-Saclay libraries network. The events for the 2026–2027 season will also be filmed and made available online. **E.F.**

<https://www.lumen.universite-paris-saclay.fr/en>

Art & sciences

Residencies to open the doors of scientific research to artists

Throughout the year, La Scène de recherche – Théâtre Paris-Saclay welcomes artistic teams in residency. It provides access to its technical resources and staff while also offering opportunities to meet scientists, with a view to encouraging contemporary creation and fostering dialogue between the arts and sciences.

This is the story of a palm tree that plays music and one day, finds itself talking to a molecular biologist... At La Scène de recherche – Théâtre Paris-Saclay, they love telling stories, sometimes completely unbelievable ones, but above all, stories that bring theatre, sciences and research into dialogue. Like the story of the palm tree imagined by director Victor Thimonier for the show *ExTRAS #1 Botanica*, which will be staged at the theatre in Gif-sur-Yvette in November 2026. This story will be followed by a second one, about two carrots: one made of ice and the other of mud, who share concerns about their future in *ExTRAS #2 Climate records*.

Beyond their unusual nature, these performances share one thing in common: they grew out of an artistic residency within a scientific team. This is the very essence of the Territorial Experiences for Arts-Science Encounters (ExTRAS) programme set up by La Scène de recherche. The first two editions led Victor Thimonier to spend several weeks at the Ecology, Society and Evolution laboratory (ESE - Univ. Paris-Saclay/CNRS/AgroParisTech) and the Climate and Environmental Sciences Laboratory (LSCE - UVSQ/CEA/CNRS).

"The idea behind the ExTRAS project is to send artists into laboratories and develop short, itinerant theatrical pieces from their work, which are then performed at other venues, such as university libraries and lecture halls, or secondary schools in Essonne," explains Ulysse Baratin, director of La Scène de recherche – Théâtre Paris-Saclay. More than a thousand secondary school pupils from Essonne have thus attended *Botanica*. The second edition, *Climate Records*, is set to follow the same path, whilst the third edition is currently being developed with director Julien Guyomard.

Building bridges between art and scientific research

The ExTRAS project forms part of La Scène de recherche's commitment to playing an active role in artistic creation and to building bridges between artists and the world of scientific research. With this aim in mind, the venue hosts companies in residency throughout the year. They benefit from access to the technical resources and support from the entire on-site team, for varying lengths of time. For some artists, the residency develops into a *"long-term partnership that can last two, three or even four years. It's a way of deepening the creative work carried out with these companies,"* emphasises Ulysse Baratin.



© Victor Thimonier

As well as providing technical and artistic support, these residencies aim to broaden artists' horizons by giving them the opportunity to meet research teams at Université Paris-Saclay. *"The aim is to give them the chance to understand scientific questions, but also to discover what research involves and what everyday life is like for scientists. This offers artists material to fuel their creative process."*

Theatrical essays exploring beliefs...

This year, artists will once again come to write, develop and stage their works at La Scène de recherche – Théâtre Paris-Saclay. This includes Marion Boudier and Guillermo Pisani from the company *Le système pour devenir invisible (LSDI)*, who have embarked on a three-year partnership with the theatre. During this period, the duo will meet with scientists and create theatrical essays for their *Croyances (beliefs)* project, which began in 2022. *"This project is fuelled by an ongoing dialogue with researchers, centred on the broad question of beliefs, representations and ideologies,"* explains Marion Boudier.

Of the thirty or so plays planned, around fifteen have already been written. For example, the play *Afterwork*, which will be performed at the theatre in January 2027, explores beliefs about gender roles in the workplace, and stems from a dialogue with the Swedish researcher Johanna Rickne, whom the authors met through the Centre for Economics at ENS Paris-Saclay (Ceps). *"The play is not merely a dramatic adaptation of Johanna Rickne's findings. There is a balance between scientificity and theatricality, designed to create impressions, raise questions and invite the audience to share*

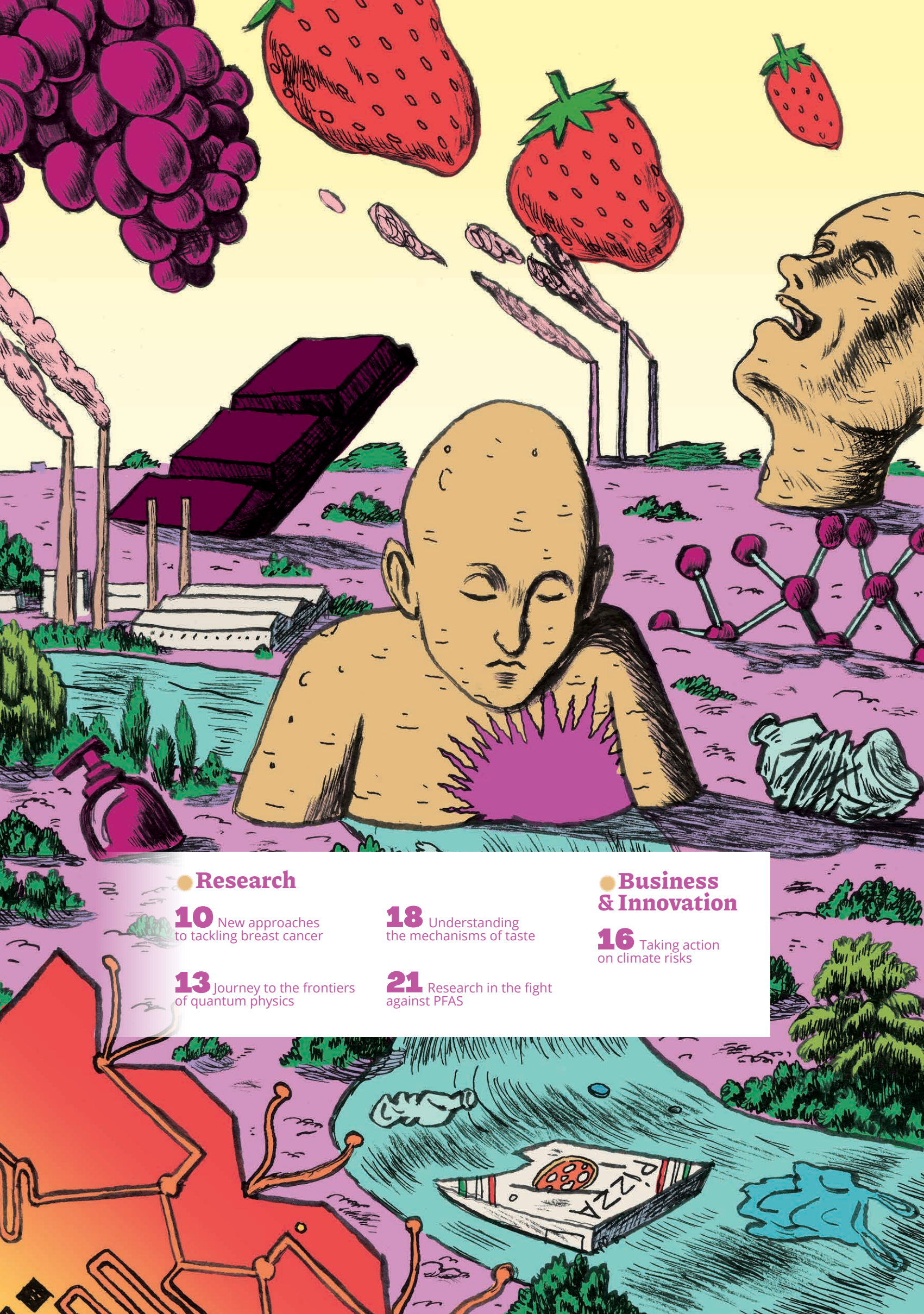
their perspectives," explains Guillermo Pisani. Another essay, *Fake News*, which explores the theme of truth and the questioning of scientific discourse, will be unveiled on 27 and 28 November 2026.

... to musicological research

During these residencies, La Scène de recherche sometimes becomes a testing ground of its own. Since 2025, the musician and researcher Nathanaëlle Raboisson and her colleagues from the 20.8 company, Paolo Castrini and Pierre Couprie, have been visiting the venue to carry out their experiments in sound spatialisation. These involve performing fixed or improvised pieces of electroacoustic music, making use of the hall's forty-two loudspeakers, arranged in a dome formation and controlled via a software programme. *"This system allows us to create virtual spaces to move sound from one side to the other,"* explains Paolo Castrini. The aim is *"to improvise with this orchestra of loudspeakers and study the new creative ways of playing that this inspires in musicians and performers,"* explains Nathanaëlle Raboisson.

A first year of residency has given the team the opportunity to carry out initial tests and observations, which they hope to explore in greater depth over the coming year. *"Having access to a place such as this one is invaluable to our research-creation process,"* emphasises the musician and researcher. This work on sound spatialisation will be on show in January 2027 at La Scène de recherche – Théâtre Paris-Saclay. **E.F.**

<https://scenederecherche.ens-paris-saclay.fr/en>



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Breast cancer

Research avenues that are paving the way for new therapeutic approaches

Breast cancer is the most common form of cancer in women. Although its prognosis has improved thanks to early detection, the disease remains deadly and continues to require intensive treatment for patients. Within the Université Paris-Saclay community, scientists are currently exploring various avenues of research to better target tumours, treat the most invasive forms of the disease and minimise side effects.

Keywords

Chemotherapy
—
Radiotherapy
—
Biomarker
—
Nanoparticles
—

Every year, October turns pink to raise awareness about breast cancer and its screening. It is currently estimated that one in eight women will develop breast cancer during her lifetime. Although it has a good prognosis when detected at an early stage, this cancer remains one of the deadliest, with an estimated 12,000 deaths per year. Hence the importance of screening, which the Pink October initiative highlights each year through hundreds of events. “October is a very important month for us,” confirms Clara Nahmias, a CNRS research director at the Molecular Predictors and New Targets in Oncology laboratory (PMNCO – Univ. Paris-Saclay/Inserm/Gustave Roussy). For more than fifteen years, the scientist has devoted her research to cancers affecting women. She also founded the Prolific association, one of whose aims is to help fund research into cell biology, particularly in relation to breast cancer.

Initially, however, Clara Nahmias was not working on cancer, but on cellular communication. “It’s the way cells communicate with one another and perceive their environment.” To study this, “we focus on the receptors that detect what is happening outside the cells and transmit the information to the inside.” While studying a particular receptor, the researcher and her colleagues identified a previously unknown protein, ATIP3 (short for AT2-interacting protein 3), and discovered that it blocks cell proliferation. “The gene encoding this protein is located in a region that is highly unstable in cancers. One thing leading to another, we then decided to investigate whether the protein plays a role there.”

Clara Nahmias and her colleagues initially focused on liver and breast cancers, before narrowing their research to the latter. “Working on a cancer that affects women is something that resonates with

me,” says the research director. But this cancer has one particular “advantage”: it is common enough to provide large cohorts of patients, and therefore “plenty of cell models to work with”. The team confirmed that ATIP3 is present in the epithelial cells

the protein is now known: ATIP3 interacts with microtubules, cylindrical structures that form the cell skeleton and are involved in cell division. “ATIP3 acts a bit like a car brake,” explains the biologist. “When it is present, it stabilises the cytoskeleton and

“This triple-negative cancer mainly affects women under the age of forty. It is therefore all the more urgent to find targeted therapies.”

— Clara Nahmias

of the mammary gland – the cells affected in the majority of breast cancers. More interestingly, they highlighted a clear difference between healthy and cancerous cells.

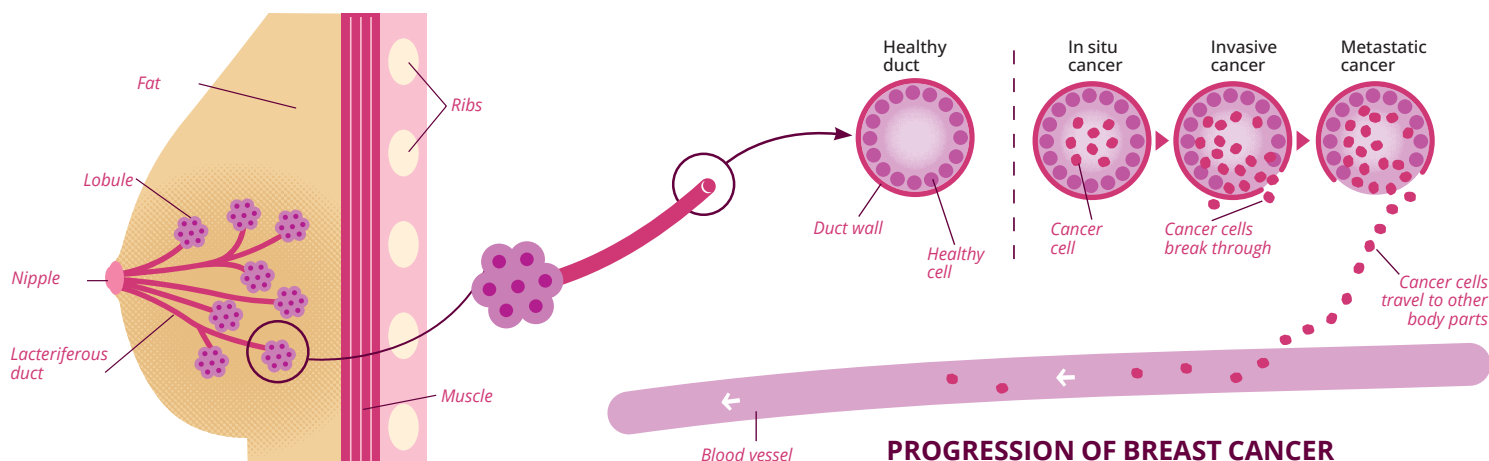
ATIP3 acts like a “car brake”

“In cancer samples, we have found that ATIP3 levels are significantly reduced, or even disappear completely. And the more aggressive the cancer, the lower the protein levels.” Among breast cancers, there is one form considered particularly aggressive: the so-called triple-negative subtype, which is characterised by an increased risk of metastasis – spreading to other parts of the body – and early recurrence. “This cancer mainly affects women under the age of forty. It is therefore all the more urgent to find targeted therapies.” Research shows that nearly 50% of invasive cancers have low levels of ATIP3. However, for the triple-negative subtype, this proportion rises to 70%, with even lower levels of the protein.

“We do not know the mechanisms that cause ATIP3 levels to decrease,” admits Clara Nahmias. However, the function of

helps the cell to proliferate in a controlled manner. But when its levels decrease or when it disappears, it’s as if the brake has been released: the cell goes into overdrive and starts to proliferate very rapidly.” In the context of tumours, ATIP3 thus acts as a prognostic biomarker: its reduction, or absence, is associated with a poor prognosis. However, further investigations revealed an unexpected paradox.

It appears that a reduction in ATIP3 also leads to greater vulnerability to chemotherapy. “At first, we thought this was completely counter-intuitive. Then we realised that, in the absence of ATIP3, the cell skeleton is more dynamic. It tends to form unusual structures that are far more sensitive to chemotherapy.” The cytoskeleton, and in particular the microtubules, is in fact one of the main targets of anti-cancer chemotherapy drugs such as taxanes, which are amongst the most widely used. Therefore, ATIP3 may also serve as a predictive biomarker for response to treatment.



Towards a more targeted therapy?

Whilst chemotherapy has proved effective in treating many cancers, it remains a treatment with limited selectivity that attacks tumours as well as certain healthy cells. This leads to side effects such as hair loss. With the discoveries regarding ATIP3, a new door is opening at the PMNCO laboratory: what if the protein could help develop a more targeted therapy?

The team's research led to the identification of two compounds – inhibitors – that act on cell cycle enzymes known as WEE1 and PKMYT1. These compounds cause the cell to enter division, even when it is not ready to do so, leading to its death. Trials are currently being conducted in mice to study the effects of the inhibitors on triple-negative cancer cells, both those that express ATIP3 and those that do not. *"Our hypothesis is that cells that do not express ATIP3 will respond better to the combination of the two compounds than those that do express the protein,"* says Clara Nahmias.

Ultimately, the aim is not to replace chemotherapy but to personalise treatment according to individual profiles. *"When a patient comes in, the idea is to test her ATIP3 level. If it is high, there is a risk that she will not respond to chemotherapy. On the other hand, if the level is low or zero, we know that she will be responsive to the treatment, but also potentially to the combination of inhibitors,"* explains the research director.

Administering chemotherapy by subcutaneous injection

Like at the PMNCO laboratory, many research teams are working to identify new targets or methods for treating breast cancer. Some are particularly interested in chemotherapy and are attempting to develop solutions to boost its effectiveness, whilst reducing its harmful impact on patients. At the Institut Galien Paris-Saclay (IGPS – Univ. Paris-Saclay/CNRS), it is this second approach that Julien Nicolas and his team, Nanomedicines for the Treatment of Serious Diseases (NANOMED), are exploring. *"Our approach is, first and foremost, to simplify anti-cancer chemotherapy,"* summarises the CNRS research director.

At present, the vast majority of chemotherapy treatments are administered by intravenous injection. *"This method of administration has proven effective, but it is quite complex to carry out and can be a burden for the patient."* It requires the patient to have a central venous catheter fitted in hospital so that the chemotherapy drugs can be injected directly into a vein. *"It is both restrictive and painful,"* emphasises Julien Nicolas. *"There are also risks of extravasation [the leakage of drugs into surrounding tissues] and infections associated with the hospital stay."*

To reduce the complexity of treatment, as well as its cost, a strategy is proposed: switching from intravenous chemotherapy to subcutaneous chemotherapy. In other words, no longer injecting the drugs into a vein but under the skin, via a simple

injection. *"It is a procedure that is relatively simple to carry out and which can potentially be done at home, with or without the assistance of hospital staff."* Although the procedure is simple, it requires overcoming certain difficulties. This is because the vast majority of anti-cancer drugs are highly irritating and vesicant (causing lesions).

"When injected subcutaneously, taxanes tend to accumulate under the skin and cause necrosis. And the same appears to be true of most chemotherapies." To prevent this, the idea is to link the anti-cancer molecules to biocompatible, water-soluble polymer chains. The combination then forms a "prodrug" with a twofold advantage. Thanks to this coupling, the polymer imposes its solubility on the molecule whilst also rendering it temporarily inactive. The result is a prodrug which, when injected under the skin, is able to enter the bloodstream and release its active ingredient only after a certain period of time.

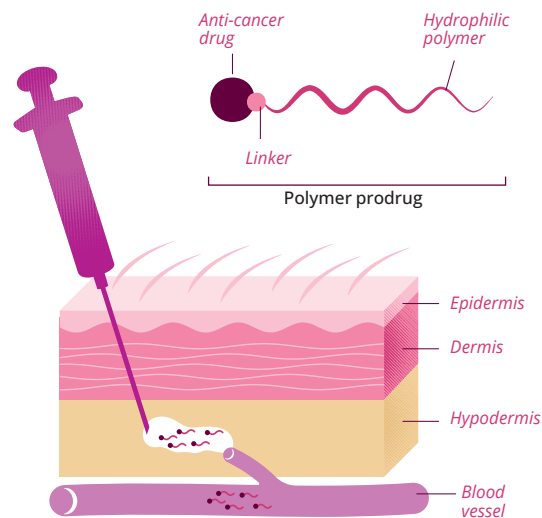
Initial research was conducted on paclitaxel, an active ingredient used in the formulation of Taxol, which is commonly used to treat breast cancer in particular. By varying the nature of the polymer, the team developed a series of prodrugs, studying their properties in terms of injectability, solubilisation of the active ingredient, etc. Ultimately, it was polyacrylamide – a biocompatible polymer used, for example, in wrinkle fillers – that yielded the best results.

Subsequent tests carried out on an animal model, as well as on a human skin model, confirmed that the prodrugs do not cause any toxicity to the cutaneous or subcutaneous tissues. They also showed that paclitaxel is released gradually and persists in the body for up to four days. This is of major significance compared with intravenous chemotherapy, which is 100% available but leads to an immediate, short-lived peak concentration. However, the higher this concentration, the greater the toxicity. *"With our prodrug, which acts as a reservoir, the concentration of the anti-cancer molecules is lower but their release is extended, which means we significantly improve the exposure of cancer cells to the chemotherapy."*

Adjusting administration patterns

In 2025, Julien Nicolas and his colleagues collaborated with a team specialising in computational oncology to develop a digital model capable of simulating chemotherapy administration patterns and their effectiveness. After training the model using experimental data, several simulations were carried out by varying the concentration and the number of doses administered.

Whilst the "standard" treatment consists of administering a high, fixed dose once a week for three weeks, *"we have observed that a high initial dose followed by smaller doses results in the near eradication of the tumour in mice. This confirms that it is possible to adapt administration patterns and identify more effective ones,"* emphasises the research director. These observations, which have been



SUBCUTANEOUS ADMINISTRATION OF CHEMOTHERAPY USING A PRODRUG

experimentally validated in mice, have yet to be replicated in humans. Nevertheless, administering chemotherapy in small doses would help to reduce its toxicity and side effects. This benefit would be in addition to those of subcutaneous administration, which is more comfortable for patients and less costly.

The team has already succeeded in extending the development of prodrugs to another active ingredient, gemcitabine, which is also prescribed for the treatment of breast cancer. More recently, it has also been conducting trials with needle-free injectors. *"These are injectors that propel the solubilised prodrug through the pores of the skin. It takes just a microsecond, but the fate of the drug and its therapeutic efficacy are exactly the same as with a traditional injection!"*, enthuses Julien Nicolas. *"This would be a benefit for those with a phobia of needles and would help make subcutaneous chemotherapy more widely accessible."*

Nanoparticles to fight radiation resistance

Radiotherapy is one of the treatments commonly used for breast cancer. It involves administering high-energy radiation to destroy cancer cells and prevent their growth. Often used after breast surgery, radiotherapy has been shown to reduce the risk of recurrence. However, tumours can sometimes develop resistance to radiotherapy, meaning the treatment becomes less effective and the cancer cells are still able to grow.

At the Laboratory for Oxidative Stress and DNA Damage (LOX3D) within the Department of Cellular and Molecular Radiobiology (DRCM – Univ. Paris-Saclay/CEA/Inserm/Univ. Paris Cité), researchers are currently exploring a potential approach to enhance the effects of radiotherapy against breast cancer: the use of nanoparticles. *"Nanoparticles are particles measuring less than one hundred nanometres (10⁻⁹ metres) in most of their dimensions. In our case, they are spheres composed of biocompatible metals with high atomic numbers, such as gold, titanium and platinum,"* explains Emmanuelle Bourneuf, a researcher at LOX3D. The strategy involves using these particles as

radiation-amplifying agents, through a cascade of physical and chemical reactions taking place within the tumours.

Nanoparticles do indeed have the ability to accumulate specifically within tumours, thanks to the porosity of their blood vessels. During a radiotherapy session, the metallic nanoparticles interact with the radiation, triggering a massive release of electrons. These, in turn, induce the production of free radicals, which cause damage within the cancer cells and ultimately lead to their death. Through this process, the nanoparticles offer the prospect of specifically enhancing the effectiveness of radiation on tumours, “*whilst reducing the impact on any surrounding healthy tissue*”, notes Emmanuelle Bourneuf.

This approach appears even more promising against resistant tumours. Cancer manifests itself through the formation of a primary tumour, which consists of epithelial cells that multiply very rapidly. However, these cells are tightly bound together: “*they are so tightly bound to one another that they cannot enter the bloodstream and metastasise elsewhere.*” To achieve this, the cells undergo a process known as the epithelial-mesenchymal transition. This causes changes to their genome and leads to the acquisition of a number of invasive and resistant properties. They then become capable of separating from their neighbours and migrating to form metastases, and subsequently further tumours. “*Mesenchymal cells are generally few in number but are associated with more aggressive and resistant tumours. The aim is therefore to target them specifically,*” explains the researcher. This is thus a significant discovery that the team revealed in 2025 in a study conducted on gold and titanium oxide nanoparticles.

Through experiments on various cancer cell lines, scientists showed that mesenchymal cells internalise more nanoparticles than their epithelial counterparts. The difference appears to stem from the expression of a specific receptor, known as CD44, located on the surface of mesenchymal cells. According to the observations, the nanoparticles appear to be trapped and then internalised into the cell via a network of molecules bound to the receptor. This discovery highlights a key mechanism for enhancing the effects of radiotherapy on the cancer cells that are most difficult to target and eliminate.

Boosting the effectiveness of other forms of radiotherapy

In addition to this research, the LOX3D team is currently collaborating with Erika Porcel and Sandrine Lacombe from the Orsay Institute of Molecular Sciences (ISMO – Univ. Paris-Saclay/CNRS), who have developed an innovative process for manufacturing platinum nanoparticles. Now patented, this process makes it possible to produce, in a single step and with a 100% yield, sterile solutions of nanoparticles that are non-toxic and biocompatible. It employs a radiolysis technique that uses radiation to break down molecules. “*The advantage is that the nanoparticles are already subjected to*

“All radiation-resistant cancers are good candidates for treatment protocols combining radiotherapy and nanoparticles.”

— Sandrine Lacombe

radiation during their manufacture, so they will not change when exposed to further radiation within the body,” emphasises Sandrine Lacombe.

The properties of these platinum nanoparticles are the subject of several studies. The ISMO team has shown that, whilst they do indeed possess radioamplification properties, they also offer advantages as contrast agents and in enhancing the visibility of tissues observed through imaging. Another study, published in 2022 in collaboration with a team from the Paris-Saclay Multimodal Biomedical Imaging Laboratory (BioMaps – Univ. Paris-Saclay/CEA/CNRS/Inserm), analyses the behaviour of the nanoparticles in an animal model of cancer, using positron emission tomography (PET). The results highlight an accumulation of the radio-enhancing agents in the tumours over several days. This observation is consistent with a protocol involving an injection of nanoparticles followed by radiotherapy sessions. This could open up the possibility of reducing the total radiation dose administered and, consequently, the potential effects on healthy tissue.

Sandrine Lacombe and Erika Porcel are conducting research into several types of cancer, including breast cancer. “*All radiation-resistant cancers are good candidates for treatment protocols combining radiotherapy and nanoparticles.*” The team is currently working on three-dimensional cell models – spheroids – to assess the behaviour of the nanoparticles and their effects. In models of brain, pancreatic and uterine cancer, observations suggest that the nanoparticles penetrate easily and increase the effects of radiation by around 30%.

At ISMO, research is not limited to conventional radiotherapy, which involves irradiation using X-ray beams, but also explores alternative forms of radiation therapy. Working in collaboration with Japanese scientists, the team demonstrated the effectiveness of nanoparticles in hadrontherapy, which uses particles such as protons or carbon ions. More recently, in collaboration with researchers from Gustave Roussy, the team has also been studying the effect of nanoparticles on FLASH therapy, which employs very high-energy electrons at very high rates. These collaborations between research teams are made possible in particular through the interdisciplinary INanoTheRad programme at Université Paris-Saclay, which focuses on the development of innovative radiotherapy treatments against cancer.

Although further research is still needed, evidence is mounting to confirm the great potential of this treatment strategy. “*It is an emerging field with a promising future,*” says Sandrine Lacombe,

citing the example of the French company Nanobiotix. The latter is currently conducting advanced clinical trials in the United States on the effects of its compound NBTXR3, which consists of hafnium oxide nanoparticles and is designed to amplify the dose of radiotherapy delivered to tumour cells.

Will new weapons against breast cancer soon be developed? These research advances certainly open up new prospects for the management of the disease and its most aggressive forms. They also represent further steps towards more targeted and personalised treatments, with the hope of better addressing the specific characteristics of each patient, whilst minimising side effects and the impact on their quality of life. **E.F.**

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At the frontiers of quantum physics

From superconducting circuits to the quantum computing of the future

A cat that is both dead and alive: Schrödinger's thought experiment is famous. But beyond its absurdity, it also raises questions about the implications of the laws of quantum physics when moving from the atomic to the macroscopic scale and, for example, when observing a superconducting electrical circuit. Experiments carried out in the 1980s by physicists John Clarke, Michel Devoret and John Martinis showed that such a circuit is capable of exhibiting macroscopic quantum effects and behaving like a giant artificial atom. This major discovery earned them the 2025 Nobel Prize in Physics. This is an opportunity today to retrace the history of this field with researchers from Université Paris-Saclay, and to meet the teams who are inventing the quantum tools of tomorrow.

Keywords

Superconductivity

Josephson junction

Quantum tunnelling effect

Quantum system

In his famous thought experiment devised in 1935, the Austrian physicist Erwin Schrödinger highlights the seemingly absurd nature of the laws of quantum mechanics when applied on a macroscopic scale. According to these laws, a cat – a macroscopic object made up of thousands of atoms – locked in a box with a bottle of poison that could break at any moment, would be both dead and alive. It is only when the box is opened by an observer that the cat's state is determined. Although the situation seems absurd, as the cat cannot be both dead and alive at the same time, it illustrates two of the fundamental principles of quantum physics: the superposition of states and the effect of observation (or measurement).

At the scale of the infinitely small, an isolated physical object possesses well-defined states. For an atom, these states are associated with its so-called discrete energy levels: an atom thus transitions from its lowest energy level (ground state) to a higher energy level (excited state) via energy jumps of well-defined values. However, quantum superposition dictates that as long as it is not observed – that is, as long as no measurements are taken – this atom may

exist simultaneously in several states. Observation of the atom breaks this superposition of states, and the atom then exists in only one state, either the ground state or the excited state.

For physicists, this raises the following question: can macroscopic objects behave in accordance with the same laws of quantum mechanics? It was in the mid-1980s that the British scientist John Clarke, the French scientist Michel Devoret – a PhD graduate of Université Paris-Saclay (formerly Université Paris-Sud) – and the American scientist John Martinis carried out a series of experiments on superconducting circuits, demonstrating the quantum behaviour of a macroscopic variable. Awarded the Nobel Prize in Physics in 2025, this work fuelled subsequent research in quantum physics, from the very first qubits – the qubit being the quantum counterpart of the bit in traditional computing – to theories of quantum system control, via the development of quantum computing.

From superconductivity to the early days of quantum electronics

The work of John Clarke, Michel Devoret and John Martinis, carried out at the University of California, Berkeley, builds on a series of developments in physics, beginning with the discovery of superconductivity in 1911. Whilst studying the electrical resistance of mercury at very low temperatures – that is, the metal's ability to resist the flow of electric current – the Dutch physicist Heike Kamerlingh Onnes made an unexpected discovery: at 4.2 Kelvin (K), a temperature close to absolute zero (0 K or -273.15°C), this resistance drops sharply. His observation marked the discovery of superconductivity. However, it was not until 1957, with the theory developed by the Americans John Bardeen, Leon Cooper and John Robert Schrieffer, that the microscopic mechanisms underlying superconductivity were understood.

In an ordinary conductor, electric current arises from the free movement of electrons within the material. However, this movement is hindered by the crystal

lattice – the three-dimensional arrangement of the material's atoms – which gives rise to electrical resistance. But at very low temperatures, in certain materials, the electrons – which normally repel one another because they have the same charge – pair up to form what are known as Cooper pairs. These new particles move in synchronisation, resulting in a current with no electrical resistance whatsoever. This is superconductivity. This phenomenon stems from a complete reversal in the behaviour of the electrons. Taken individually, two electrons never occupy the same quantum state. This is known as the Pauli exclusion principle. However, when they combine to form Cooper pairs, the rule is reversed: the electrons lose their individuality and all the pairs within a superconducting material then coalesce into a single quantum state, described by a single wave function across the entire material.

Shortly after this discovery, in 1962, the British scientist Brian Josephson described the Josephson junction, a circuit in which two superconducting materials are separated by a thin insulating barrier. "The Josephson junction is the key component for creating interesting superconducting circuits," explains Hugues Pothier, a researcher in the Quatronique group within the Condensed Matter Physics Department (SPEC – Univ. Paris-Saclay/CEA/CNRS). "It is the equivalent of transistors in semiconductor circuits." This new component is rapidly finding applications, particularly in the precise measurement of magnetic fields. It also led the American-British theoretical physicist Anthony Leggett to propose, in 1978, using this circuit to observe the tunnelling effect on a macroscopic scale. It was this suggestion that would later inspire the work of the 2025 Nobel Prize laureates.

Demonstration of the macroscopic quantum tunnelling effect

If quantum mechanics seems so counterintuitive, the tunnel effect may well be the reason. On a macroscopic scale, if you throw a ball against a wall, it will bounce off it every time. In the quantum

THE PHENOMENON OF SUPERCONDUCTIVITY

Normal conductor



In a typical conductor, electrons move freely and collide with one another.

Superconductor



When a material becomes a superconductor, the electrons pair up to form what are known as Cooper pairs, creating a current with no resistance.

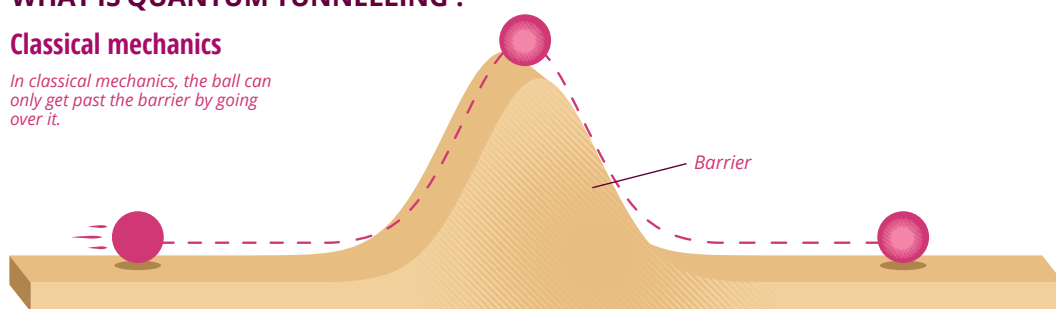


When paired up, electrons behave as if they were a single particle occupying the entire superconductor, and are described by a single wave function.

WHAT IS QUANTUM TUNNELLING ?

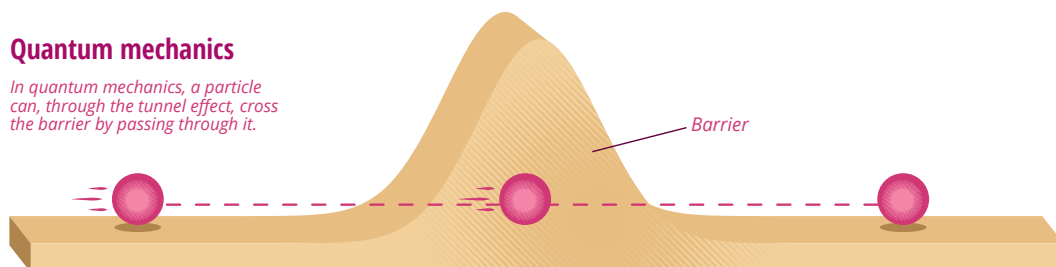
Classical mechanics

In classical mechanics, the ball can only get past the barrier by going over it.



Quantum mechanics

In quantum mechanics, a particle can, through the tunnel effect, cross the barrier by passing through it.



world, there is a non-zero probability that a particle thrown against a barrier – whether an energy barrier or a solid barrier that is thin enough – will end up on the other side, as if it had passed through an invisible tunnel. This is the quantum tunnelling effect.

In the early 1980s, Anthony Leggett theorised that it should be possible to observe, using a Josephson junction, the tunnelling effect on the scale of an entire circuit. By monitoring the behaviour of the electric voltage – which describes the macroscopic state of the system – it would be possible to observe the circuit's transition, via the tunnelling effect, from a state with zero voltage to a state with a non-zero voltage.

The reason for his choice: the dynamics of the superconducting circuit, once the equations have been set out, “are formally equivalent to those describing a ball in a corrugated metal potential”, argues Hugues Pothier, who continues his analogy. “You place a ball on a corrugated sheet, tilt the sheet, and the marble remains trapped in a trough until the slope is steep enough for the marble to escape.” In the case of the quantum circuit, the current acts as the tilt of the sheet and the voltage as the speed of the marble. “When we increase the current through the Josephson junction, there is no voltage, because the ball remains in the hollow of the sheet. Then, after a while, the ball escapes: it gains speed and a voltage is generated,” adds the researcher. But whilst this ball does indeed obey the laws of quantum physics, it is also possible for it to escape from the hollow in the sheet metal via the tunnel effect.

Consequently, the aim of the experiments carried out in 1985 by Michel Devoret and his colleagues was to prove that this ball does indeed escape via the tunnel effect and not due to thermal agitation, as both phenomena produce the same experimental result: a sudden jump in voltage. To confirm this, the team measured the ball's escape rate as a function of the circuit's temperature. “At a steady-state temperature, there is noise in the current. It is as if the metal sheet were

being shaken slightly,” explains Hugues Pothier. Because of this agitation, the ball is also likely to escape via thermal effects. However, this escape rate depends on the temperature: the lower the temperature, the less intense the agitation and the lower the chances of the ball escaping. The escape rate due to the tunnel effect, on the other hand, does not depend on temperature. By gradually cooling the circuit, the researchers thus measure a decrease in the escape rate which, below a critical temperature, begins to saturate. This is the experimental signature of the voltage jump at the Josephson junction due to macroscopic tunnelling.

The researchers then carried out a second experiment. “As this circuit behaves like a particle in a potential well, we would expect, from a quantum perspective, there to be quantised energy levels,” explains Hugues Pothier. By sending packets of precisely defined energy in the form of microwaves, the researchers were able to observe the energy jumps between the circuit's ground state and its excited states. It then became apparent that this circuit, visible to the naked eye, behaves like a giant artificial atom with quantum properties.

The founding of the Quantronique group

These experiments did not go unexplored. On his return to France, Michel Devoret joined the French Alternative Energies and Atomic Energy Commission (CEA) Paris-Saclay and, together with his colleagues Daniel Esteve and Cristian Urbina, founded the Quantronique group within SPEC, “with the aim of building quantum electronic circuits”, explains Hugues Pothier. “They thought there was another quantum effect it would be worth demonstrating: placing the circuit in a superposition of states.” Initially, the idea seemed unattainable for the team, so they turned their attention to other phenomena in this rapidly developing field of physics. Then, in the mid-1990s, the researchers developed the “Cooper pair box”, a superconducting metallic island which,

connected to the rest of the circuit by a Josephson junction, is capable of being in a superposition of states between zero and one excess Cooper pair. Ten years after deeming the superposition of states to be out of reach in an electrical circuit, here it was, finally observed!

However, a major challenge remained: how to manipulate this superposition. An initial breakthrough came in 1999 in Japan, where a team of scientists succeeded in causing such a system to oscillate between its two states. But it was within the Quantronique group that the first true superconducting qubit was developed: the quantrionium. “We were able to bring the system into a superposition of states and take measurements that were precise enough to actually manipulate this superposition,” confirms Hugues Pothier. Since then, the Quantronique group has been conducting both fundamental and applied research into superconducting circuits, with the aim, on the one hand, of better understanding phenomena that are still poorly understood – such as energy dissipation in these circuits – and, on the other, of developing novel measurement devices, such as a detector capable of counting microwave photons one by one. These photons, which have ten thousand times less energy than visible photons, are much more difficult to detect individually.

This detector has opened up an unexpected avenue of research: the detection of individual electron spins in matter, with potential applications in chemistry and biology for probing the structure of molecules at the atomic scale. The spin of a quantum particle is like a compass that points only in certain directions. As the spin of electrons is sensitive to that of neighbouring atomic nuclei, it “provides access to nuclear spin”. This is a way for the group to come full circle with its history: SPEC, founded by Anatole Abragam, one of the pioneers of nuclear magnetic resonance (NMR), is now set to take this technique a step further through the detection of a single nuclear spin, whereas NMR requires hundreds of billions of spins to produce a signal.

Thinking about the future of quantum computing

Whilst the Quantronique group is exploring the physics of superconducting quantum circuits and their applications, other scientists at Université Paris-Saclay are looking into ways of harnessing the new capabilities offered by quantum computers. This is the case for Pablo Arrighi, a researcher at Inria Centre of Université Paris-Saclay and head of the QuaCS team-project (Quantum Computation Structures) within the Formal Methods Laboratory (LMF – Univ. Paris-Saclay/ENS Paris-Saclay/Inria/CentraleSupélec/CNRS).

In his research, the computer scientist focuses on quantum simulation models based on quantum cellular automata. The concept of quantum simulation dates back to the lecture “Simulating Physics with Computers”, delivered in 1981 by Richard Feynman at the Massachusetts Institute of Technology (MIT). The starting point

for this line of thought is a problem that Pablo Arrighi likes to illustrate with the following example: *“Let’s imagine I want to simulate a system of interacting atoms. I know the equations of quantum mechanics that describe my system; all I have to do is programme them into my computer. And yet, it would take months for the computer to complete its calculations!”*

The reason lies in the number of parameters required to describe a quantum system: as the number of particles increases, the resources needed to represent its state grow exponentially. Richard Feynman therefore proposed a change of perspective: rather than attempting to reproduce a quantum system through classical computation, he suggested using another quantum system to simulate it directly. Pablo Arrighi illustrates this as follows: *“To study the aerodynamics of an aeroplane, one can calculate the effect of air molecules striking the fuselage, but one can also build a model, attach small pieces of string to it, place it in a wind tunnel and measure what happens.”*

In his research, Pablo Arrighi develops simulation and quantum computing models. To understand his work, however, it is necessary to revisit the concept of cellular automaton. *“The principle is to divide space into small elementary cells, arranged side by side in a line or grid, and to assign them a state, such as 0 or 1.”* To make the grid evolve, he simultaneously applies a local rule to each cell in the grid: *“For a given cell, we look at the state of its nearest neighbours and, based on that, decide what the cell’s state will be at the next time step.”* By repeating this process, he brings out complex behaviour across the entire grid.

This method is similar to that of numerical simulation. *“In physics and many other fields, phenomena are often described using partial differential equations. Generally speaking, these equations describe how a quantity changes as a function of the system’s variables. But in most cases, it is not possible to solve them analytically. So, what do we do? We discretise the problem so that it can be processed on a computer,”* explains the researcher. Dividing time and space into small intervals helps to replace an unsolvable equation with a sequence of simple operations that the computer carries out step by step: this is the principle behind a numerical scheme. Thus, *“we arrive at a kind of cellular automata”*.

It is possible to take this strategy even further, and Pablo Arrighi is seeking to apply it to quantum mechanics, in particular to quantum electrodynamics – the theory describing the interactions between charged particles and light. The aim is to derive, from local rules, the behaviours described by this theory. *“In the future, we will have quantum computers and we will want to simulate electrons or photons to make predictions in quantum chemistry, for example, and for that, we will need quantum simulation algorithms capable of faithfully reproducing the physics involved.”*

Controlling a quantum system

But before that, another problem inherent in quantum systems needs to be resolved: their extreme fragility and

sensitivity to the environment (noise, temperature, electromagnetic fields, measurements, etc.). In order to harness and preserve their quantum properties, researchers at the Signals and Systems Laboratory (L2S – Univ. Paris-Saclay/CentraleSupélec/CNRS) are attempting to apply control theory to them. This involves studying the system’s dynamics and how its evolution can be influenced. *“We construct an observer – a simulation of the system that replicates its dynamics based on the observations made and the information gathered,”* explains Dario Prandi, a researcher at L2S. With this, it is then possible to estimate the system’s state and determine what action to take.

“In the future, we will have quantum computers and we will want to simulate electrons or photons to make predictions in quantum chemistry, for example, and for that, we will need quantum simulation algorithms capable of faithfully reproducing the physics involved.”

— Pablo Arrighi

However, the transition to the quantum world greatly complicates matters. *“A quantum measurement does not simply provide information about the system: it also influences its evolution,”* explains Nina Amini, a specialist in quantum control theory and a researcher at L2S. Furthermore, the results of measurements are inherently random, which makes it difficult to estimate the system’s state. Added to this is the influence of the environment. As a quantum system is never perfectly isolated, it interacts with its surroundings, which can lead to a loss of the very quantum properties that are being sought to be preserved.

To control such a system, scientists rely, for example, on indirect measurement protocols. This involves causing the quantum system under study to interact with a second, intermediate system, and then measuring only the latter. The information gathered provides insight into the state of the first system, whilst taking into account the effects of the measurement on its evolution. As measurements are taken successively over time, the evolution of the system’s state – determined by the results – is described by what is known as a quantum trajectory. Using mathematical tools, scientists update their estimate of this state as observations are made, and are thus able to determine the actions required to steer it towards a desired state. This feedback loop makes it possible, for example, to stabilise the state of a qubit.

Overcoming the complexity of quantum systems

Another challenge in quantum control lies in the complexity of the models required to describe the evolution of the systems. As their size increases, the calculations quickly become too computationally intensive to track their dynamics in full detail. One of the challenges facing the team is to develop simplified mathematical

descriptions that retain the properties essential for controlling these systems. Rather than working on the system in all its complexity, *“we are looking to identify smaller subsystems that retain certain key properties of the original system”*, explains Paolo Mason, also a researcher at L2S.

This approach reduces the complexity of the calculations whilst retaining the information essential for studying and monitoring the system’s behaviour. By constructing simpler models – yet ones that are sufficiently accurate to describe the behaviours of interest – scientists are seeking to make the control of complex quantum systems more accessible.

From Schrödinger’s thought experiment to the superconducting circuits that won the 2025 Nobel Prize in Physics, researchers at Université Paris-Saclay are constantly pushing the boundaries of quantum physics further. Through their experiments, they are finding ways to bring to reality ideas that have long remained out of reach – each representing a step forward in a field of research that is as vast as it is fascinating. **S.B.**

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Taking action on climate risks

Start-ups developing solutions to better anticipate and adapt

Floods, heatwaves, droughts... As the effects of climate change become increasingly apparent, it is essential to learn how to cope with them. Start-ups emerging from the Université Paris-Saclay research ecosystem are developing practical solutions to help territories and economic activities adapt to climate risks.

TheCLIMATEStandards Adapting infrastructure to a changing climate

Beyond reducing greenhouse gas emissions, adaptation is now recognised as a key pillar of the response to climate change and its consequences. "90% of disasters worldwide are now attributed to climate change. That represents around 300 events a year," explains Damien Serre, a lecturer associate with the Cultures, Environments, Arctic, Representations, Climate laboratory (CEARC – UVSQ) and co-founder of the start-up TheCLIMATEStandards.

Founded in June 2025 and building on twenty years of research in the field, this start-up is working on adapting civil engineering infrastructure – such as transport, energy, telecommunications and water networks – to climate change. Such infrastructure is particularly vulnerable to extreme weather events,

be they heatwaves, droughts, floods, storms or even ground movements. In recent years, "there have been some tentative steps taken by infrastructure managers", notes Damien Serre. "Some are restructuring their risk management units to incorporate climate change adaptation, which shows that these issues are beginning to be taken into account in their considerations." This is precisely where the lecturer and Angel Paterna-Hidalgo, the other co-founder of TheCLIMATEStandards, have chosen to focus their efforts.

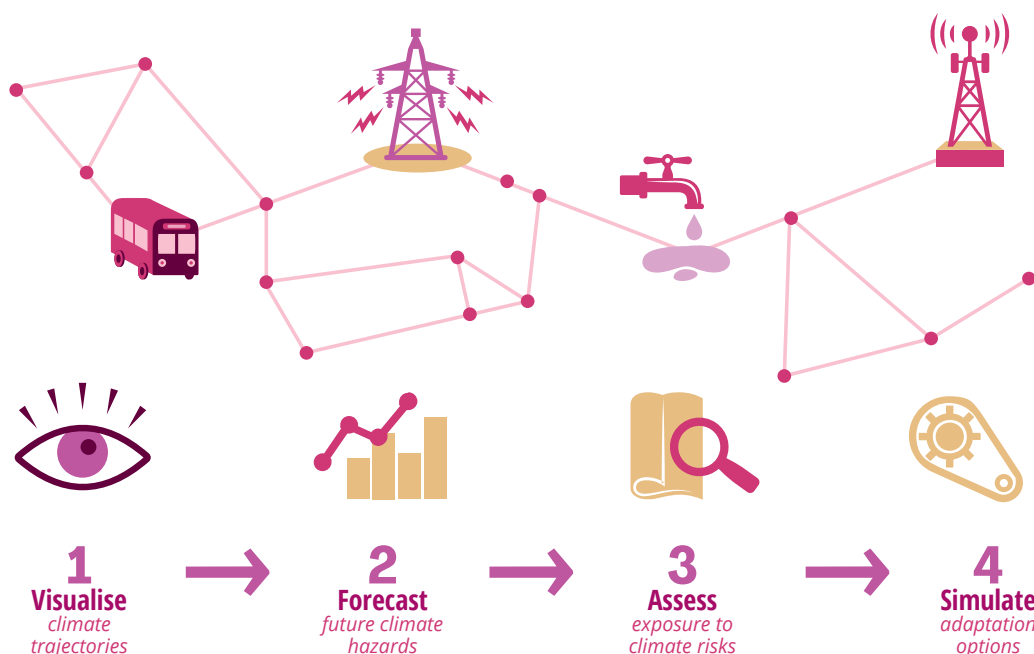
Anticipating infrastructure vulnerability

As part of his research, Damien Serre has worked with more than forty critical infrastructure operators across Europe. These collaborations have given him an

in-depth understanding of the challenges faced by these operators and enabled him to work with them on various solutions. Two years ago, he decided to take things a step further and develop a practical, operational and scalable solution. This solution takes the form of a SaaS (Software as a Service) platform, a service accessible directly via a web browser, without the need for local installation.

This platform translates climate projections for 2050 and 2100 into potential hazards, such as droughts, floods, storms, etc. These projections are then cross-referenced with the vulnerabilities of clients' infrastructures, drawing in particular on their incident records, to assess how exposed they may be to future climate impacts. "For example, we have worked extensively on the Parisian Autonomous Transport Administration (RATP) network," explains the specialist. "This involved looking at how the network has been affected in the past and what incidents have occurred, then cross-referencing this data with our projections of future climate hazards to determine how the infrastructure will be affected by climate change."

The platform also offers the ability to simulate adaptation strategies before investing and to measure their benefits: improved infrastructure performance, reduced risks and impacts on users and local areas, and extended infrastructure lifecycles, amongst others. It also helps to identify priorities for action, particularly on large networks. "The question that still often arises is: where do you start when you have kilometres of infrastructure to manage?," explains the co-founder of TheCLIMATEStandards. Finally, the platform brings adaptation strategy closer to maintenance strategy by gradually integrating adaptation measures into routine maintenance to prepare infrastructure for the 2050 and 2100 deadlines.

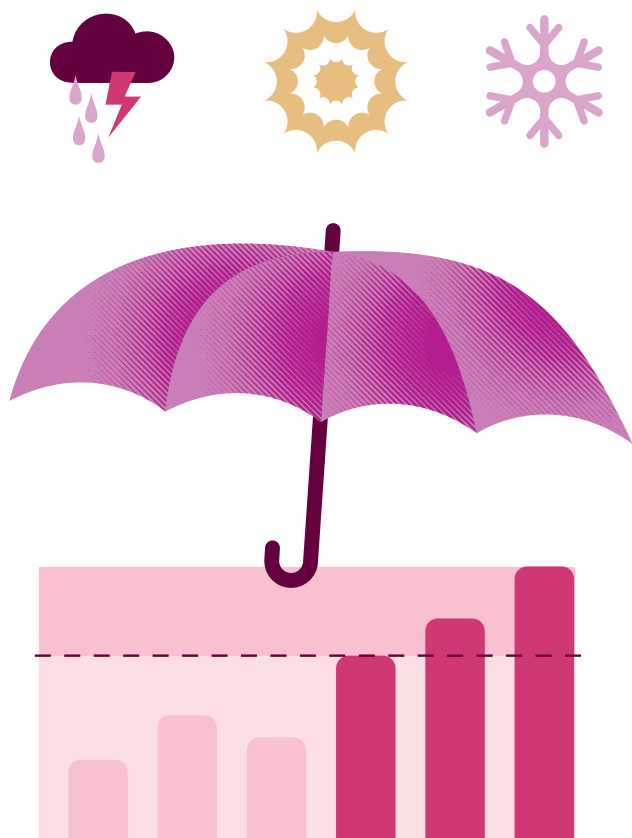


A well-established network

"When you're a researcher and you make the transition to becoming an entrepreneur, you have to learn everything all over again," says Damien Serre. For the lecturer and his team, the turning point came in July 2025, when they met with IncubAlliance Paris-Saclay, a public research incubator within the Paris-Saclay ecosystem. After completing their pre-incubation programme, Genesis Lab, the team has now moved on to the incubation phase, during which the incubator supports them in setting up and developing their business.

Throughout its development process, the start-up has also built up a network of partners in the Paris-Saclay area. This is a connection that Damien Serre and his colleagues wish to nurture: *"We are currently exploring avenues for collaboration with other laboratories, such as the Laboratory for Climate and Environmental Sciences (LSCE – UVSQ/CEA/CNRS). We also have a network of industry partners who are actively engaged and very open to considering potential collaborations."* The start-up is currently finalising its team and hopes to be supporting around thirty clients within three years. Among its first clients are organisations in the water and coastal infrastructure sectors.

<https://theclimatestandards.com/en/>



Sereno

Measuring and anticipating climate risks to provide better protection

Turning weather conditions into data is what François Mercier-Tigrine, a former PhD student at the Atmospheric Space Observations Laboratory (LATMOS – UVSQ/Sorbonne Université/CNRS), is now doing with Sereno. This start-up, which he co-founded and where he serves as scientific director, uses weather data to measure and predict climate risks. It helps businesses and insurers to manage these risks through alerts and, above all, specialised insurance policies.

Sereno originates from the research carried out by François Mercier-Tigrine during his PhD at LATMOS. *"The project I worked on during my PhD is based on the idea of measuring rainfall by analysing the attenuation of signals from television satellites received via satellite dishes,"* he explains. *"When it rains, part of the signal transmitted by the satellites is absorbed by the rain. By measuring the signal loss, we can then work out the amount of rainfall."*

Just over a year later, in 2018, François Mercier-Tigrine and his colleague Ruben Hallali launched the start-up HD Rain, with the aim of installing sensors, satellite dishes and small electronic units to measure signal strength. *"The aim was to produce rainfall maps, forecasts and alerts, mainly using these sensors."* Gradually, the insurance side of the business developed, and the start-up began offering data certification for parametric insurance.

Indicator-based insurance

Parametric insurance relies not on an individual incident and its assessment by an expert, but on a predefined threshold based on an index. *"For example, if a winegrower takes out a traditional insurance policy, the assessment aims to establish the extent of the damage and determine the percentage of the harvest destroyed by frost,"* explains François Mercier-Tigrine. *"Under parametric insurance, the policy sets out precise conditions in advance: if a weather station records temperatures below -1°C, the policyholder receives a certain level of compensation; below -2°C, the compensation is higher."* Designed in this way, parametric insurance provides a response to evolving climate risks and the limitations of traditional insurance.

Building on this idea, the start-up began to act as a trusted third party – in other words, as the entity that provides and certifies data between the insurer and the policyholder. *"Initially, we did this using our own data and sensors, but we gradually began working with all sorts of data: from Météo-France sensors, satellite data from Africa, and so on. This marked a gradual pivot for the company from 2023–2024 onwards,"* reveals the former researcher. The company then underwent another transformation: HD Rain gave way to Sereno, which went a step further by directly developing parametric insurance

products linked to weather conditions. It is therefore no longer simply a matter of certifying data, but of designing the products themselves.

Better protection against climate-related risks

In practice, Sereno's work involves meeting with insurance brokers, who introduce them to their clients, explain their issues, and provide their data and claims histories. The company then uses its expertise to determine which meteorological data should be correlated with these claims. *"For example, we might determine that, for a given client, the indicator that best captures their risk is the average rainfall in October. We then construct an index and design an insurance product around it. We also calculate the price of the product, based on the probability of the event occurring,"* explains the co-founder. Parametric insurance thus addresses a twofold challenge: providing better cover for increasingly significant climate-related risks, whilst offering a simpler claims settlement process directly linked to measurable data.

The final step is to find an insurer to cover the financial risk. In the insurance sector, *"responding to changing climate risks has become a major issue. It is no longer necessary to convince an insurer. The same applies to local authorities. They are increasingly witnessing the consequences of climate-related events and are therefore convinced that these must be taken into account,"* emphasises François Mercier-Tigrine. Today, Sereno counts several municipalities, including Toulon, Montpellier and Sanary-sur-Mer, amongst its public-sector clients. It also works with insurers such as AXA Climate, Arisk, Descartes Underwriting and African Risk Capacity.

<https://sereno.insure>

Taste, flavours and sensations

Understanding the mechanisms at play to drive change in practices

The crunch of a square of chocolate, the aroma of warm bread, the intense or comforting flavour of a dish served in a sauce... Or, conversely, the bitterness of an endive or the dryness of a wine that is too young. Taste is a sense that captures the imagination and brings back memories. It is also an active area of research at Université Paris-Saclay, where researchers are combining chemistry, biology, consumer science and even entomology to understand the physiological mechanisms behind this sense and the variations in perception between individuals.



Keywords

Flavour

Trigeminal sensitivity

Bitterness

Astringency

Consumption

Taste is probably one of the five human senses that is most difficult to describe: *"What the general public refers to as 'taste' corresponds, in scientific terms, to the concept of 'flavour', which combines taste, smell and trigeminal sensitivity,"* explains Alix Rollinat, a researcher at the Paris-Saclay Food and Bioproduct Engineering laboratory (SayFood – Univ. Paris-Saclay/INRAE/AgroParisTech). In scientific terms, taste refers solely to the sensation perceived by the taste buds. It comprises five basic tastes: salty, sweet, bitter, sour and umami, a lesser-known taste found in many meats, soya sauce, sun-dried tomatoes and Parmesan cheese. However, the perception of a food is not limited to these five tastes. The sense of smell also plays a vital role, thanks to aromas (see the Research article in *L'Édition* No. 25). Finally, the last component of flavour, trigeminal sensitivity, refers to the ability to detect textures, the fizz of a drink, the freshness of mint or the astringency of a wine.

"What the general public refers to as 'taste' corresponds, in scientific terms, to the concept of 'flavour', which combines taste, smell and trigeminal sensitivity."

— Alix Rollinat

These different perceptions are linked to chemical compounds and involve distinct sensory systems. Taste is based on the binding of a molecule to a receptor located on the surface of a sensory cell in a taste bud. This binding triggers a cascade of signals, such as the opening of an ion channel in the cell membrane, resulting in a change in the transmembrane electrical potential. This signal is then amplified and activates the body's central nervous system. Trigeminal sensations, on the other hand, are detected and transmitted to the brain via the trigeminal nerve. These sensory modalities are then integrated to provide a complete assessment of a food.

Is bitterness a marker of toxicity?

But what is the purpose of taste? According to Frédéric Marion-Poll, professor emeritus associated with the Evolution, Genomes, Behaviour and Ecology laboratory (EGCE - Univ. Paris Saclay/AgroParisTech/CNRS/IRD), the original function of the taste system is to *"assess the potential quality of food"*. This applies not only to humans, but also to insects, which are the focus of the scientist's research. In particular, he studies the bitter taste that insects avoid, probably because it is associated with toxic compounds. The aim is to develop innovative methods of crop protection. *"The use of substances that taste unpleasant to insects reduces the amount of insecticide needed to protect a cultivated area,"* explains Frédéric Marion-Poll.

The link between bitterness and toxicity is thought to be aposematic in nature. This term refers to an organism's ability to warn its predators of its toxicity by means of a strong signal. This often takes the form of a bright colour, as in the case of poisonous frogs, or a smell, a sound or a taste – in this instance, bitterness. As the specialist explains: when a predator ingests a bitter and toxic substance, *"it associates this flavour with an unpleasant experience and remembers this signal as indicating a substance to be avoided"*. Whilst other non-toxic species also develop a bitter taste, this selection by predators gives them a reproductive advantage. Thus, although not all bitter-tasting plants are toxic, insects tend to avoid them.

To explore this relationship between flavour and the perception of a food's nutritional quality, Frédéric Marion-Poll is investigating the mechanisms by which fruit flies perceive toxic molecules. This insect is frequently used in experiments, and the scientific community has developed numerous genetic tools that enable a wide range of manipulations. In one experiment, the professor emeritus's team deactivated the bitter-taste receptors in the flies' sensory cells, then successively exposed the insects to various solutions, some containing bitter and toxic substances and others not. The first of these solutions, consisting exclusively of sugar, proved a resounding success with the

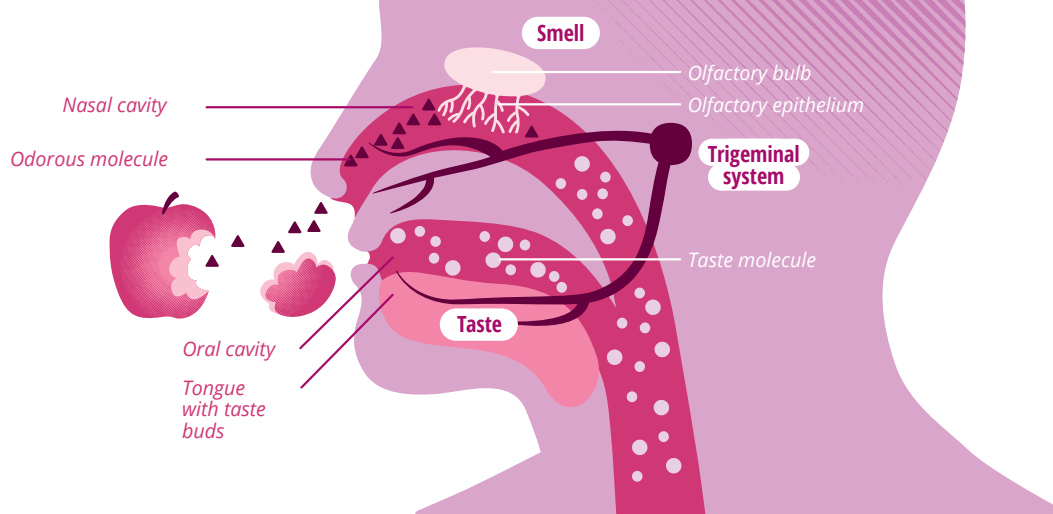
insects. The second mixture was a blend of sugar and L-canavanine (an amino acid found in various plants, such as pulses). The flies, unable to perceive the bitter taste, also reacted positively. However, with the third mixture – a blend of sugar and strychnine (an alkaloid that is toxic to mammals) – the fruit flies reacted much less strongly than before, indicating their ability to avoid strychnine even without perceiving its bitterness.

By analysing the activity of sugar-sensitive neurons, scientists have found that these no longer respond to sugar in proportion to the dose. This means that *"certain bitter substances, such as strychnine, have the ability to inhibit sugar receptors"*, explains Frédéric Marion-Poll. This dual effect – activation of bitterness receptors and inhibition of sweetness receptors – reinforces the avoidance response to these substances, even when they are incorporated into a mixture.

A genetic influence on the perception of bitterness

Another source of complexity in analysing the link between toxicity and bitterness lies in the genetic diversity within a species. Here again, Frédéric Marion-Poll's team made use of the tools developed for fruit flies, employing fly strains whose ancestors and genomes are thoroughly understood, in order to establish correlations with the observed phenotypes – the behaviours. The scientists exposed the flies to solutions containing sugar, sugar and L-canavanine, or sugar and caffeine – which is bitter but not very toxic to fruit flies at low doses. The team then observed different types of behaviour depending on the fly strains. Some tasted the bitter solutions just once and did not touch them again, suggesting that they had detected the bitter substances. Others did not distinguish between the solutions. Still others appeared to tolerate the bitter compounds initially but subsequently developed an aversion to L-canavanine. *"This suggests that there is a post-ingestive reaction linked to intoxication."* This experiment, which is currently being analysed, highlights differences in insect behaviour, which appear to be linked to traits acquired across generations.

FLAVOUR AND ITS COMPONENTS



In order to study this genetic variability in greater depth, the scientists are collaborating with other specialists to develop new experimental techniques, using automated systems capable of dispensing droplets of solutions and measuring the volumes consumed. *“The Université Paris-Saclay ecosystem is an ideal place to develop interdisciplinary collaborations,”* notes Frédéric Marion-Poll. *“In partnership with engineering students from the campus, as well as specialists in physics and optics, we would be able to develop even more effective high-throughput tests.”*

The diversity of feeding behaviours within a species challenges the traditional approach to modelling behaviour, which is based on an average insect. It also suggests that incorporating bitter compounds into insecticides would help to use them more sparingly, by preventing or limiting the emergence of resistant insects and protecting beneficial insects. The professor emeritus is counting on the new experimental devices to shed new light on the subject in the near future.

The little-known mechanism of astringency

In humans, bitterness is often associated with another unpleasant sensation: astringency. This is the field of study of Alix Rollinat, a young lecturer at AgroParisTech and a member of the SayFood laboratory. After completing a Master’s degree in oenology, she decided to deepen her understanding of this sensation, which is often found in red wine, by pursuing a PhD at the Centre for Taste and Food Sciences in Dijon. Astringency is akin to *“a sensation of dryness on the palate, tongue and gums, the feeling of having no saliva left in the mouth”*, explains the scientist. Although it is often confused with bitterness, astringency is not a savour but a trigeminal sensation – the third major component of flavour.

Alix Rollinat wants to understand the mechanisms behind this sensation: *“I was struck by the idea that we cannot explain a sensation that we all experience!”* Although the mechanisms are still unclear, the compounds responsible for astringency are known. They belong mainly to the family of phenolic compounds, molecules characterised by an aromatic ring (a ring of six carbon atoms) and a hydroxyl group (OH). There are a multitude of different phenolic compounds. However, depending on the type of molecule, the bonds formed with proteins present in the oral cavity vary, as do the sensation and intensity perceived.

Several theories have been put forward to explain this sensation. The first is that phenolic compounds cause the precipitation of proteins present in the thin mucosal film that protects the epithelial cells. This alters the lubrication of the oral cavity by increasing friction, which the brain interprets as a sensation of dryness. The other hypothesis suggests that the interaction of phenolic compounds with the mucosal film leads to the cleavage of a protein embedded in the membrane of the epithelial cells, which triggers signaling cascades extending to the trigeminal nerve. According to the lecturer, *“there is some truth in both hypotheses, but neither is sufficient on its own to explain the phenomena we are observing”*.

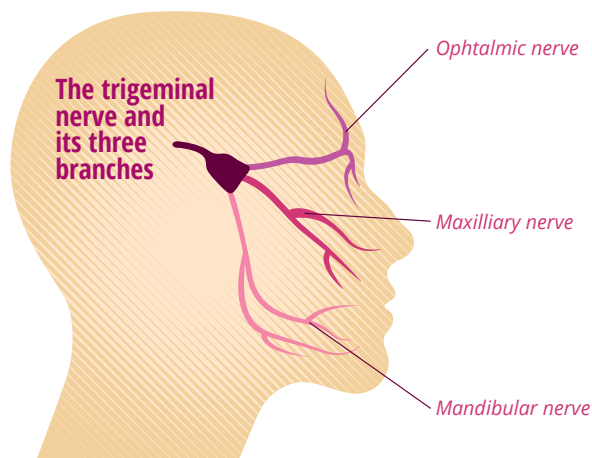
This raises the question: is astringency perceived in the same way by everyone? To answer this, Alix Rollinat developed, as part of her PhD, a protocol for measuring the threshold of astringency perception, by adapting the Best Estimate Threshold (BET) method. The experiment consists of eight rounds, during which participants must taste three different preparations. Two cups contain only water, whilst the third contains an astringent compound, the concentration of which increases with each round. The volunteers must identify the cup containing the compound and rate the intensity of the perceived astringency on a scale of 0 to 10.

“An analysis of perceived intensities as a function of actual concentration reveals an ‘S-shaped curve’,” explains Alix Rollinat. *“First, there is a plateau corresponding to background noise; then, once the perception threshold has been crossed, the perceived intensity increases to a greater or lesser extent with concentration, before reaching a second plateau which reflects a saturation effect.”* This S-shaped pattern is common to all two hundred volunteers, though with varying detection and saturation thresholds. To explain this diversity, further analyses were carried out on so-called “extreme” subjects, that is, those with very low or very high detection thresholds. Neither dietary habits – in particular the regular consumption of astringent foods – nor salivary flow account for these variations in thresholds, but certain aspects of the tongue’s tactile sensitivity appear to offer promising avenues for further investigation.

Complex interactions between aroma and astringency

Taking this a step further, Alix Rollinat is investigating the population with “intermediate” perception thresholds, looking at variations in perception depending on different types of astringent compounds, whilst also exploring the interactions between aroma and astringency. *“How does an astringent sensation alter the aromatic perception of a food?”*, asks the lecturer, citing the example of wine, which gains aromatic complexity when astringent compounds are added. *“And conversely, how does an aroma alter the perception of astringency?”*

Studies carried out by other research teams have shown that adding sugar reduces the sensation of astringency. However, the quantity required is very significant: 171.15 grams of sugar per litre are needed to reduce the sensation of astringency by the equivalent of one gram per litre of tannic acid, a phenolic compound. Adding a sweet-tasting aroma,



TRIGEMINAL SYSTEM AND ITS SENSATIONS

such as banana, reduces the amount of sugar needed to achieve the same result by two-thirds.

These interactions between aroma and astringency have yet to be fully explored, but they offer promising avenues of research, particularly with a view to encouraging the consumption of plant-based proteins or fermented products (see the Research article in *L'Édition* No.26). This issue lies at the heart of the work of another researcher at the SayFood laboratory, Valérie Guénard Lampron, who works at the intersection of food science and consumer science: *"The aim is to identify the barriers to the adoption of these foods – whether sensory or behavioural – and to propose strategies to overcome them."*

Understanding taste preferences to change habits

Fermented products and those based on plant proteins share the common feature of offering both particularly beneficial nutritional profiles – in terms of fibre, protein or probiotics, for example – and significant agronomic benefits: nitrogen fixation, crop rotation, reduced need for fertiliser and irrigation, and so on. However, their adoption faces several obstacles. These include sensory issues relating to textures and flavours perceived as unpleasant, such as overly pronounced vegetable notes, bitterness, an earthy taste or astringency. A lack of knowledge about how to prepare these foods also prevents them from being incorporated into the diet of the wider population.

The use of consumer panels is a useful technique for understanding reactions to these products, which are not commonly found on people's plates. Using rating scales, scientists assess the general public's sensitivity to a product and characterise target consumer groups. This approach, involving volunteers from the general public with minimal guidance, is complemented by panels of experts trained to establish a food's sensory profile by precisely identifying its pleasant or unpleasant aspects. In both cases, the ingredients are prepared either conventionally or using a 3D food printer. *"It's a very practical tool,"* confirms Valérie Guénard Lampron. *"We can vary the texture of the food, the number of layers or even the viscosity, albeit with a few technical challenges. With the 3D printer, we obtain perfectly identical samples, using a reproducible and controlled process."* In order to identify ways of overcoming these reservations, Valérie Guénard Lampron's team experiments in the laboratory with various preparation and cooking techniques, taking into account every stage of the food's cultivation, processing and consumption.

Whilst *"France imports around half of the legumes it consumes"*, as the researcher points out, another challenge is to increase local production. The Intégrale project, led by the Qualiment consortium – of which the SayFood laboratory is a member – therefore focuses on two legumes, the field fava bean and the lentil, which possess a high level of genetic diversity. The aim of the project is to identify the best varieties according to various criteria. *"We are seeking a balance between adaptation to the French climate and soil, ease of hulling and grinding, and, finally, sensory and nutritional qualities."* The SayFood team is focusing on the characteristics of the more or less wholemeal flours produced through these processes, and is exploring relevant and appetising uses for them. Food companies are also participating in the consortium, with the aim of developing new products.

Changing eating habits depends not only on improving the taste of legumes and fermented products, but also on developing a new gastronomic culture. In the Pulse Fiction project, funded by the French National Research Agency (ANR), scientists at SayFood are working with a chef who develops recipes using raw ingredients. Volunteers then recreate the dishes in the kitchen provided for them at the laboratory, before tasting them. This experimental kitchen is equipped with standard equipment but facilitates observation of the testers, enabling the identification of any sticking points in a recipe and the recording of feedback. This approach helps, in particular, to experiment with a range of preparation techniques, as Valérie Guénard Lampron explains: *"Is it more acceptable for a consumer to add red bean flour to a cake or to incorporate the legume in the form of a puree? Would they prefer to buy the legume already rehydrated or to prepare it from scratch, with the long soaking and cooking times, to feel they are eating more healthily? Does this involve too much effort? And what is the difference in sensory perception?"*

Collective catering also provides a valuable opportunity to engage with the public, showcase new recipes and raise awareness of the challenges involved in the food transition. In partnership with the Crous (French Regional Student and Services Centre), teams from the SayFood laboratories, Paris-Saclay Applied Economics (PSAE – Univ. Paris-Saclay/INRAE/AgroParisTech) and Physiology of Nutrition and Eating Behaviour (PNCA – Univ. Paris-Saclay/AgroParisTech/INRAE) opened an experimental restaurant on the Saclay campus in 2025. The aim is to observe, in a real-life setting, the behaviour and choices of individuals representative of the French population when faced with innovative foods, by identifying the conditions and extent of the changes that customers are prepared to accept. In the Conso+FF project, for example, *"we incorporate the cultural dimension of food by adapting well-known recipes to include fermented foods,"* explains the researcher. The descriptions of the dishes vary, to identify which terms generate the most interest. *"Should we emphasise the environmental approach, the health benefits, or an appetising description?"*

By identifying groups of interested consumers and offering innovative and appetising products, Valérie Guénard Lampron is hopeful that she can help change practices. Just as Frédéric Marion-Poll hopes, through his research, to find the recipe for keeping insects at bay. *"Ultimately, it always goes back to taste,"* concludes the researcher. **M.D.**

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PFAS

Research in the fight against forever chemicals

It has only been a few years since per- and polyfluoroalkyl substances, or PFAS, began to attract widespread attention. Yet their effects on human health have been documented for decades. Ubiquitous in the environment and in everyday objects, they now pose a real public health problem. In the research laboratories at Université Paris-Saclay, scientists are continuing their work to understand the behavior of these toxic compounds and to identify a way to eliminate them.

In the coatings of nonstick pans, in food packaging, in cosmetics, and even in sanitary towels... PFAS are everywhere. Whilst the effects of these molecules on human health and the environment are increasingly being studied by scientists and reported on by the media, manufacturers have been using these per- and polyfluoroalkyl substances (PFAS) for decades. The properties of PFAS make them highly attractive for many products: they are water-soluble, degrade very little, and are heat-resistant... But their strengths are also their flaws. Once released into the environment or the human body, they spread easily and persist, earning them the nickname "forever chemicals".

PFAS are a family of synthetic molecules. There are millions of different types, but they all share one common feature: each molecule contains a chain of carbon atoms surrounded by fluorine atoms. It is this very strong bond between carbon and fluorine that gives these compounds their durability. The first PFAS were developed in the late 1930s by the chemical industry. The first of these, PTFE (polytetrafluoroethylene), better known by its trade name Teflon, was discovered by accident in 1938. Within a few decades, the number of synthesised PFAS multiplied, and their use became widespread not only in everyday products but also in professional applications.

Very soon after production began, their toxicity became apparent. DuPont, the manufacturer of Teflon – which has been found liable on several occasions by US courts for releasing PFAS into the environment and drinking water – noted this as early as 1961 in internal studies. "Researchers have been studying PFAS for more than thirty years now, but many of the mechanisms by which they affect the body remain poorly understood," says Francesca Mancini, a research fellow at the Centre for Epidemiology and Population Health (CESP - Univ. Paris-Saclay/UVSQ/Inserm), who studies the impacts of these substances on human health.

"The most widely studied molecules are the historical PFAS, PFOS and PFOA, which were used from the 1940s to the 1990s," the researcher continues. It is, in fact, PFOA (or perfluorooctanoic acid) that is used in the production of Teflon, which was phased out by DuPont's factories. "When health effects began to emerge, particularly affecting the immune system, efforts were made from the 2000s onwards to phase them out and replace them with other PFAS."

But who is particularly affected by their harmful effects? "People exposed in the workplace receive the highest doses," says Francesca Mancini. "This is the case, for example, with firefighters, who have been shown to experience skin exposure due to their protective equipment, as well as inhalation of particles from fire-fighting foams. There are also people exposed because they live near sites contaminated by industrial discharges." The general public is not spared either: their exposure comes via water and food, which arrive at their homes already contaminated with PFAS. This is due to packaging that also contains PFAS, but also to the fact that these substances accumulate in living organisms and move up the food chain.

Pollutants reabsorbed by the body

Once inside the body, PFAS do indeed have an unfortunate tendency to remain there. "They are persistent organic pollutants, but unlike other substances, they do not accumulate in fatty tissue. They bind more easily to proteins," explains Francesca Mancini. The reason the body struggles to eliminate them is that they are reabsorbed by the body. When PFAS are excreted in the stools, the majority of them re-enter the bloodstream from the gut. "For long-chain PFAS – those with six or more carbon atoms – it is estimated that it takes two to six years to eliminate half of them." Yet it is these long-chain PFAS that are most widely used. "There is another route of excretion: childbirth and breastfeeding. But in this case, they are passed on to the child, especially if it is the first child," the scientist points out.

PFAS are suspected of acting as endocrine disruptors, by altering hormone production and behaviour, or by binding to hormone receptors. "Links have been identified between PFAS and chronic inflammation, oxidative stress and epigenetic changes", meaning changes relating to the expression or suppression of certain genes. It is not yet known whether these effects have any impact on health, but they are likely to be passed on from one generation to the next. Other studies show that PFAS increase the risk of testicular and kidney cancers. "There is growing evidence suggesting a link with certain types of breast cancer, and hypotheses exist regarding pancreatic cancer," adds Francesca Mancini.

Whilst the mechanism by which PFAS act is still poorly understood, according to the researcher, health effects can occur at levels as low as a few picograms of PFAS

per litre of blood, "the equivalent of a single drop in a swimming pool". Nevertheless, "a distinction must be made between acute effects and chronic exposure." The European Food Safety Authority (EFSA) has set a threshold intake of 4.4 nanograms per kilogram per week, a limit that has already been reduced in recent years and is likely to change further as new research emerges. In infants, exposure in utero and during breastfeeding is the main contributor to PFAS intake. "This could increase the risk of cancer in adulthood, but the risk posed by these substances does not outweigh the benefits of breastfeeding," the researcher emphasises.

To better understand the transgenerational effects of PFAS, Francesca Mancini is studying the E3N-Generations cohort, which brings together members of the same family across three generations. The researcher has focused in particular on mother-daughter pairs. The initial finding

Keywords

Perfluorooctanoic acid (PFOA)
—
Bioaccumulation
—
Endocrine disruptor
—
Soil contamination
—



Waterproof clothing*



Painting



Fire-fighting foam



Non-stick coating



Food packaging



Pesticides



Stain-resistant furniture



Cosmetics and skincare products*

PRODUCTS CONTAINING PFAS

*In France, since 1 January 2026, PFAS have been banned in cosmetics, ski waxes and clothing, with the exception of protective workwear.

is that exposure to PFAS has decreased between the first and second generations, although it remains significant. Furthermore, these substances appear to interact significantly with the metabolic pathways of testosterone, cholesterol and thyrotropin, a hormone that regulates the thyroid. *"We are also working to better understand the effects on breast cancer and on certain biological markers. We currently have studies underway investigating the links between PFAS and pancreatic cancer, endometriosis and Parkinson's disease."*

Despite these increasingly well-documented health effects, it remains difficult for the average person to avoid PFAS. Nevertheless, Francesca Mancini insists: *"We mustn't feel guilty, because on an individual level, there is very little we can do. In accordance with the precautionary principle, PFAS must be regulated across the board. For if the harmful effects of one molecule are demonstrated, similar compounds may have the same effects, especially as the replacement of hazardous molecules is happening faster than their scientific assessment."* Certain applications are, however, more difficult to assess, such as the equipment used by firefighters to protect them from immediate danger. PFAS are also found in medicines and prosthetics, the latter of which result in very little release into the environment.

PFAS accumulate in agricultural soils

But PFAS are not only found in the human body. These forever chemicals are everywhere in the environment, even at the poles. They also contaminate groundwater, which provides our drinking water supplies. *"The sources of PFAS discharge are very diverse but are primarily linked to industrial activities,"* says Pierre Benoit, director of the Functional Ecology and Ecotoxicology of Agroecosystems laboratory (EcoSys – Univ. Paris-Saclay/AgroParis-Tech/INRAE). *"We have much more data on aquatic environments, derived from water*

Year after year, when this sewage sludge or compost is repeatedly applied to the same plots of land, the PFAS it contains accumulate in the soil, migrate into groundwater, and may even accumulate in plants or organisms such as earthworms. In 2021, a study in which the EcoSys laboratory participated analysed the contamination of organic waste over a 25-year period. This research detected the presence of 160 different PFAS in agricultural soils. However, concentration levels in these agricultural soils remain significantly lower than those at industrial sites, which can accumulate large quantities of PFAS.

Tools for monitoring the behaviour of pollutants

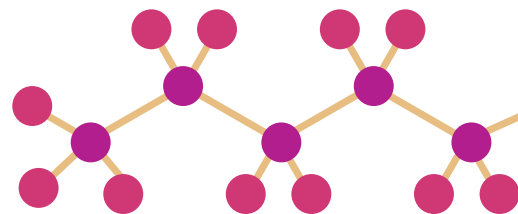
Monitoring soil condition is therefore essential, but data is still lacking. *"Since this has become a major public health issue, there has been an explosion in the number of publications on PFAS, but certain aspects remain under-explored. As far as soil is concerned, we have data on the mobility of PFAS, less on their degradation and even less on their bioaccumulation in living organisms."* The EcoSys laboratory is studying, in particular, the contamination of soil invertebrates, *"for example, the bioaccumulation of PFAS in earthworms, as the pollutants can then be transferred up the food chain."*

"We have been taking part in long-term, national-scale trials in which we are monitoring several sites," explains the research director. *"In particular, we have measured – under real-world conditions on farmers' land – what is present in the compost, what accumulates in the soil or migrates into water, and even what ends up in the crops harvested from their fields."* Whilst the tools for measuring contaminants in soil have improved, they remain limited when it comes to accurately tracking their behaviour. Pierre Benoit and his team are currently working with scientists from the Frédéric Joliot Institute

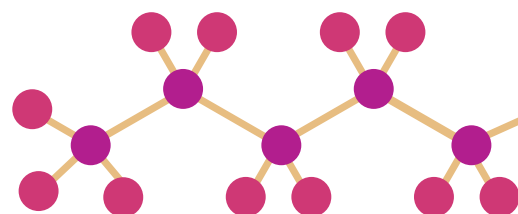
STRUCTURE OF THE BEST-KNOWN PFAS

Carbon Fluorine Oxygen

PFOA (perfluorooctanoic acid)



PFOS (perfluorooctanesulfonic acid)



assess the risk of exposure to PFAS through food: if these substances accumulate in products consumed by livestock or humans, this risk is far from negligible. *"At the moment, none of this has been properly quantified,"* laments Pierre Benoit. *"We are seeking to carry out the same assessments that were conducted in the past for heavy metals, except that there are a vast number of these molecules: there are thousands of possible compounds, whilst we are only able to monitor a few hundred."*

We therefore need to identify the chemical properties of each of these compounds. For example, PFAS with short carbon chains are more soluble in water and migrate more easily, whilst those with longer chains are less mobile and more likely to accumulate. To gain a clearer understanding, the team has developed a tool: *"TyPol is used to classify molecules according to their chemical structures and properties. This helps us to better understand the links between the chemical structure of PFAS and their behaviour in the environment or their ecotoxicological effects."* According to Pierre Benoit, it is now possible to identify far more molecules than before. *"Techniques have advanced tremendously, detection limits are becoming increasingly precise, and this allows us to make progress much more quickly."*

How to destroy a persistent pollutant?

So, how to get rid of the forever chemicals that have already been released into the environment? As well as gaining a better understanding of their effects, scientific research is also developing decontamination methods to remove these compounds. *"That is the distinctive feature of PFAS: they do not degrade, or hardly degrade at all, unless we intervene, because of this very strong carbon-fluorine bond,"* explains Mehran Mostafavi, a professor of physical chemistry at Université

"Since this has become a major public health issue, there has been an explosion in the number of publications on PFAS, but certain aspects remain under-explored."

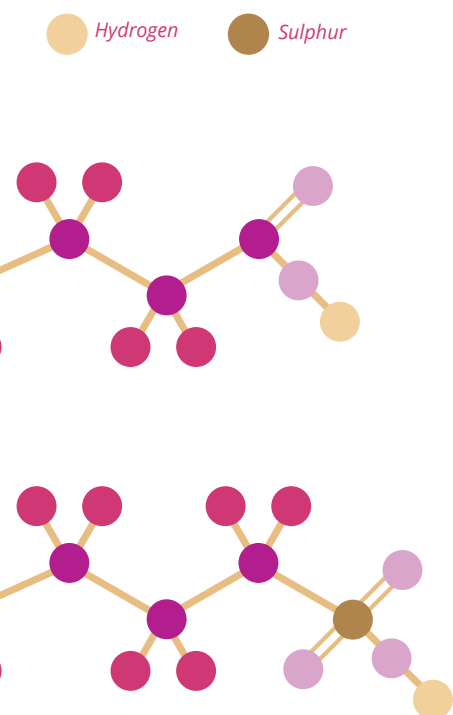
— Pierre Benoit

quality monitoring. We also know that PFAS are present in the air, but we have very little data on this. They may be present in the form of dust or aerosols, resulting from the application of pesticides."

In his laboratory, Pierre Benoit and his colleagues are investigating soil contamination. *"In the case of agricultural soils, PFAS originate from various sources. Sewage sludge from treatment works or certain types of urban compost used as fertilisers instead of synthetic fertilisers are among the pathways of entry."* Wastewater carries with it household products, cosmetics, fibres from clothing, fragments of kitchenware. All of these are sources of PFAS that subsequently end up in sewage treatment works.

of Life Sciences of the French Alternative Energies and Atomic Energy Commission (CEA) to develop a method for labelling PFAS using carbon-14, a radioactive element. *"This would make it easier to track their behaviour in the soil and measure their transfer to plants or other organisms."* The EcoSys laboratory is, in fact, equipped with an experimental platform dedicated to radiolabelled molecules.

Since February 2026, the FluorAgro project, to which Pierre Benoit's team is contributing, has been continuing this study of soil contamination. Its aim is to identify all sources of PFAS in agricultural soils and to measure their bioaccumulation in plants and earthworms. This will help to assess contamination levels in the most common crops, such as cereals and pulses. Based on this data, the project aims to



Paris-Saclay and a member of the Institute of Physical Chemistry (ICP – Univ. Paris-Saclay/CNRS).

"The more stable a molecule is, the less reactive it is, and therefore the more resistant it is to being broken down," continues the lecturer. "It is possible to burn PFAS, but this involves heating them to over 1,000°C, which is impractical and costly." But what does it mean to degrade a PFAS? "They are chains of carbon atoms. If you split them in two, you simply end up with smaller PFAS. The aim is therefore to mineralise them – that is, to separate all the fluorine atoms from the carbon atoms to which they are bonded – so that you have fluoride ions (F⁻) on one side and more conventional organic molecules on the other." The fluoride ions can then be recovered in solid form.

For this reason, the short-chain PFAS are the most difficult to process. "At the ICP, we have focused in particular on TFA, or trifluoroacetic acid. It is a ubiquitous molecule, because it is both the compound used to produce other PFAS and a product of their degradation." TFA is therefore found at both the beginning and the end of the PFAS life cycle. It is a very short molecule, with only two carbon atoms, one of which is surrounded by three fluorine atoms. Furthermore, TFA is highly soluble in water, which facilitates its migration into the environment.

Together with his team, Mehran Mostafavi identified a method for permanently mineralising TFA. "For longer molecules, it was noticed that a so-called 'hydrated' electron – that is, one isolated in an aqueous solution – is highly reactive and is capable of breaking the carbon–fluorine bond." However, TFA resists this reaction as long as its two carbon atoms are bonded to one another: they must therefore first be separated using another chemical species that is also highly reactive. "We found that a negative oxygen ion first breaks the bond

between the carbon atoms, and only then do the hydrated electrons manage to separate the fluorine atoms from the carbon, once these bonds have been made more accessible." To produce these ions, the chemists place the molecule in a basic environment, with a pH of around 11. The hydrated electrons, meanwhile, are produced by using radiation to break down water molecules. "To do this, we use the ELYSE pulsed radiolysis platform of the ICP," explains the professor.

This approach has the advantage of not requiring catalysts, which are often expensive. "In addition, ionising radiation penetrates deeply, making it possible to treat a large volume of water in a single go." Furthermore, this technique is not specific to TFA, as Mehran Mostafavi points out: "We have tested this method on around ten PFAS, including PFOA, and have succeeded in removing them 100%." It also works for longer PFAS, but requires more radiation, which increases the cost of treatment. "However, it could not be applied to PFAS that are not water-soluble, such as Teflon."

Decontamination alone will not be enough

This raises an obvious question: will it be possible, in the future, to remove PFAS? Mehran Mostafavi offers a more cautious view: there are still other obstacles to overcome. "In the case of consumer products, the concentrations are too low to remove them directly. First, we need to filter the PFAS out of the water to concentrate them and then treat them. This involves developing specialised filters, and research is currently being carried out on this. If we were to use this method directly during water treatment, the reactive species used could interact with molecules other than PFAS, and we would have no control over the products of these reactions."

In any case, irradiation is already used on an industrial scale to sterilise medical devices, and some countries use radiolysis to decontaminate other compounds. Scaling up to an industrial level could therefore be achieved quite easily. "In the laboratory, we only process a few millilitres of solution at a time. Now, we need to scale up to thousands of litres", the professor emphasises. "To this end, we have filed a patent and responded to a call for proposals from SATT Paris-Saclay [the Technology Transfer Accelerator office of the Paris-Saclay cluster]. We are also in discussions with industry partners." If the method developed at the ICP becomes more widely available, it would help manufacturers to treat PFAS that are already in storage and awaiting a means of degradation.

However, decontamination is not a miracle solution: it will only serve to treat some of the PFAS that have already been released, not to compensate for future discharges. Mehran Mostafavi draws the following parallel: "The purpose of a medicine is not to allow you to carry on getting ill. We must therefore drastically reduce the use of PFAS, restrict their production and find alternatives to these molecules. Fortunately, awareness is growing."

The production and use of PFOS and PFOA have been subject to several European regulations. In France, since 1 January 2026, PFAS in general have been banned in cosmetics, ski waxes and clothing, with the exception of protective workwear. From 2030, all textiles, apart from certain technical fabrics, will be covered by this ban. However, this does not mean that PFAS are being phased out entirely. The ban does not apply to kitchenware, and the association Générations Futures has listed 37 PFAS-based pesticides that are still authorised in Europe, 30 of which are authorised in France. Scientists will therefore not be able to ease their efforts and will need to carry out further research to better document the effects of these toxic substances and identify alternatives. E.G.

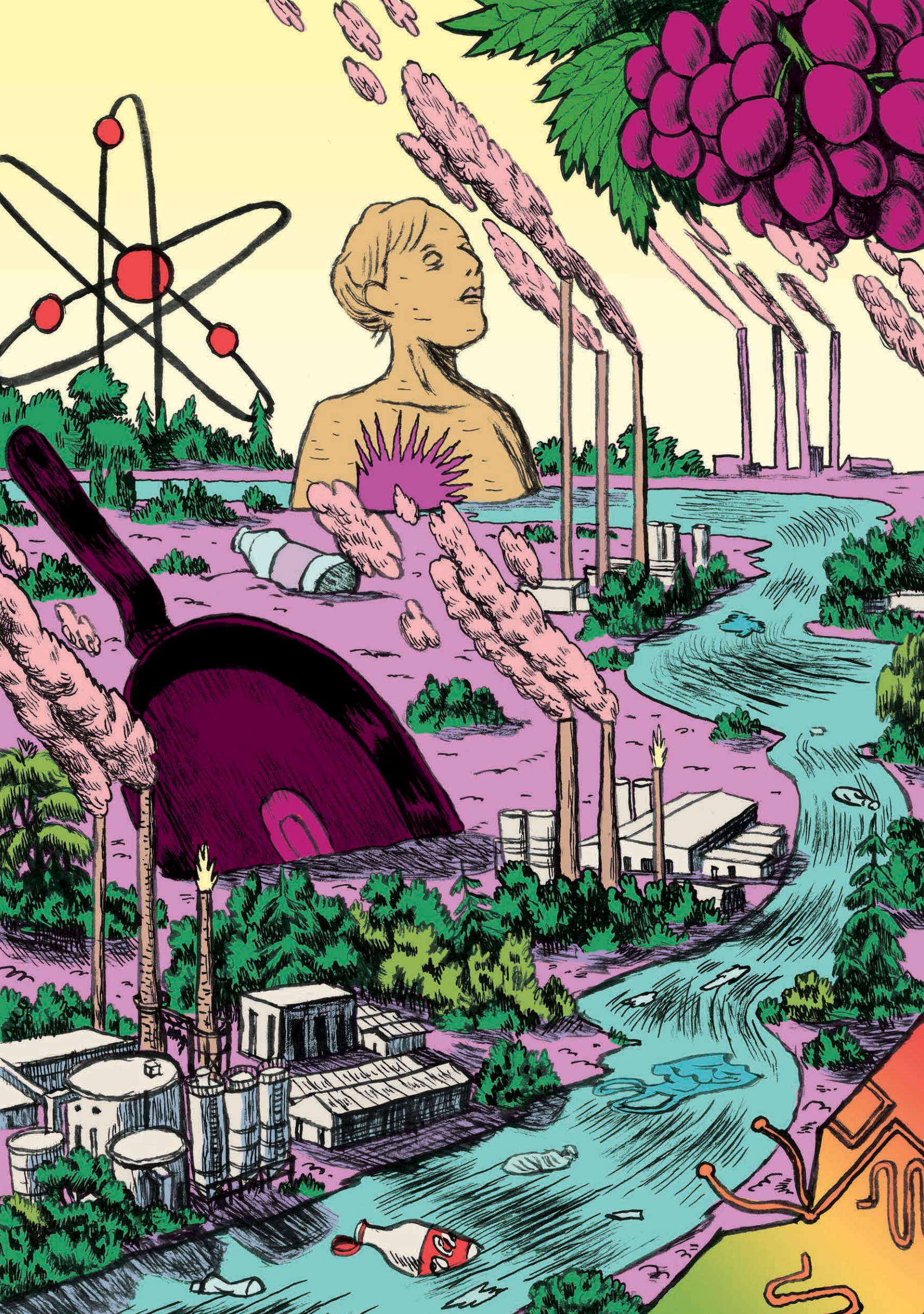
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Sport

A shower of medals for the Université Paris-Saclay students

Throughout the year 2025-2026, the student athletes of the Université Paris-Saclay community distinguished themselves in a number of university competitions. Judo, handball, athletics, rugby, football... This is an opportunity to put into the spotlight the different sports associations within the university and their athletes' results.

The start of the academic year always rhymes with new challenges for students. For nine of them, however, the university year started with a huge challenge. On the 12th of September, they flew to Albania to take part in the European University Judo Championships. *"This is the first time that the Université Paris-Saclay team is taking part in such a championship,"* smiles Gaël Tchang-Minh, who leads the judo team, alongside his colleague Steeven Da Silva. *"In the past, students have qualified for the European Championships as individuals, but it's always a challenge to be among the three best teams in the rankings."*

In March 2026 at the France University Championships, the judo athletes did not get one, but two passes. On the first day, Christ Hippocrate delivered and climbed on the top of the podium in his category, while Romane Maud et Amaury Hubert ranked third in their respective categories. The day after, the three athletes, joined by five others, united to help the team

thousand students enrolled in competitive sports," explains Sébastien Kaiser, head of AS STAPS and teacher at F2S. Throughout the year, athletes train and compete under their association's colors. But they are sometimes gathered within a single team, notably at national championships, to represent Université Paris-Saclay. The judo team is one example, made of AS STAPS, SUAPS, Université d'Évry and UVSQ students. *"Some have joined the team during the last university year but a strong sense of belonging was built,"* says Gaël Tchang-Minh.

Despite the high level displayed by their opponents, the judo fighters have made a good impression at the European Championships. Romane Maud created the sensation again by finishing third in her category, while Océane Guede finished fifth. In the team rankings, the athletes did not make it to the podium, but finished in fifth place, a good result for their first participation as a team.

"Our students aren't required to compete in a sport. But we try to encourage them to do so because it's a fantastic opportunity for experimentation and learning."

— Sébastien Kaiser

grabbed the silver medal. *"This year, we managed to create a nice emulation and a real team-spirit, even though our athletes come from different horizons,"* explain Gaël Tchang-Minh, judo professor at Faculty of Sports Sciences (F2S), and Steeven Da Silva, judo professor at University Service for Physical and Sports Activities (SUAPS) of Université Paris-Saclay.

Various associations under a same banner

Within the Université Paris-Saclay perimeter, there are in fact various sports associations in which students can do sports at university competitions. The SUAPS is open to all students at the university, regardless of their degree programme or faculty. The AS STAPS, on the other hand, gathers only the students from Science and Techniques of Physical and Sports Activities (STAPS) degree programmes at F2S. In addition to these are the sports associations from Université d'Évry and Université de Versailles - Saint-Quentin-en-Yvelines (UVSQ).

"These four associations are gathered in the same entity, the Université Paris-Saclay sports association (ASUPS), which counts about one

A bridge between education and sports practice

Judo athletes are, of course, not the only ones to have won titles during the 2025-2026 academic year, particularly within the STAPS programme, where strong links are forged between sports practice and education. *"Whilst our students are practising, they are also developing their skills in sports coaching and supervision,"* explains Sébastien Kaiser. From the very first year of the STAPS bachelor's degree, they are asked to choose a sport as their speciality, which they will then study in greater depth.

"Our students aren't required to compete in a sport. But we try to encourage them to do so because it's a fantastic opportunity for experimentation and learning," continues the teacher. Currently, around ten specialities are available at competitive level. As well as judo, this includes handball, where the AS STAPS men's team were crowned Île-de-France champions in 2026. *"It's been a good year,"* confirms Sébastien Kaiser. *"The men's team made it through to the national stage in Brest, where they finished*



© DR

in sixth place." Here again, the squad was strengthened by students from other faculties affiliated with the SUAPS.

A successful season for the ultimate team

For popular sports such as rugby, football, futsal (indoor football) or athletics, the various associations provide plenty of opportunities to play and compete for the Université Paris-Saclay students. However, the SUAPS, which gives access to about twenty sports in competition, is the only one to offer the opportunity to play some disciplines such as ultimate (a sport played with a frisbee), whose team excelled in 2026 by finishing second best in the Île-de-France Championships and then third in the France Championships.

The same applies, for example, to French boxing, in which two students, Mouhamadou Ba and Baptiste Filoleau, were awarded a gold medal and a bronze medal respectively at the last Île-de-France Championships. These results place the new academic and sporting year under a good sign. **E.F.**

<https://www.universite-paris-saclay.fr/vie-de-campus/le-sport-sur-les-campus-de-paris-saclay>

Passage

A single platform for all internship offers for secondary school pupils at Université Paris-Saclay

Launched in September 2026, Passage is a platform designed to help secondary school pupils discover Université Paris-Saclay, its activities and its professions by bringing together all the internship opportunities available at the university.

In secondary school, internships are an important first step into the world of work for pupils in both Year 10 and Year 11. They provide an opportunity for pupils to explore a field that interests them or to broaden their horizons as they consider their future career paths. However, finding an internship is not always an easy task for young people, particularly if they are not fortunate enough to have a contact in their chosen sector.

At Université Paris-Saclay, Year 10 and Year 11 pupils are regularly welcomed into various departments to give them their first taste of the world of scientific research. However, these opportunities are not always widely known. Conversely, other departments would like to offer internships to secondary school pupils, but lack sufficient internal resources to organise activities spanning several days. It was in recognition of these challenges that Passage – the Platform providing Access to Secondary school internships and General Extracurricular Activities – was created.

↓ All offers on a single platform

Launched in September 2026, Passage is run by La Diagonale · Université Paris-Saclay – the university's Arts, Culture, Sciences and Society Department – as part of Springboard, the PIA4 (4th Future Investment Programme) Excellences project. *"The platform's main aim is to serve as a showcase for internships at the university,"* explains Alice Centofanti, project manager at La Diagonale. In other words, to bring together on a single website all the internship opportunities offered by Université Paris-Saclay to secondary school pupils. *"Until now, it was difficult to find out about the various options because each structure advertises its internships on its own website. The opportunities are therefore very scattered."*

With Passage, the idea was to map out the available opportunities and to design a tool capable of making them visible, including to a wider audience who may not be familiar with what the university has to offer. The project also provides an opportunity to investigate potential issues faced by structures that currently host interns or wish to do so. *"Some have explained that they struggle to set aside enough time to offer students a meaningful two-week placement,"* continues Alice Centofanti. *"They have raised the idea of creating shared internships where pupils would have the opportunity to visit several different locations."*

Initially, the Passage project was aimed solely at research structures. The platform was therefore designed to facilitate contact



between pupils and laboratories, with a view to encouraging careers in science and making science accessible to everyone. Then, as the project took shape, *"we realised it would be more beneficial to extend this opportunity to all departments and entities, because there are not only researchers at the university – there are plenty of other professions,"* explains the project manager.

↓ A tool with a wide range of features

Developed in collaboration with a team from the Digital Institute and Information Systems (DISI) at CentraleSupélec, the platform enables pupils to register to view all the structures offered within Université Paris-Saclay and to submit their applications. Filters help narrow down searches to a specific period, topic or geographical area. In addition to the available opportunities, the website also lists university departments that match the search criteria and accept unsolicited applications.

To offer an internship, the process is carried out on this same platform by creating a professional profile. *"Once registered, users are free to customise their structure with its address, a description and a photo,"* explains Alice Centofanti. *"You can then advertise internships that have already been planned, accept unsolicited applications or simply see who is interested in your organisation."* The tool also helps manage applications, from uploading relevant documents to getting in touch with the candidate.

In addition to these features, a calendar section allows users to indicate their availability over a specific period, with a view to organising shared internships. With the same aim in mind, the search filters help professional users find

structures similar to their own. *"The platform does not create shared internships, but it is a way of finding other structures with which to create something together."*

↓ A trial run in its first year

Now that it has been launched, the Passage platform is embarking on its first year as a trial run. The La Diagonale team is currently working with several structures, including the Scientific Communication, Outreach and Heritage Service (Compas) at the Orsay Faculty of Sciences, which is accustomed to collaborating with schools and laboratories on various initiatives. This phase will involve assessing how pupils and professionals engage with the platform and the content that will be added to it.

As well as bringing together the university's internship opportunities, the project is already opening up new avenues. The Career Guidance and Professional Integration Unit (OIP) within the Department of Education and Success (DFR) at Université Paris-Saclay plans to use Passage as an educational tool to work with Year 11 pupils on how to apply for a placement, put together a CV and write a cover letter. **E.F.**

<https://passage.universite-paris-saclay.fr/>

Sustainable development

When the Climate Fresk makes an appearance at the start of the academic year

Last September, students from several different degree programmes had the opportunity to take part in a Climate Fresk (in French, *Fresque du climat*) workshop as part of their induction days. Using a set of cards, this educational and collaborative activity aims to raise awareness about current climate issues among as many people as possible.

Three hours of discussion centred around a card game. This was the experience around a hundred Master's students enjoyed on 10 September during the induction week of the Graduate School Sport, Movement and Human Factors (GS SMFH). A week later, the Master's in Teaching and Education (M2E, formerly Teaching, Education and Training Professions – MEEF) cohorts enjoyed the same experience during their induction day organised by the Teacher Education Service (SFE) of the Orsay Faculty of Sciences.

"The Climate Fresk is a very good tool for understanding the issues surrounding climate change and carbon dioxide emissions," says Alexandra Perrot, a lecturer at the Faculty of Sport Sciences of Université Paris-Saclay who led one of the workshops organised by the GS SMFH. "Even as facilitators, it makes us think about our own behaviour."

The Climate Fresk was first introduced to the new intake of MEEF Master's students in 2024 at the start of the academic year, on the initiative of the SFE. Thanks to financial support from the Graduate

completed the training programme. However, the start of the 2026–2027 academic year saw the introduction of a new initiative. Whilst the first-year cohorts took part in a Climate Fresk workshop, the second-year cohorts took part in a 2tonnes workshop.

Also based on a fun and collaborative teaching approach, the 2tonnes activity aims to identify solutions – whether individual or collective – to reduce our carbon footprint by 2050. *"The idea is that it shouldn't be repetitive for cohorts who have already taken part in the Climate Fresk," explains Alexandra Perrot. "The 2tonnes workshop takes a solutions-focused approach, so it's the logical next step. It also allows us to take a step back from the first workshop and see what difference it has made for the students."*

Part of the engineering programme at Polytech Paris-Saclay

Beyond the start of the academic year, the Climate Fresk has also found its place in other parts of the university. At Polytech Paris-Saclay, it now forms part of the future engineers' study programme, within a teaching module entitled "Engineers and Societal Challenges". *"This teaching module aims to address various topics, including sustainable development, the energy transition and resource efficiency," explains Claudine Gillot, an educational engineer responsible for Sustainable Development and Social Responsibility at Polytech Paris-Saclay.*

Organised in the third year of the programme, the Climate Fresk workshops are also led by teachers and staff who have been specifically trained for this purpose, such as Claudine Gillot. *"In January 2026, the workshops brought together around 180 students. The discussions were very fruitful."*

As with the events organised by the GS SMFH and the SFE, this initiative serves as a starting point for exploring other aspects of climate issues. At the last event, the day continued with a conference organised by The Shift Project, which aimed to discuss the key role of engineers in the ecological transition and to explore practical courses of action. **E.F.**



© GS SMFH

Each of these days gave the students, divided into small groups, the opportunity to start building relationships with one another, as well as with the teaching staff, at the start of the academic year. However, this was not the only aim of this collaborative activity, which involved a very special card game: that of the Climate Fresk (in French, *Fresque du climat*).

A tool to raise awareness about climate issues

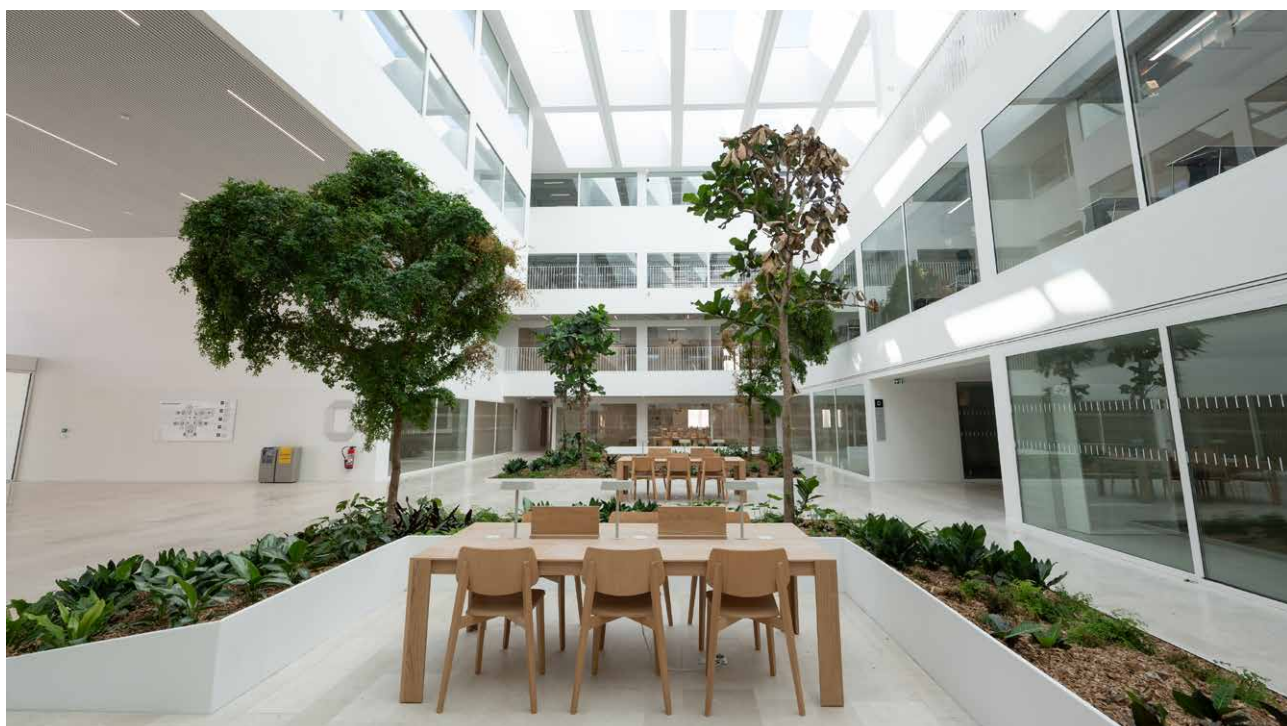
Created in 2015, this educational tool aims to raise awareness amongst as many people as possible about current climate issues, as well as their causes and consequences. To this end, it draws on around forty cards created from the reports of the Intergovernmental Panel on Climate Change (IPCC), and representing different aspects of climate change. During each workshop, participants are invited to use the cards to create a fresco, highlighting the links between the different aspects. The group must then make the fresco their own by illustrating it, before discussing each person's views and thoughts.

School Education (GS EFE), the initiative is now repeated every year. *"This induction day provides an opportunity for young teachers-to-be to discuss climate change, a major societal issue," explains Catherine Berrier, director of the SFE. "It is an experience they will be able to draw on in their own professional lives in the future."*

Understanding the issues, then identifying solutions

This is the second time such an activity has been organised at the Faculty of Sport Sciences. *"Last year, we received positive feedback from students, even though the experience stirs up a lot of emotions," says Alexandra Perrot. The initiative is part of a wider effort to incorporate twenty hours of teaching on the theme of sustainable development into every Master's programme. Of this total, ten hours are covered by the GS SMFH, which organises the Climate Fresk workshops and seminars.*

"Since last year, we have been trying to train as many teachers and staff as possible to run these workshops," confirms the lecturer. Around twenty of them have now



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Breguet building

After three years of renovation work, the building opens a new chapter in its history

After three years of renovation work, the historic Louis Charles Breguet building has reopened its doors at the heart of the CentraleSupélec campus on the Moulon plateau in Gif-sur-Yvette. The architectural complex, built in the 1970s, underwent a complete transformation. Covering an area of 36,000 square metres, the building is set to become a key venue for the Université Paris-Saclay community, as it now hosts the university headquarters, laboratories and teaching spaces, as well as a health centre housing the Student Health Service (SSE).

A brand-new building has just reopened its doors on the Moulon plateau in Gif-sur-Yvette. A few hundred metres away from the CentraleSupélec's Eiffel and Bouygues buildings, the scaffolding and hoardings have now been removed to make way for a new silhouette: that of the Louis Charles Breguet building. On this Monday in early September, a group of students walk towards the entrance of the complex, looking for one of the teaching rooms. Others sit down on the available sofas in the light-filled hall. It marks a return to life for the complex, which has not welcomed visitors for three years.

Named in honour of the French aircraft manufacturer – one of the founding figures of Air France – and a graduate of Supélec, the Louis Charles Breguet building is one filled with history. It was built in the 1970s while the engineering school was just settling on the Saclay plateau. At that time, the neighborhood was still rural and mainly made up of agricultural lands. Since then, the city has grown and the campus has expanded. In 2017, the Eiffel and Bouygues buildings opened their doors. It was time for their historical neighbor to undergo a makeover.

"The Breguet building, which was conceived by Michel Longuet and Michel Herbert, is an impressive concrete structure set against a

geography that is divided between landscapes and the urban character of the campus," explains François Guillon, project manager for the Breguet project, in an interview with CentraleSupélec. Rather than building a new architectural complex, the decision was made to preserve the

on a 36,000 square metres area, arranged around a central hall, which serves as the "heart" of the building and a space for interactions. The creation of this light-filled hall required a remarkable technical feat in the summer of 2025: the installation of a 2,500 m² glass roof.

"The whole building has been renovated with the original architecture in mind, with a strong emphasis on reusing many of the existing materials." — François Guillon

historical heritage and to go for a complete renovation of the complex. *"The whole building has been renovated with the original architecture in mind, with a strong emphasis on reusing many of the existing materials,"* says the manager.

↓ **36,000 m² to accommodate a variety of uses**
Those who remember the original building will therefore easily recognize its silhouette and its banded facades. Its interior, on the other hand, has undergone a complete transformation imagined by the architects from Atelier Kempe Thill and Patriarche. The complex now stretches

The new Breguet building has been designed as an open, cross-disciplinary space, intended to encourage encounters and exchanges between the various communities on campus. Its spaces, spread across four wings, have therefore been designed to accommodate a wide and varied range of uses. First and foremost is teaching: some 3,800 m² of space is dedicated to this purpose. The complex also houses 10,000 m² of space dedicated to research, that will host the Signals and Systems Laboratory (L2S - Univ. Paris-Saclay/CNRS/CentraleSupélec), the Supélec ONERA DSTA Research Alliance laboratory (Sondra - Univ. Paris-Saclay/French

Aerospace Lab ONERA/CentraleSupélec/ DSO National Laboratories/National University of Singapore) and the Paris Electrical and Electronic Engineering Laboratory (GeePs – Univ. Paris-Saclay/ CNRS/CentraleSupélec/Sorbonne Université). In addition to this, 6,500 m² of space have been created for businesses and start-ups.

For Université Paris-Saclay, the reopening of the Breguet building marks an important institutional milestone, as the complex now hosts the headquarters of the university, under a 25-year agreement. The headquarters includes numerous central departments, the presidency as well as the Université Paris-Saclay Foundation, spread across 2,000 m² of office space. *“It was part of the university’s plan to have its presidency based in this building and to bring together a wide range of activities, notably administrative services and student life services,”* points Antoine Latreille, Vice-President for Heritage at Université Paris-Saclay.

For students, the Breguet building should become a must-visit venue, and not just for teaching. Since October, the Université Paris-Saclay Student Health Service (SSE) has set up its home there, inside a dedicated space: the Health Centre, which occupies 960 m² on the first floor of the complex.

Making healthcare more accessible

More than just moving from one building to another, this is a genuine evolution for SSE. *“Among the services that we currently offer, some are meant to be extended. We will also add new services, since we will now have more space, more time and more staff,”* says Dr Brigitte Caron, medical director of the Université Paris-Saclay SSE. Until now, the service and its various health centres, spread across all the campuses, involved individual prevention, collective prevention, as well as peer support. These will now be supplemented by activities relating to therapeutic treatment across various areas, including mental health, sexual health, nutrition, physical activity and addictions.

“Since the 2023 reform, SSEs have a duty to ensure access to primary care for students,” explains the medical director. This mission is driven by a challenging context, characterised in particular by a growing shortage of medical professionals. *“Many students are currently going without healthcare because they do not have a primary care doctor, have to travel too far, or cannot afford it.”* It is to address these difficulties that the SSE has worked to expand its activities through the Université Paris-Saclay Health Centre.

It includes the previously existing departments, such as those for community-based prevention and individual prevention, to which a new service is now being added. The mental health unit, for example, which until now has focused on prevention and short-term support, will expand to include therapeutic services in 2027, thanks in particular to the recruitment of additional psychologists and psychiatrists. Furthermore, the SSE is launching a new unit, the medical centre, which aims to bring together primary care doctors and nurses. *“We are offering the same types of preventive consultations as before for the student community, and in particular for the most vulnerable groups,”* emphasises Dr Brigitte Caron. But here too, thanks to the recruitment of additional practitioners, *“we are adding a therapeutic component with general medical consultations.”*

Another new feature among many: the Essonne Departmental Centre for Sexual Health, previously based in Orsay, is set to move into the Health Centre, along with its team of professionals. *“The centre will be on site four days a week and will offer information, consultations, screening tests, vaccinations and so on,”* explains the medical director, adding that all the departments within the Health Centre will eventually be served by a single reception and help desk.

Accessible to students, staff and the general public

While SSE has already begun to find its feet in the Breguet building, the deployment of the Université Paris-Saclay Health Center and its activities will be implemented gradually. *“We’re going to see a gradual increase in activity that will continue through 2028,”* confirms Brigitte Caron. This is because the service will not be limited to students within the university perimeter.

Ultimately, the aim is for the general healthcare consultations offered at the Health Centre to be accessible to university staff, as well as to the general public – particularly residents of the surrounding area, where doctors are in short supply. *“Appointments will be booked via Doctolib, like for any traditional health centre, but students will remain our top priority,”* points out the medical director.

Education, research, innovation, university life, student health... After three years in the shadows and without residents, the Breguet building is about to write a new chapter in its history. **E.F (with B.D.)**

<https://www.centralesupelec.fr/actualites/avec-breguet-centralesupelec-acheve-la-metamorphose-de-son-campus>

<https://www.universite-paris-saclay.fr/en/universite-paris-saclay-health-centre>



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Calendar

Autumn 2026 / Winter 2027

 Place  Host

We were there

OCTOBER

6 October

**Tremplin – Forum
carrière du doctorat
(PhD Careers forum)**



Careers forum

 **Henri Moissan building, Orsay**
 **Innovation Alliance Université Paris-Saclay university innovation cluster**
As part of the Innovation Alliance Université Paris-Saclay university innovation cluster, which it leads, Université Paris-Saclay organised the first edition of its forum dedicated to the careers of PhD graduates and to synergies between the worlds of academic research and business. The event provided an opportunity to gain a better understanding of career opportunities following a PhD, through round-table discussions in the auditorium and conversations at the stands of the companies attending the event.
<https://www.universite-paris-saclay.fr/actualites/tremplin-le-forum-carriere-du-doctorat>

Not to be missed

NOVEMBER

12 → 27 November

L'Édition is 10 years old!

Exhibition

 **Henri Moissan building, Orsay**
 **Université Paris-Saclay**
To mark the 10th anniversary of *L'Édition*, this exhibition showcases the illustrations featured in the research section of the thirty issues of the Université Paris-Saclay's external and international journal. It offers a chance to take a look behind the scenes at *L'Édition* and discover the work that went into each of these illustrations.
<https://www.universite-paris-saclay.fr/evenements/les-10-ans-du-journal-ledition-dans-une-exposition>

16 → 20 November

Open Science Week



Event

 **Online and Lumen, Gif-sur-Yvette**
 **Université Paris-Saclay**
This international event, in which Université Paris-Saclay participates every year, aims to promote open science initiatives and access to the results of scientific research. Webinars, training

sessions, workshops, games and exhibition stands will feature throughout this year's event, offering the chance to discover the practices, tools and initiatives that are shaping open science today.
<https://osw2026.sciencesconf.org/>

26 November

Sciences en jeux

Workshop

 **Lumen, Gif-sur-Yvette**
 **Université Paris-Saclay, S[cube] association**
Now in its second edition, the "Sciences en jeux" (Sciences in games) event offers an opportunity to discover the richness and diversity of existing games designed to promote science outreach, through a full programme featuring a round table, stand visits, workshops and, of course, games. It will also provide an occasion to meet and exchange ideas with professionals from the worlds of gaming and science communication, as well as other scientists.
<https://sciencessociete.universite-paris-saclay.fr/en-ce-moment/nos-actualites/journee-sciences-en-jeux-2026/>

27 & 28 November

**Fake News -
An enemy of the
people**



Theatre

 **La Scène de recherche, Gif-sur-Yvette**
 **La Scène de recherche – Théâtre Paris-Saclay**
Performed by thirteen actors and actresses and reimagining Henrik Ibsen's *An Enemy of the People*, *Fake News* is a large-scale play that tackles a burning issue: who to trust? The play transports the audience to a city where the water may be contaminated and where scientific evidence clashes with political and economic interests. On stage, the debate rages, narratives clash and become distorted, prompting us to question the nature of trust and the quest for truth.
<https://scenederecherche.ens-paris-saclay.fr/agenda/fake-news-ennemi-people>

DECEMBER

15 December

**Cafés des labos
soutenables
(Sustainable Labs Cafés)**



Meeting

 **Online**
 **Vice-Presidency for Sustainable Development and Social Responsibility of Université Paris-Saclay**
Held once a month from 1 pm to 2 pm, the "Cafés des labos soutenable" (Sustainable

Lab Cafés) provide an opportunity for laboratory staff to share their experiences of implementing sustainability initiatives within their laboratories, and to discuss best practices, challenges and solutions encountered. The session on 15 December will feature Sophie Schbath, a research director at the Applied Mathematics and Informatics from Genome to the Environment laboratory (MaIAGE – Univ. Paris-Saclay/INRAE), who will speak on the topic of communication and raising awareness.
<https://www.universite-paris-saclay.fr/actualites/cafes-des-labos-soutenables-class>

JANUARY

20 January → 25 March

**Bienvenue en
Nitrocène
(Welcome to the Nitrocene)**

Exhibition

 **Lumen, Gif-sur-Yvette**
 **Lumen, Observatoire de l'Azote**
The exhibition aims to offer a sensory exploration of the many facets of nitrogen. Since the early 20th century, this element – which is fundamental to life on Earth – has been the subject of a major technological quest. From agricultural fertilisers to military explosives and miracle drugs, nitrogen touches every field and floods the environment. The exhibition's itinerary invites visitors to explore alternative ways of thinking about and shaping the world through this element.

FEBRUARY

3 → 4 February

**Paris-Saclay Summit
– Choose science**



Event

 **CentraleSupélec, Gif-sur-Yvette**
 **Paris-Saclay Urban Community, Le Point, Île-de-France Region, Essonne Department, Impulse Partners, Université Paris-Saclay**
Now an annual highlight in research and innovation, the Paris-Saclay Summit – Choose Science offers two new days designed to put science at the heart of society. The programme for this fourth edition includes more than eighty conferences and debates with scientists, including experts from Université Paris-Saclay, inventors, citizens, politicians, students and entrepreneurs, offering different perspectives on major topics such as health, artificial intelligence and industrial innovation.
<https://evenements.lepoint.fr/paris-saclay-summit/>

Reading highlights

Autumn 2026



“Pourparlers” collection

Launched in June 2026, the “Pourparlers” collection is published by MSH Paris-Saclay in collaboration with La Scène de recherche – Théâtre Paris-Saclay as part of POPS, the open-access publishing house of Université Paris-Saclay (in French, *Presses ouvertes de l'Université Paris-Saclay*). It lies at the intersection of two entities – academic and artistic – each with a strong vision. Each volume in the collection follows a simple structure, comprising an artistic text and one or more academic articles centred on a shared theme. The first book in the series showcases the play *Quand la ville se lève* (When the city rises) by Charlotte Lagrange, performed at La Scène de recherche in January 2026, alongside two academic essays by Clémentine Cottineau-Mugadza and Denise Pumain, to explore the themes of gentrification, urban sprawl and the way in which spatial planning shapes both the land and people's lives. Two further publications – one focusing on Simon Roth's play *Erdal est parti* (Erdal is gone) and the other on Julien Avril's adaptation of *Les Héritiers* (The heirs) – are due to be published in late 2026. Pending their publication online when the POPS portal opens, the books are available in print at the MSH Paris-Saclay and at La Scène de recherche.

<https://msh-paris-saclay.fr/ouvrages/pourparlers/>

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The Fête de la science

at Université Paris-Saclay

From 2 to 12 October 2026, Université Paris-Saclay took part, with the support of the Île-de-France Region, in the 35th edition of the *Fête de la science* (Science festival), organised by the French Ministry of Higher Education, Research and Space. Once again this year, the event attracted a full crowd of participants of all ages, keen to meet the scientific community and discover the world of research in a fun way. For this year's edition, which explored the theme "*Saveurs savantes*" (Scientific flavours), a wide range of free activities were on offer across the university's campuses, exploring the links between science and food, as well as many other topics. Let's take a look back at this unmissable event through some pictures.



© Photo above: Stéphane Maisonneuve

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