Issue 04 | Year 2017 | Country France

l'Édition of université paris-saclay may

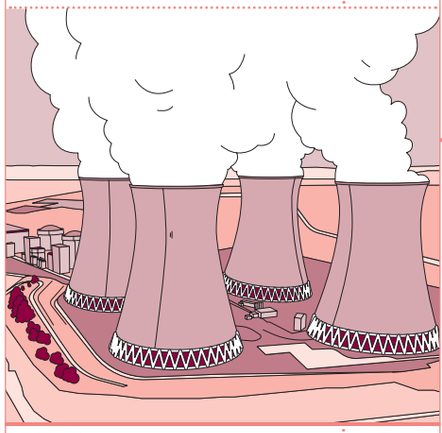
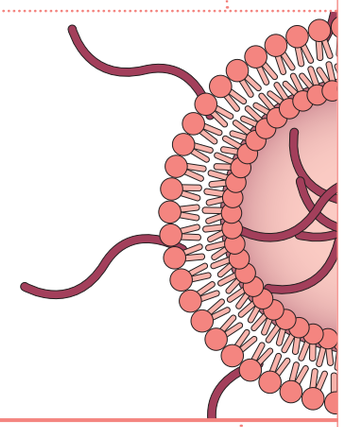
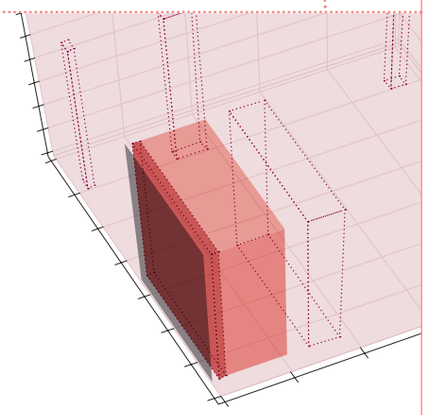


Illustration: UPSaclay viewed by Andrew Archer | Pages 07, 16





université PARIS-SACLAY

Address: Espace Technologique, Bât. Discovery – RD 128 – 2e étage, 91190 Saint-Aubin – France

Website: universite-paris-saclay.fr

A RESEARCHER'S VIEW

© École polytechnique

Yanlei Diao
Holder of a Chair of Excellence from Université Paris-Saclay, distinguished by an "ERC Consolidator Grant"

Coming to Université Paris-Saclay with an ERC grant presented a great opportunity for me to conduct research in a dynamic, vibrant environment. UPSaclay offers a wide area of expertise and student resources from different programs, hence the possibility to launch large initiatives and gain international visibility. UPSaclay's support program is tremendously helpful to get an ERC grant: I received advice and consulting on my ERC project, with detailed comments and suggestions, which were found very helpful. Big data research requires substantial funding, and ERC grants, very well known at the international level, significantly exceed the funding available in my prior grants in the US. Here the ERC funding allows me to build a research team and establish strong collaboration between academia and industry.

Such collaborative research, hosted in this environment, has the great potential to take research ideas to the next level, transform them into scientific results, and ultimately, impact the real world.

In 2016, Université Paris-Saclay was awarded ¼ of French ERC grants.

*ERC = European Research Council <erc.europa.eu>

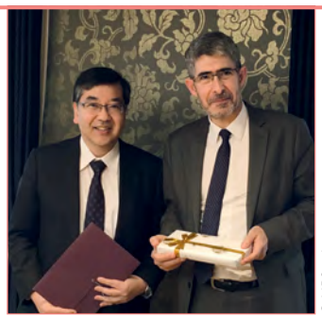
facebook.com/UParisSaclay

@UPSaclayNews

@universite_paris_saclay

ledition@universite-paris-saclay.fr

EDITOR'S LETTER



© UPSaclay

Signing of a framework agreement with Osaka University

The work accomplished by the academic communities of Université Paris-Saclay since the end of 2014 is considerable and has enabled the implementation of leading shared actions, in particular with the graduation of some 6,000 Master's and PhD. students in 2016. By working together, 19 institutions among the most renown in France are aspiring to radically modernize French higher education by combining the best of their teaching models. As such, Université Paris-Saclay ranks among the top European university clusters as a major player in European research. Already deeply invested in European programmes, the scientific communities of Université Paris-Saclay are involved in the Horizon 2020 programme, with 164 ERC grants since 2013, which is the French record.

"An intense international academic cooperation strategy."

Hundreds of agreements have been signed between higher education and research institutions from around the world and the founding members and partners of Université Paris-Saclay. These agreements include: dual Master's degree agreements, enabling students to carry out an academic mobility in a partner university and to get two Master's degrees; joint Ph.D. agreements that promote student mobility by developing scientific cooperation between French and international research teams; "International Associated Laboratories" (LIA in French), which are "laboratories without walls", pooling human and material resources to carry out a common project; "International Research Networks" (GDRI in French), which are networks led by a coordination committee.

Through all these initiatives, Université Paris-Saclay and its members are developing an intense international academic cooperation strategy based on the quality of the education they provide and that of research teams at the highest international level.

Gilles Bloch,
President of Université Paris-Saclay

Section

AWARDS & PRIZES

· **Evry iGEM team** won the bronze medal in the International Genetically Engineered Machine competition.

· **CEA** received the "EARTOI Innovation Awards 2016" in the "expected impact" category.

© Juliette Agnel - Académie des sciences

· The French Academy of Sciences awarded the Jacques Herbrand Prize to **Yasmine Amhis** (CNRS), the State Prize to **Christian Serre** (CNRS, UVSQ) and the Grand Guy Lazorthes Prize to **Marie Dutreix** (CNRS, Inserm, UPSud).

· **Isabelle Méjean** (École polytechnique) won the 2016 Malinvaud Prize of the French Association of Economic Science.

· **The "Bovine Genetics & Genomics" team** (Inra) received the 2016 Inra "Laurier d'impact de la recherche agronomique".

· **Marc Humbert** (UPSud) won the 2016 Eliane and Gérard Pauthier Prize from the Rare Disease Foundation.

· **Raphaël Mercier** (Inra) won the 2016 Inra "Laurier Défi scientifique".

· **Nathalie Droin** and **Jane Merlevède** (UPSud) are winners of the Lucia and Olga Fradiss Prize.

© Dupont

· **Joël Doré** (Inra) was awarded the DuPont Nutrition & Health Science Medal for Excellence in Microbial Research.

· **Luis Galarraga** (Télécom ParisTech) won the Best Thesis Award at the EGC conference.

· **Purificación López-García** (UPSud, CNRS, AgroParis-Tech) won the 2017 Silver CNRS Medal.

· **Christophe Keroslian** (UVSQ) is the laureate of the Ina THEQUE Incentive Prize.

· **Emmanuel Jacquemin** (UPSud) won the 2016 International Galien Prize.

· **Yves Meyer** (ENS Paris-Saclay) received the 2017 Abel Prize from the Norwegian Academy of Science and Letters.

Section

TEACHING, LEARNING

© Tanikawa

Design & Science rewarded

The new Design & Science Université Paris-Saclay prize allows young students to design innovative projects, from idea to prototype. It extends the ArtScience prize, created in 2009, and will eventually bring together universities, engineering and design schools, and companies around an annual theme.

The 23 students of the first edition are from Télécom ParisTech, École polytechnique, École normale supérieure Paris-Saclay, Centrale-Supélec and Strate - École de Design. Helped by their professors and some artists, designers and innovation lawyers, mixed-competency groups met once a week during a semester to work on the theme of "slowness".

This year, the project Sleev'up (how to improve the recovery of patients with joint problems) won a €3,000 grant, some coaching and a business incubation program. In fact, among the most advanced projects each year, several become startups, like EnergySquare, the 2013 winner, presented in *L'Édition #1*.

<prix-design-et-science-universite-paris-saclay.net/>

Keywords

Intellectuel property, Welcome office, Design, PhD careers

An e-international welcome office

Université Paris-Saclay has launched an e-international welcome office to provide a common portal to our 19 institutions for incoming students and researchers. The Université Paris-Saclay Welcome Network aims to bring talented international scientists and students to France. Whether studying a degree, working in one of the research centers or coming for an internship, the e-international welcome office has general information regarding administrative procedures (visas, residence permits, etc.) as well as more practical matters (health insurance, housing, public transport, etc.)

<universite-paris-saclay.fr/en/e-international-welcome-office>

© Tanikawa

The future is being built today

Public or private research, entrepreneurship, consulting firms, journalism, technology transfer... PhDs provide many more possibilities than one might imagine. The "careers of doctors" courses, part of the training program offered by Université Paris-Saclay's doctoral college, aims to inform PhD. students about their options, at the national and international levels. With both theory and practice, this program allows them to obtain more details about the sector of the activity they are interested in, to meet professionals and to identify the key skills that they will have to develop or strengthen. A label adds value to this course.

<universite-paris-saclay.fr/en/the-joint-doctoral-programme-proposed-by-the-doctoral-college>

An international and innovative master's degree

© Bensamoun

A master's degree about future technologies that also revolutionizes teaching and learning. This is how Alexandra Bensamoun, director of the Centre d'Études et de Recherche en Droit de l'Immatériel (CERDI, UPSud), might describe the "Fundamental intellectual property and digital technologies" master's degree, which she supervises.

It took almost 3 years to build this binational master's degree. It allows students to validate both a Université Paris-Saclay's master's degree and an LLM (Master of Laws) from Université Laval, Québec. "It was a big gamble", the professor explains, "but everyone worked hard to prepare an original program successfully." Students thus spend a term in each university and then choose in which country they want to do their research project, which will be co-supervised in France and Quebec. They are very enthusiastic about this: "It enables us to see law from a new angle", they say.

> **"This double master uses reverse pedagogy."**

This year, despite numerous applications, only a small cohort of 11 students are discovering this new master's degree. This way, they benefit from individual support. And a special education. Indeed, this double master uses reverse pedagogy, which is still rare in France. "Students who work upstream get more from exchanges with the professor", promises Alexandra Bensamoun. Before the class, each professor provides (by email!) resources to the students, addressing the themes, issues and stress points of the subject. Thus guided, students prepare an oral presentation: a personal reflection, a defense speech (sometimes in favor of a counter-intuitive position), a talk, a comment on recent news, etc. To do so, they of course have access to CERDI's resource centre and Université Laval's library.

A widespread method of teaching in Quebec, this reverse pedagogy is combined with lectures by professionals, in order to introduce students to the range of careers that are open to them. Some students are preparing their entry to French law schools, others are planning to apply to the Quebec Bar or become a legal expert. Others still are hoping to pursue a doctorate degree. All recognize the comprehensive education and the chance to meet "different cultures and ways of thinking".

"The nature of our master's degree, half-French half-Quebec, has allowed us to help each other and to provide each other with valuable reciprocal advice on immigration procedures, housing or thermal protection!", concludes the first generation of this extraordinary master's degree.

<universite-paris-saclay.fr/en/education/master/m2-propriete-intellectuelle-fondamentale-et-technologies-numeriques>

DON'T MISS OUT ON...

MAY

Description
The third edition of Université Paris-Saclay's Basketball Trophy.
Date
4
Place
Orsay, France
Host
Université Paris-Saclay members
Link
<universite-paris-saclay.fr/en/event/basketball-trophy-of-universite-paris-saclay>

Description
Fascination of Plants Day.
Date
18
Place
Versailles, France
Host
AgroParisTech, CNRS, Inra, UEVE, UPSud

Description
CURIOSITAS: the Art & Science Festival of Université Paris-Saclay.
Date
from 18th to 21th
Place
Gif-sur-Yvette, France
Host
Université Paris-Saclay members
Link
<universite-paris-saclay.fr/en/event/curiositas-art-science-festival-of-universite-paris-saclay>

JUNE

Description
European Research Council's 10-year anniversary.
Date
9
Place
Gif-sur-Yvette, France
Host
Université Paris-Saclay members

Description
A day to explore the work of Yves Meyer, the 2017 Abel Prize.
Date
20
Place
Cachan, France
Host
École normale supérieure Paris-Saclay
Link
<ens-cachan.fr/agenda/prix-abel-2017-colloque>

Description
Joint symposium ICSN – UPSaclay.
Date
from 28th to 30th
Place
Gif-sur-Yvette, France
Host
CNRS, UPSud, UVSQ
Link
<symposium-2017.sciences-conf.org/resource/page?id=4&lang=en>

Description
Université Paris-Saclay's PhD. graduation ceremony.
Date
30
Place
Versailles, France
Host
Université Paris-Saclay members
Link
<universite-paris-saclay.fr/en/ceremonie-diplome-2015>

JULY

Description
The 24th General Congress of the French Physics Society.
Date
from 3th to 7th
Place
Orsay, France
Host
Université Paris-Saclay members
Link
<sfp2017.fr>

Description
The Versailles International Summer School of Sustainable Mobility.
Date
from 3th to 8th
Place
Saint-Quentin-en-Yvelines, France
Host
Université Paris-Saclay members
Link
<vi3sm.cearc.fr/>

Description
The Genopole Summer School on "Bioinformatic and biostatistic tools in medical genomics".
Date
from 4th to 7th
Place
Seine Port, France
Host
CEA, CNRS, Inra, Inria, Inserm, UEVE, UPSud
Link
<universite-paris-saclay.fr/en/event/summer-school-genopole-2017-bioinformatic-and-biostatistic-tools-in-medical-genomics>

Description
The LERMIT Sumer School on medication chain.
Date
from 10th au 12th
Place
Montigny-le-Bretonneux, France
Host
CEA, CNRS, ENS Paris-Saclay, Inserm, UPSud
Link
<universite-paris-saclay.fr/en/event/summer-school-of-the-lermit-laboratory-medication-chain>

Description
Young Atom Opticians Conference for PhD. students.
Date
16
Place
Paris, France
Host
CNRS, ENS Paris-Saclay, IOGS
Link
<yao2017.lkb.ens.fr/>

SEPTEMBER

Description
22th International Workshop on Electro-magnetic Nondestructive Evaluation.
Date
from 6th to 8th
Place
Gif-sur-Yvette, France
Host
CNRS, CEA, Centrale-Supélec, UPSud
Link
<ende2017.fr/>

Illustrations on the right page and page 16:
Andrew Archer

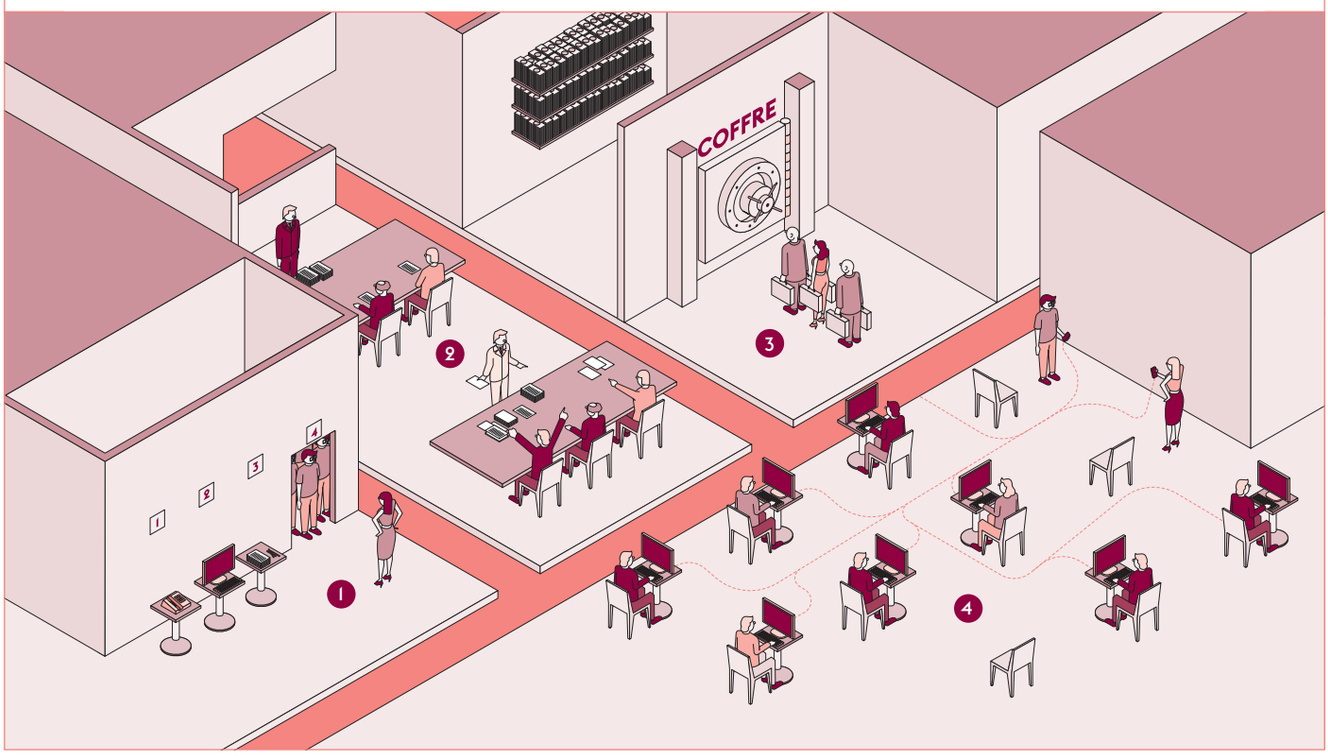
Keywords
Management, Occupational health, Equal pay, Telework

Institute
HEC

Expert
Shirish C. Srivastava

Title

How to boost your company



Name

Shirish C. Srivastava

HEC Management Research Group (CNRS-GREGHEC), Université Paris-Saclay

A tenured Associate Professor at HEC, Shirish C. Srivastava is interested in technology enabled offshore sourcing, e-government, emerging technologies and technology enabled innovation. Currently working on the editorial board of several journals, he has been awarded numerous national and international awards, including the Prix Académique de la Recherche en Management, France for three years (2013, 2015 and 2016).

Do you want your company to perform better? Université Paris-Saclay members can help you, while taking care of your employees.

1 Plan your work

As a manager, you probably get interrupted a lot by your employees. Phone calls, e-mails, people barging their way into your office… you have to frequently switch between tasks, which leads to a loss of productivity. A research team from CentraleSupélec and Université d'Evry Val d'Essonne (UEVE) studied multitasking scheduling problems. They developed models and algorithms that can help you optimize your task sequence and rest breaks to minimize the total completion time or earliness and lateness (since both are costing you money).

2 Don't hire independent directors

Independence has become the main criterion for assessing the adequacy of board membership. It is supposed to reduce agency costs, provide greater transparency, increase managerial accountability, let market signals be quickly incorporated into managerial decision-making and so on. That is, save your company. But it may do the exact opposite, according to a team from CNRS, École polytechnique and AgroParisTech. Studying 4132 separate directors in 335 separate French firms, researchers showed that board independence is detrimental to firm performance, even when taking into account individual intrinsic ability. Independent directors lack firm- or industry-specific knowledge and CEOs may be reluctant to share information with them. This creates an informational gap and a real inefficiency that outweighs the benefits of independence.

3 Cut yourself some (financial) slack

Slack, like financial assets, functions as a buffer in periods of crisis, says a team from HEC. Comparing data from before and after the 2008 world financial crisis, researchers established that, similarly to their larger counterparts, small firms must secure high levels of profitability in order to achieve sound growth during recessions. A degree of financial slack, at all times, is equally important in driving profitability in these specific periods. Investing in R&D does not however affect small firms' ability to be profitable and grow during recessions.

4 Listen to Millennials

Millennials, that is people born in or after 1980, are now on the job market and will soon make up the majority of your employee pool. But it is proven that this generation Y has very different work beliefs, motivations and concerns than previous generations, such as baby boomers. You might want to understand how these people think, to boost your company's attractability and their productivity. For example, since they are supposed to be technology-savvy digital natives, who use Facebook, Twitter or Pinterest extensively in their personal lives, you might think they would be enthusiastic about you implementing Corporate Social Networks (CSNS) to facilitate closer collaboration and knowledge sharing within your organization and enhance productivity. But the majority of them are not.

Based on a study of some graduate students, researchers evaluated Gen Yers' technological preferences and can now propose practical guidelines for successfully implementing CSNS with Gen Y employees.

— Keep it strictly professional: more than a work-life balance, Millennials want a clear demarcation between their professional and personal lives;

— Provide distributive justice: CSNS must be used as instruments for participative management (debate, voting, etc.) and informal extra-professional groups with no opinion-based discrimination should be encouraged;

— Ensure privacy and data security (in particular, do not keep track of employees' usage);

— Lead by example: facilitate and encourage collaborations, empowerment and democracy. These tools can shorten the hierarchical distance;

— Ensure quality (with multi-device apps) and provide training, with a mentoring system for new employees;

— Make sure you satisfy higher-order needs in equal measure: you must strive to meet Gen Yers' need for self-actualization (co-creation of value, use of creativity), sociability (collaboration, sharing and the ability to build their own professional network) and esteem (valorized autonomy and skills, enhanced employability and reputation).

Publications

· S. Cavaco et al. Board independence and operating performance: analysis on (French) company and individual data. Applied Economics Vol. 48, Iss. 52, 2016

· A. Tognazzo et al. Does slack always affect resilience? A study of quasi-medium-sized Italian firms. Entrepreneurship & Regional Development Vol. 28, Iss. 9-10, 2016

· A. Shirish et al. Adaptive use of social networking applications in contemporary organizations: Examining the motivations of Gen Y cohorts. International Journal of Information Management, Vol. 36, Iss. 6, Part A, December 2016, Pages 1111-1123

· Z. Zhu et al. Multitasking scheduling problems with a rate-modifying activity. International Journal Of Production Research Vol. 55, Iss. 1, 2017

» focus

Take care of your shoulders!

Shoulder disorders are frequent and cause long periods of absence from work, loss of productivity and high costs for employers. A team from Inserm and UVSQ participated in a collaborative study that identified 5 forms of work organization, based on workers' decision latitude and pace constraints, in a French working population. Workers with high organizational constraints had more shoulder disorders, even when the decision latitude was high. Knowing this could help ergonomists to implement preventive actions for workers exposed to these deleterious forms of work organization.

Publication · J. Bodin et al. Forms of work organization and associations with shoulder disorders: Results from a French working population. Applied Ergonomics, Volume 59, Part A, March 2017, Pages 1-10.

» focus

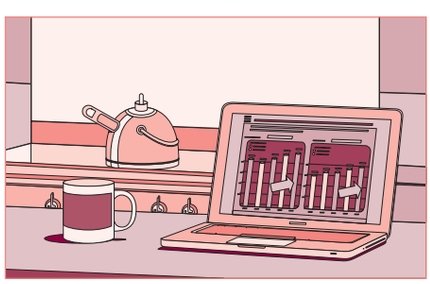
The motherhood penalty

The gender pay gap is a well-known issue, but there is a parenthood pay gap too. The difference in the hourly wage between mothers and non-mothers is approximately -3% per child and is more pronounced with the first child. According to Lionel Wilner (ENSAE-CREST), this so-called "motherhood penalty" is not due to the fact that women with children move to family-friendly firms and trade money off against job amenities. It might however reveal discrimination and could justify public intervention (campaigns, on-the-job childcare, paternity leave, etc.)

Publication · L. Wilner. Worker-Firm Matching and the Family Pay Gap: Evidence from Linked Employer-Employee Data. J Popul Econ (2016) 29: 991.

» focus

Telework isn't working



New technologies should foster the development of home-based telework. But, according to a Paris-Sud University team and collaborators, both employees and employers agree that telework has immediate disadvantages (reorganization of work, fewer interactions, need for specific equipment) and only uncertain advantages (decreased commuting, greater autonomy, better work-life balance, increased productivity). So telework is mainly an informal working arrangement and is likely to remain so, the team found.

Publication · A. Aguilera et al. Home-based telework in France: Characteristics, barriers and perspectives. Transportation Research Part A: Policy and Practice, Volume 92, October 2016, Pages 1-11.

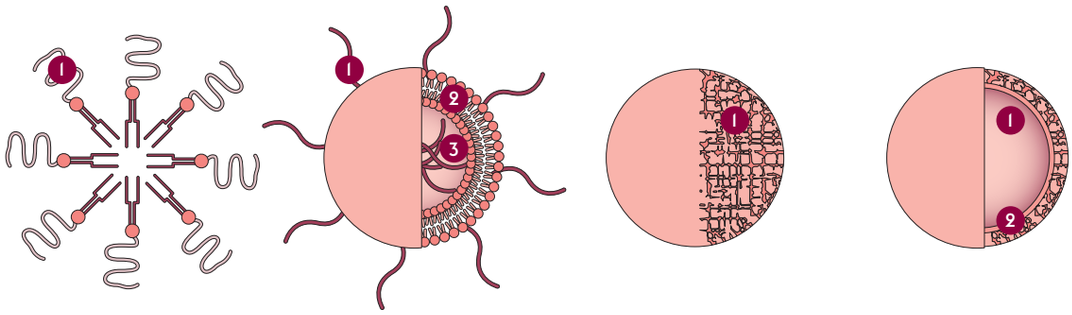
Keywords
Nanotechnologies, Cancer, Satellite, Computer, Toxicity

Institute
Paris-Sud University

Expert
Elias Fattal

Title

Nanomedicine: a good asset against cancer



POLYETHYLENE GLYCOL (PEG)

LIPOSOME
1– PEG
2– Lipid bilayer
3– Aqueous core

NANOSPHERE
1– Polymeric matrix

NANOCAPSULE
1– Aqueous/oily core
2– Polymeric shell

SCHEMATIC REPRESENTATIONS OF THE NANOPARTICLES MOST FREQUENTLY USED IN THE FIELD OF DRUG DELIVERY. NANOSPHERES AND NANOCAPSULES CAN ALSO BE PEGYLATED, WHICH ENHANCES THEIR CIRCULATION HALF-LIFE.

Name
Elias Fattal

Institut Galien Paris-Sud, Paris-Sud University, Université Paris-Saclay

Elias Fattal is a full Professor at Paris-Sud University and the director of the Institut Galien Paris-Sud, a research unit dealing with the design of nanomedicines, where he is also leading the "Particle and cell engineering for therapeutics" research group. He has been President of the international Society of Drug Delivery Sciences and Technology (APGI) from 2003 to 2010 and received the Dr. and Mrs. Henri Labbé Prize from the French Académie des Sciences in 2016.

Chemotherapy and radiation are effective to treat cancer. However, using nanoparticles, their potency can be much increased.

In over 90% of patients with metastatic cancer, treatment failure is due to drug resistance. Cytotoxic drugs affect the whole body and act on all cells in division, preventing cancer cells proliferation but inducing major side effects. Even if they have considerably improved the prognosis and the overall survival of cancer patients, the efficiency of chemotherapy and radiation remains limited. But nanomedicine could overcome many of the challenges associated with cancer drug development.

Nowadays, particles a few nanometers wide are developed to deliver treatment in a controlled manner and directly to cancer cells, thus alleviating side effects to surrounding healthy tissue. The nanosize range allows more rapid drug distribution within the body, leading to better efficacy. A drug loaded onto a nanoparticle is also protected from degradation and early elimination from the body. In solid tumors, blood vessels tend to be more permeable than in normal tissue. So a prolonged circulation in the blood compartment allows the drugs to strongly accumulate in tumors, compared to a drug administered in solution. This is called "passive targeting". Active targeting involves using cancer cells' overexpressed surface proteins as targets.

Many types of nanocarriers can be used for drug delivery (see figure). Due to their size, these nanomedicines interact directly with cell membrane and can be internalized by these cells, releasing their payload directly inside their target. As shown by researchers from Paris-Sud University in 2009, this intracellular trafficking of nanoparticles can help to overcome or circumvent the mechanisms associated with drug resistance.

Nanomedicine therefore simultaneously reduces adverse effects and drug resistance, and enhances the therapeutic effect. Multiple teams from UPSaclay members are working on harvesting these benefits. In particular, researchers from UPSud and Inserm considered multidrug-resistant hepatocellular carcinoma, a common liver cancer. The team developed a nanoparticle formulation called Livatag® which is currently in a multicenter phase III clinical trials and recently received the "fast track" status from the FDA. The site-specific delivery seems to reduce toxicity and improve pharmacological efficacy in vivo models: a survival rate of 88.9% was observed after 18 months of nanoparticles

treatment, against only 54.5% with a more classic treatment. The same team also investigated the molecular mechanisms involved in colorectal cancer.

Despite their great potential, clinical trials involving nanomedicine remain rare. An alternative to current strategies to improve the efficacy of conventional chemotherapy might involve combined techniques.

An ultrasound-triggered drug delivery system was developed by researchers from CNRS and UPSud. Ultrasounds release the therapeutic agent (delivered by nanoparticles) at the tumor site. This new protocol is cost-limited and non-invasive. The timing of ultrasound application depends on the chosen strategy, either intravascular or extravascular (intratumoral) drug release. Exposure time is also an important parameter as the goal is to expose the highest number of particles to ultrasound, without causing unwanted side effects: a dose of 2 W/cm² during 5 minutes is usually considered safe and effective.

> **"Teams from UPSaclay members are working on harvesting the benefits of nanomedicine."**

Designing multidrug nanoassemblies is another attractive way to improve cancer treatments. Combining cancer drugs with heat shock protein inhibitors was tested by another team from CNRS and UPSud. Thermotherapy consists in heating the tumor (via ultrasound, microwaves or radiofrequencies) to create local hyperthermia. Magnetic nanocarriers can be used for specific intracellular heating, after taking advantage of passive or active targeting. But hyperthermia induces an increased expression of heat shock proteins, such as hsp90, that renders the cell resistant to thermal damage. Coencapsulation of cancer drugs and hsp90 inhibitors can therefore increase the thermotherapy's efficacy.

Combined with thermotherapy, another inhibitor of a heat shock protein called hsp70 can be used to trigger an immune response against tumor cells in the host. Researchers from UPSaclay members are already exploring this interesting strategy.

Enhancing targeted delivery is a powerful means of fighting cancer but results will only be reliable if the delivered dose can be carefully evaluated, particularly in radiotherapy. Current devices being imprecise, researchers have just launched the MARATHON project, developed at CEA, CNRS and UPSud. They aim to create innovative dosimeters, based on new radiosensitive materials doped with nanoparticles.

Another Université Paris-Saclay project has just been funded: NanoTheRad uses ENSTA ParisTech's and CEA's irradiation facilities. Its goal is to improve personalized medicine. Researchers will combine targeted radiotherapies and nanoparticles able to make tumors more sensitive to irradiation. That way, a more targeted delivery of a proper dose should alleviate drug resistance and side effects.

Publications

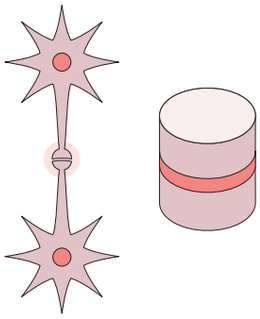
· L. Kotelevets et al. Nanotechnologies for the treatment of colon cancer: From old drugs to new hope. International Journal of Pharmaceutics, Volume 514, Issue 1, 30 November 2016, Pages 24-40

· T. Boissenot et al. Ultrasound-triggered drug delivery for cancer treatment using drug delivery systems: From theoretical considerations to practical applications. Journal of Controlled Release, Volume 241, 10 November 2016, Pages 144-163

· F. Sauvage et al. Heat shock proteins and cancer: How can nanomedicine be harnessed? Journal of Controlled Release, Volume 248, 28 February 2017, Pages 133-143

» focus

A brain-like computer



The brain is a low-energy, highly adaptable computing system. Bioinspired hardware aims to mimic important functionalities of synapses and neurons, including the colocation of memory and computing, and ability to learn and adapt (plasticity). A team from CNRS and UPSud is well on its way to building such ultra-high-density networks out of complex processing units interlinked by adjustable connections. To do so, researchers are developing controllable nanometer-scale devices exploiting spintronics, i.e. the quantum properties of magnetic and electronic materials.

Publication · J. Grollier et al. Spintronic Nanodevices for Bioinspired Computing. Proc IEEE Inst Electr Electron Eng. 2016 October; 104(10): 2024–2039

» focus

Next-generation satellites

Nano-satellites are small, simple, low-cost and... difficult to maneuver. To increase their lifespan or allow access to new missions, a powerful but miniature propulsion system remains to be added. Several projects and startups, based on various advanced technologies, have emerged at Université Paris-Saclay and are supported by Paris-Saclay's technology transfer company (SATT): ExoTrail (UVSQ, École polytechnique), ThrustMe (École polytechnique), etc.

<exotrail.com/en>
<thrustme.fr/>

» focus

How to predict toxicity

Upon contact with biological fluids, nanoparticles (NPs) are coated with cellular compounds, particularly proteins. A team from the Institute for Integrative Biology of the Cell (CEA, CNRS, Paris-Sud University) showed that flexible proteins with large unstructured region(s), in particular RNA-binding proteins, are more prone to bind on silica NPs. These proteins get trapped on the NPs and cannot perform their cellular function. Characterizing them could enable scientists to predict nanoparticles' potential toxicological effects.

Publication · G. Klein et al. RNA-binding proteins are a major target of silica nanoparticles in cell extracts. Nanotoxicology 2016 10 (10), 1555-1564

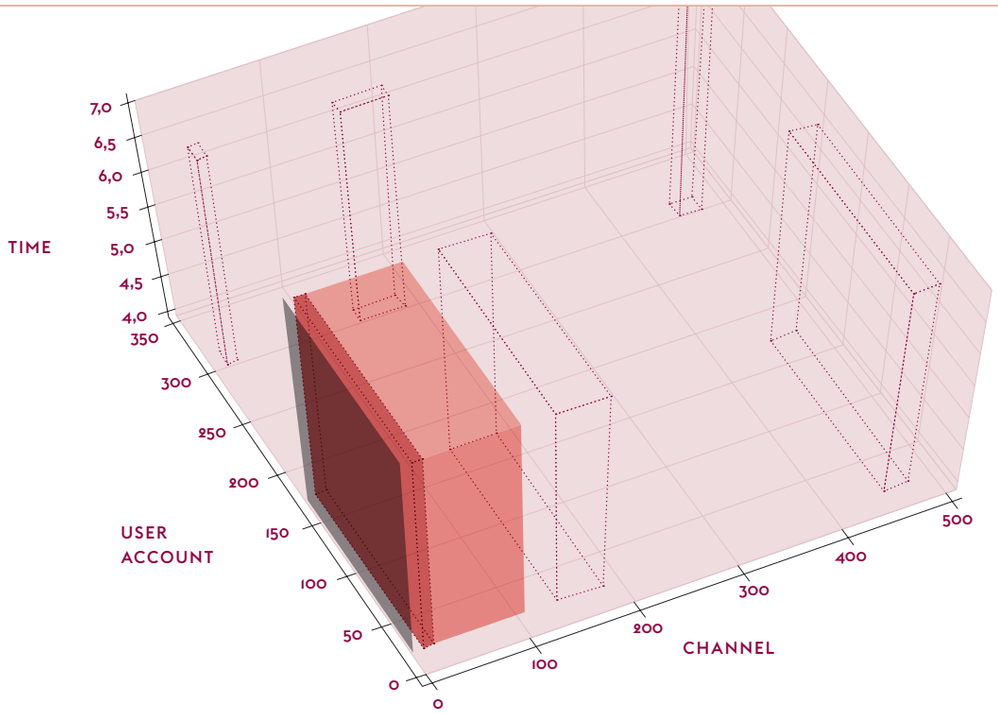
Keywords
Cybersecurity, Detection, Cars, Attacks, E-vote

Institute
Télécom ParisTech

Expert
Jean-Luc Danger

Title

Cybersecurity: Detect and Conquer



GRAPHICAL REPRESENTATION OF THE IMPACT OF ATTACK AI AND COUNTERMEASURES C1, C2 AND C3.

Attack (AI)
Router Reconfiguration (C1)
Block IP (C2)
Patches (C3)

Name
Jean-Luc Danger


© Danger

Télécom ParisTech, IMT, Université Paris-Saclay

A full Professor at Télécom ParisTech, Jean-Luc Danger is the head of the digital electronic system research group. His personal research interests are trusted computing, random number generation, cybersecurity and protected implementations in novel technologies. He authored more than 200 scientific publications and patents in architectures of embedded systems and security, and is co-founder of the Secure-IC company.

Jean-Luc Danger wishes to thank Hervé Debar (Télécom SudParis) for his careful review.

Researchers from Université Paris-Saclay members are developing algorithms and visual tools to help detect and counteract cybersecurity failures.

You can't fight what you can't see. The protection of computer systems is a growing concern, with an increasing number of smart devices gathering our private data. Computer security has to cover hardware as well as software vulnerabilities, including network access. It needs to offer efficient countermeasures.But the first step to cybersecurity is to detect and identify intrusions and cyberattacks.

Usual attacks have adverse effects on the availability of a service (Denial of Service), try to steal confidential information or to compromise the service's behavior by modifying the flow of events produced during an execution (that is, adding, removing or modifying events). They are difficult to detect in a highly distributed environment (like the cloud or e-commerce applications), where the order of the observed events is partially unknown.

Researchers from CentraleSupélec designed a new approach to tackle this issue. They used an automaton, modeling the correct behavior of a distributed application, and a list of temporal properties that the computation must comply with in any execution ("is always or never followed by", "always precede", etc.). The automaton is then able to generalize the model from a finite (thus incomplete) set of behaviors. It also avoids introducing incorrect behaviors in the model in the learning phase. Combining these two types of methods (automaton and list), the team managed to lower the rate of false positives (down to 2% in certain cases) and the mean time necessary to detect an intrusion (less than one second).

Another team from the same UPSaclay member chose a different approach. Researchers designed an intuitive visualization tool that helps to easily and automatically manage security alerts. Cybersecurity mechanisms raise large quantities of alerts, many of them being false-positive. VEGAS, for "Visualizing, Exploring and Grouping AlertS", is a customizable filter system. It offers the front-line security operator (in charge of dispatching the alerts to security analysts) a simple 2D representation of the original dataset of alerts they receive. Alerts that are close in the original dataset are still close in the computed representation, while alerts that are distant stay distant. The officer can then select alerts that

visually appear to belong to the same group, i.e. similar alerts, to generate a new rule to be inserted in the dispatching filter. That way, the amount of alerts the front-line security operator receives is reduced and security analysts only get the alerts they need to investigate further.

Those analysts could then use another visualization tool developed by a team from CNRS and Télécom SudParis to calculate the impact of cyber attacks and security countermeasures. Here, systems are given coordinates in multiple spatial, temporal and context dimensions. For instance, in order to access a web-server (resource) of a given organization, an external user (user account) connects remotely (spatial condition) to the system by providing their login and password (channel) at a given date (temporal condition).

In this geometrical model, an attack that compromises some resources using a given channel will be represented as a surface (square or rectangle). If it also compromises some users, it will be a parallelepiped. On the contrary, if we only know which resources are compromised, the attack will only affect one axis of the representation and be a line.

> **"Cybersecurity mechanisms raise large quantities of alerts."**

Researchers then geometrically determine the portion of the service that is under attack and the portion of the attack controlled by a given security measure. They can automatically calculate the residual risk (the percentage of the attack that is left untreated by any countermeasure) and the potential collateral damage (the percentage of the service that is not under attack but is affected by a given countermeasure). Such figures allow security administrators to compare the impact of multiple attacks and/or countermeasures in complex attack scenarios. Administrators are able to measure the size of cyber events, identify vulnerable elements and quantify the consequences of attacks and measures.

But what if the attack takes place directly in the hardware? Indeed, when outsourcing their circuits, companies can not be assured that no malicious circuit, such as a hardware trojan horse, has been introduced. Researchers from Télécom ParisTech proposed a metric to measure the impact of the size and location of a trojan: using this metric, there is a probability superior to 99% (with a false negative rate of 0.017%) of detecting a hardware trojan bigger than 1% of the original circuit.

More recently, the same team designed a sensor circuit to detect "electromagnetic injection", an intentional fault injection utilized to steal secret information hidden inside integrated circuits. This sensor circuit has a high fault detection coverage and a small hardware overhead. So maybe you *can* fight what you can't see, or at least you can try to. You just have to be prepared!

Publications

· G. Gonzalez-Granadillo et al. Journal of Computer and System Sciences, Volume 83, Issue 1, February 2017, Pages 3-21

· D. Crémilleux et al. 2016 IEEE/IFIP Network Operations and Management Symposium, Istanbul, 2016, pp. 1097-1100

· E. Totel et al. 12th European Dependable Computing Conference (EDCC), Gothenburg, 2016, pp. 53-64

· N. Miura et al. 53nd ACM/EDAC/IEEE Design Automation Conference (DAC), Austin, TX, 2016, pp. 1-6

» focus

The best defense is a good offense?

Side-channel attacks, which aim to recover secret data thanks to direct physical access to a cryptographic device, are a serious threat. To better understand these attacks and identify points of interest, a team from UVSQ proposed an approach to evaluate the parameters of an attack and validate the data processing workflow. Compared with results published so far, their method is less resource intensive: it needs less memory and processing time to retrieve a secret value. Fortunately, researchers also discuss countermeasures.

Publication · D. Jauvart et al. (2017) Improving Side-Channel Attacks Against Pairing-Based Cryptography. In: Cuppens F., Cuppens N., Lanet JL., Legay A. (eds) Risks and Security of Internet and Systems. CRiSIS 2016. Lecture Notes in Computer Science, vol 10158. Springer, Cham

» focus

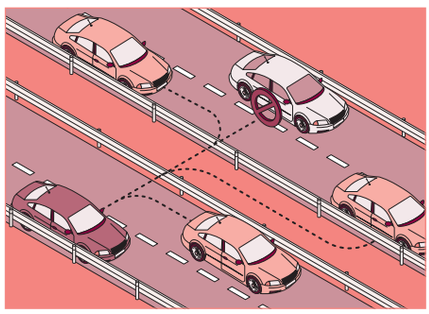
A safer e-vote system

A team from UVSQ, CEA and collaborators proposed a new transparent electronic-voting protocol. Using fully homomorphic encryption (computations can be carried out on encrypted information), it ensures that each vote count and is secret, and that only legitimate voters can vote, once. The decryption task is distributed and each trustee provides an independent publicly verifiable proof of correct decryption. Any attempt to cheat is detected. For the first time, this protocol is even protected against potential attacks from future quantum computers.

Publication · I. Chillotti et al. A Homomorphic LWE Based E-voting Scheme. Post-Quantum Cryptography, vol. 9606, pp. 245-65. Lecture Notes in Computer Science.

» focus

Let's protect our cars too



Cybersecurity is a growing concern, even for vehicles. Researchers from Télécom ParisTech took part in the development of a new protocol, SA-KMP, to secure communications over vehicular networks. The "secure and authenticated key management protocol" uses symmetric keys with low computational costs. It outperforms existing protocols (even the usual Public Key Infrastructure PKI), is more scalable and is secure against a wide range of malicious attacks, including denial of service.

Publication · H. Tan et al. A Secure and Authenticated Key Management Protocol (SA-KMP) for Vehicular Networks. IEEE Transactions on Vehicular Technology, vol. 65, no. 12, pp. 9570-9584, Dec. 2016.

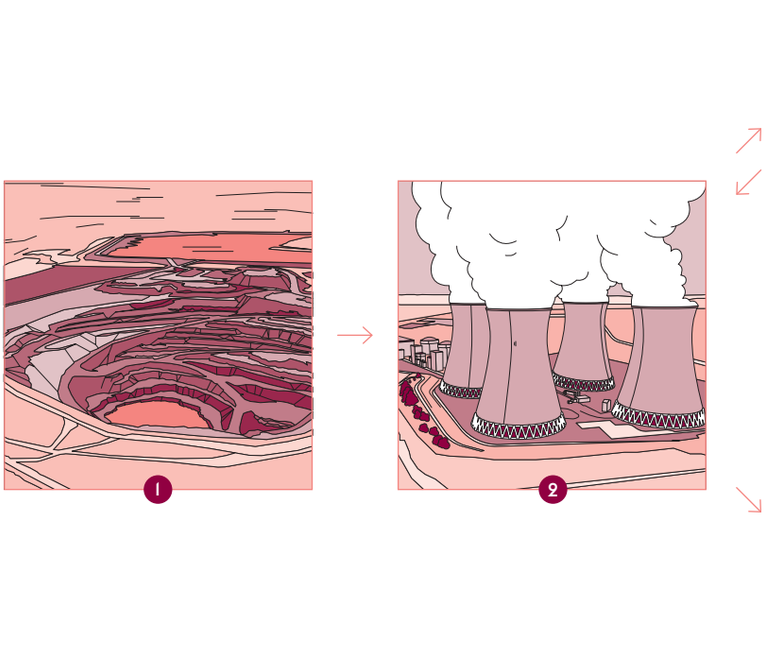
Keywords
Materials, Irradiation, Packaging, Composite, Medicine

Institute
Paris-Sud University

Expert
Gaël Sattonnay

Title

Nuclear materials under pressure



1– The materials are extracted from mines and often artificially enriched.

2– They undergo irradiation, pressure and temperature in a nuclear power plant.

3– Following treatment, some materials can be used again in power plants.

4– Other materials are stored.

Name
Gaël Sattonnay


© Florence Lequien

Centre des Sciences Nucléaires et de Sciences de la Matière (CSNSM), Paris-Sud University, Université Paris-Saclay

An Associate Professor at Paris-Sud University and Vice-President of Teaching in the Department of chemistry at Orsay Faculty of Sciences, Gaël Sattonnay investigates the radiation effects on materials with ion beams delivered by accelerators. These studies provide insight into the behavior of materials in nuclear reactors.

In a nuclear context, materials research is key to prevent irradiation or corrosion damage.

Until we manage to get a 100% clean energy supply (if we do), nuclear power plants will be in operation around the world with their reactor under extraordinary conditions: high pressure, high temperature, sometimes up to supercritical conditions. Being able to guarantee and keep a close watch on their stability is obviously a primary concern, since accidents would have huge financial, health and environmental impact.

Materials used in today's nuclear plants and those considered in the next generation of reactors must be resistant to irradiation. Some complex oxides, such as $A_2B_2O_7$ pyrochlore compounds (A being a rare earth and B a metal), are considered in the framework of new nuclear materials development.

A team from UPSud, CEA, CNRS and Synchrotron SOLEIL studied the behavior of yttrium titanate pyrochlores $Y_2Ti_2O_7$ submitted to radiation. The radiation tolerance of these compounds can be described by a combination of several processes including structural, bonding (the way atoms are linked to one another) and energetic parameters.

Using atomistic simulations and cutting-edge spectroscopic techniques, researchers gained information on the local structure (at atomic and nanometric scales) of $Y_2Ti_2O_7$, before and after irradiation. They showed that irradiation can modify the local atomic structure of the material. In particular, the environment of Ti atoms is altered, with local atomic reorganization: Ti-O bond distance decreases, while Ti-Ti distance increases, etc. This leads to strong structural distortions, influencing the long-range structure.

> **"Guaranteeing nuclear plants' stability is a primary concern."**

When submitted to intense irradiation, $Y_2Ti_2O_7$'s crystalline structure can thus be totally suppressed, which is called "amorphization". Researchers found that this process depends on the capability for cations to accommodate different oxygen environments at a short range. Therefore, if Ti is replaced by Zr, pyrochlore remains stable under intense irradiation, as Zr atoms accommodate more diverse environments.

This discovery can help build safer nuclear power plants. But these plants also produce nuclear waste that needs to be stored. High-level radioactive waste is usually immobilized within a borosilicate glass matrix for geological disposal. Under the surface, these matrixes have to deal with a somewhat harsh environment, including water infiltrations. It is therefore necessary to know the water leaching behavior of borosilicate glasses, in order to appreciate the matrix alteration process.

When the glass comes in contact with water, a complex alteration layer is formed at the glass/water interface. A team from CEA and CNRS used CEA's ALIENOR linear accelerator to irradiate a simple glass before and after leaching. That way, they could study the effect of initial glass irradiation on its alteration behavior (irradiation then leaching) and the irradiation stability of the alteration layer (leaching then irradiation).

The first experiment showed that irradiation does not induce any modification of the leaching kinetic nor of the final structure of the alteration layer: the alteration process seems to smooth over the defects created by irradiation.

In the second experiment, on the other hand, the initial glass (not altered, not irradiated) and the alteration layer had different behavior under irradiation, acting like two distinct materials. The alteration layer is not very sensitive to irradiation, the defect creation efficiency being much lower in leached glass. The pore water contained in the altered material (~20% in this experiment) could then have a protective role. Leaching glass could both be preventive and eliminate some irradiation-induced defects.

However, irradiation is not the only cause of defects in materials used in highly-sensitive nuclear context. Corrosion issues are also important to tackle, in particular in supercritical water nuclear power plants and plants cooled by liquid metals. Usual materials have a corrosion rate of 20-40 mm per year and are most vulnerable around their critical temperature (~400 °C).

Corrosion phenomena are determined by material-dependant factors (alloy composition, surface parameters, etc.) and environment factors (density, temperature, stress, pollutants, etc.). A CEA team pointed out that supercritical fluids temperature and impurities (pollutants) can change the corrosion mechanisms. Stress corrosion cracking is increased by pollutants, which emphasize the importance of pre-oxidation treatments and coatings to decrease the amount of impurities.

Density is also key in supercritical water: with high water densities, corrosion occurs like in liquids (via an electrochemical process), while in low water densities, corrosion occurs like in gas (oxidation), with different consequences. But in supercritical water as in supercritical carbon dioxide, researchers discovered that nickel base alloy with high chromium content has a better behavior than the widely used stainless steel.

Thus, original research results from Université Paris-Saclay's members will help face primordial issues with irradiation and corrosion in the indispensable nuclear power plants that still provide a large part of our energy.

Publication

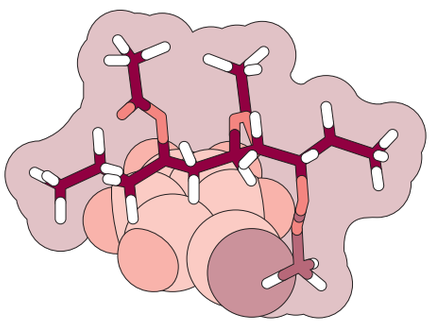
· S. Mougnaud et al. Journal of Nuclear Materials, Volume 482, 15 December 2016, Pages 53-62

· G. Sattonnay et al. Phys. Rev. B 94 224109 (2016)

· S. Sarrade et al. The Journal of Supercritical Fluids, Volume 120, Part 2, February 2017, Pages 335-344

» focus

Food packaging rules are too lax

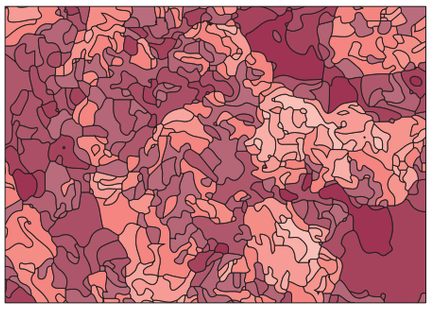


Contamination of food is a concern and regulations are supposed to be strict about this. But a team from Inra and AgroParisTech has revealed that the real chemical affinity for water of many aromatic solutes has numerous parameters and is often underestimated in packaging materials. Researchers have developed a novel way of rapidly computing such solubilities. In food contact materials, the migration rate of substances such as endocrine disrupting chemicals should therefore be reevaluated with the new method, and the rules modified accordingly.

Publication · P-M. Nguyen et al. Ind. Eng. Chem. Res., 2017, 56 (3), pp 774–787

» focus

Magnetic properties on demand



Some composites are potential electromagnetic wave absorbers. Researchers from CNRS, ENS Paris-Saclay and collaborators showed that iron substitution in a Polyaniline/barium hexaferrite composite (Fe^{3+} ions are substituted by Al^{3+}, Bi^{3+}, Cr^{3+} or Mn^{3+}) plays an important role in the composite's magnetic properties. The composite joins the characteristics of the individual constituents. Depending on the application (wireless telecommunication system, radar, local network, medical equipment, etc.), different magnetic properties could then be emphasized.

Publication · T. Ben Ghzaiel et al. Journal of Alloys and Compounds, Volume 692, 25 January 2017, Pages 774-786

» focus

Checking medical devices

Acrylic copolymers are present in many medical devices (dental implants, intraocular lenses) or drug adjuvants. But as they age, they can release degradation products under oxidative and heating conditions, which can be toxic. A UPSud team developed a new method to detect these acrylics degradation products, in particular in biological fluids. It has a low detection and quantification limit, which means it can detect products before they are toxic. This method could then be used for the quality control of acrylic medical devices.

Publication · L. Tortolano et al. Journal of Chromatography B, Volume 1038, 1 December 2016, Pages 26-33

One hell of a LASER

© Eric Erbe and Christopher Pooley

"Mice don't smell of sulphur, they smell of violets!" With these words, researcher Sylvie Lautru (Institute for Integrative Biology of the Cell, UPSaclay) and artist Marion Laval-Jeantet explain their project called "Holy-Coli", that was presented at the first LASER Paris meeting, on February, 23rd.

> **"Art and science interact here for your sensory pleasure."**

The *Leonardo Art Science Evening Rendezvous* are growing worldwide. With the help of Association Leonardo/ISAST and the agnès b. endowment fund, the Paris meeting allows two artists and two scientists to discuss their work with the public, at least one duo being supported by the Diagonale Paris-Saclay.

"Holy-Coli" is one of these duos. It intends to make the mouse holy again, since these hated animals have a high value for scientific research. Art and science interact here for your viewing, hearing, and this time smelling!, pleasure. With advanced biotechnologies developed at Université Paris-Saclay, all *Escherichia coli* (or as the project's name suggests: "all e-coli") bacteria in the mice intestine will no longer produce their natural unpleasant smell but a sweet scent of violets.

However, numerous ethical questions remain to be answered before this project can be completed. Which does not prevent the public from already being fascinated, quite the opposite: a sweet smell of success?

<i2bc.paris-saclay.fr/spip.php?article1089&lang=en>

CURIOSITas

© Éric Bauer for UPSaclay

Seeing a tree trunk breathe with a thermal camera or measuring its development as the seasons go by, getting lost in the illusion of animated automatons in a shop window that control us as much as we guide them, discovering the "cold" moods of artists or physicists, moving throughout the ages with archaeological sites... Those are a few of the recreational and sensory experiences offered by the Arts & Sciences Festival of Université Paris-Saclay, CURIOSITAS. This year, some installations, exhibitions, workshops, dance performances or concerts evoke the theme of Order and Disorder. An opportunity for artists and scientists to discover new research subjects and tweak their usual instruments and experiences. An opportunity also for the public to let themselves be drawn into these poetic and surprising worlds.

<ladiagonale-paris-saclay.fr/curiositas/>

Gentle arguments

© AgroParisTech

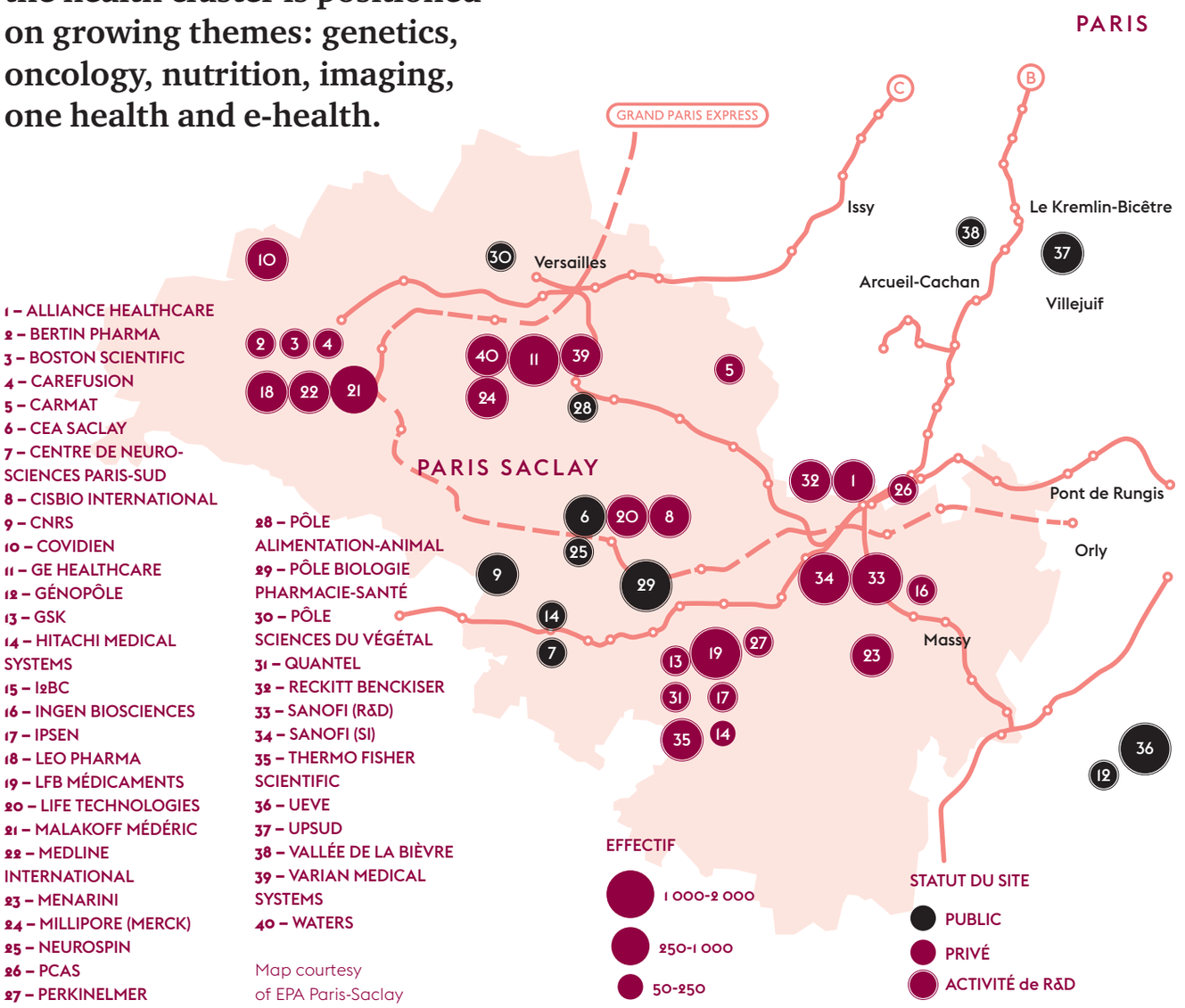
AgroParisTech organizes regular "Disputes" (which can be translated as "Arguments"), a series of round tables around a theme that also resulted in a documentary film. This year, participants are debating "Biodiversity and Plants", in connection with the "Sharing Biodiversity" documentary directed by Jean-Hugues Berrou, cocreator of the Disputes. After climate change and biodiversity protection, the Dispute on February, 21st, dealt with invasive exotic species. As always, scientists and members of the civil society debated enthusiastically with an audience of experts and curious people. Referring to the Latin root word, AgroParisTech's Disputes allow everyone to be heard without raising their voice.

<agroparistech.fr/Disputes-d-AgroParis-Tech-2016-2017-Biodiversite-Vegetal.html>

Titre

I·Health

Within Université Paris-Saclay, the health cluster is positioned on growing themes: genetics, oncology, nutrition, imaging, one health and e-health.

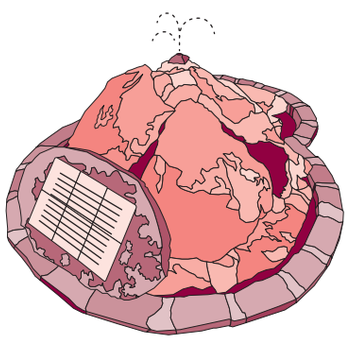


1 – ALLIANCE HEALTHCARE
2 – BERTIN PHARMA
3 – BOSTON SCIENTIFIC
4 – CAREFUSION
5 – CARMAT
6 – CEA SACLAY
7 – CENTRE DE NEURO-SCIENCES PARIS-SUD
8 – CISBIO INTERNATIONAL
9 – CNRS
10 – COVIDIEN
11 – GE HEALTHCARE
12 – GÉNOPÔLE
13 – GSK
14 – HITACHI MEDICAL SYSTEMS
15 – I2BC
16 – INGEN BIOSCIENCES
17 – IPSEN
18 – LEO PHARMA
19 – LFB MÉDICAMENTS
20 – LIFE TECHNOLOGIES
21 – MALAKOFF MÉDÉRIC
22 – MEDLINE INTERNATIONAL
23 – MENARINI
24 – MILLIPORE (MERCK)
25 – NEUROSPIN
26 – PCAS
27 – PERKINELMER
28 – PÔLE ALIMENTATION-ANIMAL
29 – PÔLE BIOLOGIE PHARMACIE-SANTÉ
30 – PÔLE SCIENCES DU VÉGÉTAL
31 – QUANTEL
32 – RECKITT BENCKISER
33 – SANOFI (R&D)
34 – SANOFI (SI)
35 – THERMO FISHER SCIENTIFIC
36 – UEVE
37 – UPSUD
38 – VALLÉE DE LA BIÈVRE
39 – VARIAN MEDICAL SYSTEMS
40 – WATERS

Map courtesy of EPA Paris-Saclay

14,000
employees

130
institutions



1620
Discovery of Fontaine Saint-Clair, near Bures-sur-Yvette, a miraculous source

62
Masters
including 8 fully English-spoken Masters with 11 "Mentions":

- Bioinformatics/ Computational Biology
- Integrative Biology and Physiology
- Life Sciences and Health
- Chemistry
- Health Law
- Engineering of processes and bioprocessing
- Nutrition and Food Science
- Physics
- Public Health
- Pharmaceutical Science
- Human Movement & Sport Sciences: Adapted Physical Activity and Health

A cure for degenerative disorders?

Neuromuscular and neurodegenerative disorders, such as Duchenne muscular dystrophy and Huntington's disease, can be treated with synthetic antisense oligonucleotides. These compounds display specific properties that can be used to rescue or inactivate the gene product causing the disease. A team from UVSQ and Inserm has focused on a new generation of DNA analogues, called tricyclo-DNA, that allowed spectacular dystrophin rescue and improved cardiac and respiratory functions in dystrophic mice. These compounds are well tolerated and could soon have therapeutic applications in humans.

Publication · A. Goyenvalle et al. Therapeutic Potential of Tricyclo-DNA antisense oligonucleotides. Journal of Neuromuscular Diseases 3 (2016) 157–167

One world, One Health

Is it more cost-effective to vaccinate all the humans bitten by rabid dogs or to vaccinate the animals directly? How to promote the appropriate use of antibiotics while guaranteeing the farmers' income and protecting animal welfare? These questions, and many others, are at the heart of a new way of thinking about health: One Health, that is, taking into account the inseparable links between human health, animal health and the environment. The global approach to this complex system aims to better understand its biological, economic, cultural, etc. interactions. Supported by national, European and global organizations, this "One Health" concept is a key driver for innovation, in a context of climate change and increased global food demand. With a dedicated conference at the Salon of Agriculture (Paris, France), Inra has highlighted this approach which is rapidly gaining momentum at Université Paris-Saclay.

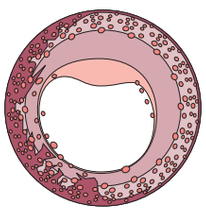
<inra.fr/en/Scientists-Students/Animal-biology/All-magazines/INRA-symposium-SIA-2017-One-Health>

NeuroPSI

The Paris-Saclay Institute of Neuroscience is an interdisciplinary scientific institute dedicated to multiscale studies of the nervous system.

UPSaclay members:

- CNRS
- Paris-Sud University



<neuro-psi.cnrs.fr/?lang=en>

I2BC

The Institute for Integrative Biology of the Cell is studying the mechanisms of life at the cell scale, from atoms to cellular structures.

UPSaclay members:

- CEA
- CNRS
- Paris-Sud University
- Inra

<i2bc.paris-saclay.fr/?lang=en>

Cancer: a predictive intestinal microbiota

The intestinal microbiota, also called "gut flora", plays a major role in the immune system's development. Teams from Université Paris-Saclay (Paris-Sud University, Inra, CNRS, Inserm, Agro ParisTech), the AP-HP and Gustave Roussy hospitals showed that the composition of the intestinal microbiota predicted the effectiveness and tolerance of immunotherapy. Handling this composition could then improve the effectiveness of this technique which stimulates the patient's immune system against cancer (metastatic melanoma in this case).

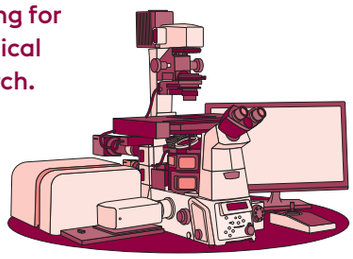
Publication · N. Chaput et al. Baseline gut microbiota predicts clinical response and colitis in metastatic melanoma patients treated with ipilimumab. Ann Oncol 2017 Mar 27

Abbelight

Innovative solutions in the field of super-resolution microscopy and membrane imaging for biological research.

UPSaclay members:

- CentraleSupélec
- CNRS
- Paris-Sud University



<abbelight.com/>

DeepOr

A platform to monitor and optimize the use of Hospital Operating Rooms (ORs), thanks to Big Data and Computer Vision.

UPSaclay members:

- École polytechnique
- Télécom SudParis

<deepor.ai/>

Matatie

Snacks without allergens so that an allergic or intolerant child can also enjoy treats.

UPSaclay members:

- AgroParisTech

<facebook.com/Matatie2016/>

Keywords
Digital technology,
Foundation stone

Title

Soon on the Saclay plateau

At the heart of digital technology

© Grafton Architects

In 2019, Télécom ParisTech, IMT's general management and a part of Télécom SudParis will settle on Université Paris-Saclay's campus.

For the second move of its history, the century-old school will move into a property of over 42,000 m², including a restaurant open to all institutions.

Suitable for the new more cooperative, more transversal, more user-friendly working practices, the building will act as a reminder of the role played by digital technology, present nowadays in all businesses, all sectors and all parts of society. Télécom ParisTech wants to develop multidisciplinary projects, with all its neighbouring partners, to provide digital answers to the key economic and social challenges of our time.

The school also intends to intensify its relationship with its partners to become Université Paris-Saclay's "college of innovation through digital technology", taking part in multiple projects and organizations: B5GI strategic research initiative, I2DRIVE Convergence Institute, I3F IDEX chair, DIGITEC project, etc.

<telecom-paristech.fr/eng>
<universite-paris-saclay.fr/en/research/project/lidex-isn>

© Grafton Architects

Meet our M.I.S.S.

© UPSaclay

A project led by the Île-de-France regional council and Université Paris-Saclay, the Maison d'Initiation et de Sensibilisation aux Sciences (Science Awareness and Initiation House, M.I.S.S.S.) is a laboratory for 8-15 year olds, with their teachers. The foundation stone ceremony was on January, 12th. Architects Daniel Cléris et Jean-Michel Daubourg's plans have been specifically designed to inspire amazement, enthusiasm, commitment in all students, ie to create a huge "wow" effect. Meanwhile, classes are already attending workshops off-site. Taking on scientific questions, the young students examine their everyday life, discover the scientific method and science careers, experiment with genuine equipment at the heart of our campus. PhD. students guide and stimulate them in discovering 11 themes, from foams to the nanoworld's colors to archeology and molecular gastronomy. Here they can meet science in all her finery.

<hebergement.u-psud.fr/miss/>

© Barthélemy

CHEMISTRYWORLD

Diamonds to track down neurodegenerative diseases' origins

"Fluorescent nanodiamonds that can be internalised by neurons have been used by researchers in France to study vesicle flow inside them. By tracking the nanodiamonds, researchers showed that certain drugs could impede the vesicles' progress."

BDAILY

STUDENT START-UP CREATES SELF-MAINTAINING INDOOR GARDEN

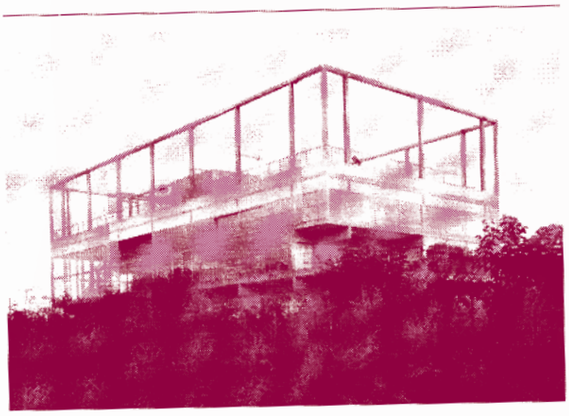
"Basile, a revolutionary self-maintaining indoor garden, has been created by a student start-up funded by Université Paris-Saclay."

FINSMES

France, The New Wave of Venture Capital Funds

"France is emerging as one of the most active European countries in terms of venture capital investment activity. A trend confirmed by the latest official data available. During the first half of 2016, €5.5 billion were invested in more than 1,000 companies

GIZ



Studio Muoto projeta edifício que promove o convívio e a diversidade na Université Paris-Saclay

"Fundada nos últimos dias de 2009, a Université Paris-Saclay é um instituto de pesquisa federal com grandes ambições. Construída em Paris-Saclay, polo de pesquisas e negócios em desenvolvimento no sul de Paris, ela pretende ser para o local o que Standford é para o Vale

BDAILY

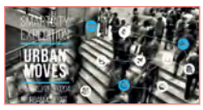
NEW MOLECULE BETTER THAN MORPHINE TO BE TESTED

'A new molecule, opiorphin, hat treats pain as effectively s morphine without the rious side effects has been scovered by Catherine B

université
PARIS-SACLAY

IT HAPPENED

On March, 9th, 5 prototypes invented by Université Paris-Saclay students were selected as part of the "Urban Moves" program. They will be tested on the territory.



<universite-paris-saclay.fr/en/event/discover-the-connected-ojects-of-urban-moves-program >

DigitalDays@Nano-INNOV highlighted, on March, 14th, the latest scientific and technological advances of IRT SystemX and CEA.

<universite-paris-saclay.fr/en/event/artificial-intelligence-cybersecurity-blockchain-last-research-works-from-irt-systemx>

In partnership with the University Paris-Saclay, CNRS and the French Physical Society organized the Night of Gravitational Waves, on March 20, 2017 throughout France and Italy.

<universite-paris-saclay.fr/en/event/gravitational-waves-night>

The MT180 competition enables PhD students to present their research topic, in three minutes, to a curious and demanding public.

<universite-paris-saclay.fr/fr/evenement/mt180-2016-cest-parti>

WORTH READING

The Conversation

Do you look like your name?

Most parents can remember the subtle mix of excitement and anxiety accompanying the choice of their baby's name – it will follow the child his or her entire life. But the effect could be even more significant. In research recently published in the *Journal of Personality and Social Psychology*, our research team shows that the stereotype that a given society has of a first name can influence the way people look…

<theconversation.com/do-you-look-like-your-name-74781>

Artificial sweeteners: not so "lite" for our health

People drink so-called "diet" sodas containing such sweeteners or add them to their tea or coffee.Sweeteners such as aspartame, the most common, or the more recent sucralose, have been used to replace sugar for over thirty years to avoid putting on weight. Yet their use is controversial, as they are suspected of contributing to weight gain and type 2 diabetes or of being carcinogenic.

<universite-paris-saclay.fr/en/news/artificial-sweeteners-not-so-lite-for-our-health>

IN ISSUE #5

Laser,
Justice,
High Performance Computing,
Artificial Intelligence

Contributors to this issue

· **Yanlei Diao**, Researcher, École polytechnique and Inria · **Andrew Arnold**, Senior Internal Communications Consultant of DuPont Nutrition and Health · **Gaëlle Degrez**, Editorial Manager, Paris-Sud University · **Alexandra Bensamoun**, Researcher and PIFTN Master's degree Manager · **Marin Brenac**, **Gauthier Soufflard** and **Manon Laumelais**, PIFTN graduate students · **Pauline Dorkel**, Diagonale Paris-Saclay Project Officer · **Hamida Muller**, Administrative Manager, UPSaclay doctoral college · **Shirish C. Srivastava**, Researcher, HEC · **Alexis Descatha**, Researcher, UVSQ AP-HP and Inserm · **Lionel Wilner**, Researcher, ENSAE ParisTech · **Alain Rallet**, Professor Emeritus, Paris-Sud University · **Elias Fattal**, Head of Institut Galien Paris-Sud · **Julie Grollier**, Researcher, CNRS/Thales Laboratory · **Jean-Christophe Aude**, Researcher, CEA · **Jean-Luc Danger**, Researcher, Télécom ParisTech · **Hervé Debar**, Researcher, Télécom SudParis · **Houda Labiod**, Researcher, Télécom ParisTech · **Damien Jauvart**, PhD student, CEA and UVSQ · **Ilaria Chillotti**, PhD student, Laboratoire de Mathématiques de Versailles (UVSQ, CNRS, Université Paris-Saclay) · **Gaël Sattonnay**, Researcher, Paris-Sud University · **Olivier Vitrac**, Researcher, Inra · **Frédéric Mazaleyrat**, Researcher, ENS Paris-Saclay, and Deputy Director of EOBE graduate school · **Lionel Tortolano**, Researcher, Paris-Sud University · **Jean-Hugues Berrou**, Science & Society Project Manager, AgroParisTech · **Luis Garcia**, Researcher, UVSQ · **Nathalie Chaput**, Head of Laboratoire d'Immuno-Oncologie, Gustave Roussy · **Didier Samuel**, Dean of the Faculty of Medicine, Paris-Sud University · **Marc Humbert**, Head of Inserm U999, Paris-Sud University · **Michel Desnoues**, Multimedia Computer Graphics Designer, Télécom ParisTech · **Dominique Célier**, Communication Manager, Télécom ParisTech · **Valérie Fortuna**, Coordinator, MISS

Members of Université Paris-Saclay

NEURATRIS

Translational research infrastructure for neuroscience biotherapy

Influence

France

UPSaclay members:
CEA, Inra, Inserm

<neuratris.com>

METABOHUB

French distributed infrastructure for metabolomics dedicated to innovation, training and technology transfer

Influence

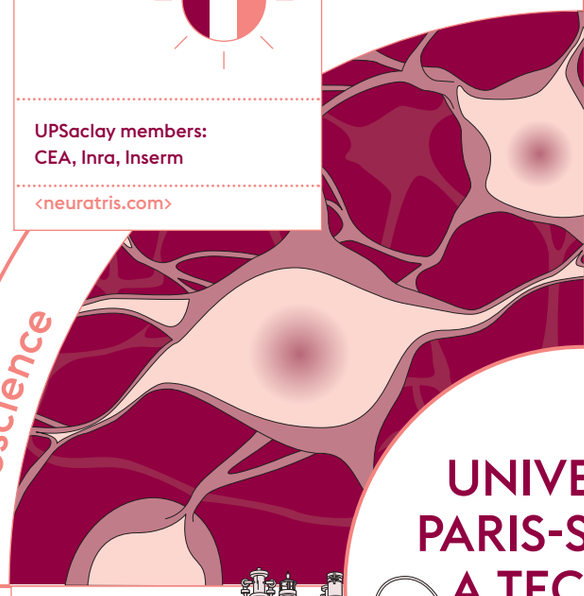
France

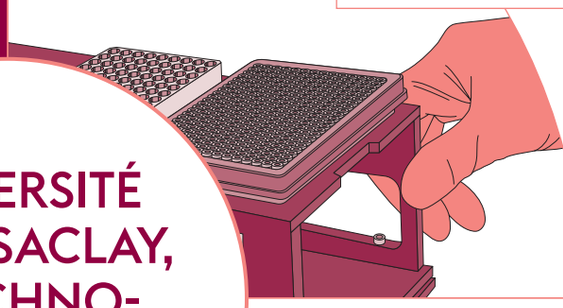
UPSaclay members:
CEA, CNRS, UPSud

<metabohub.fr>

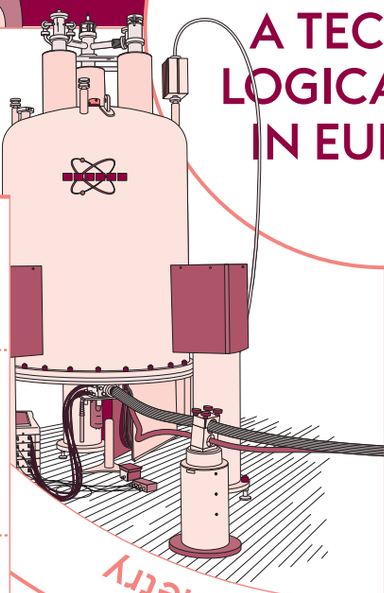
Topic biology & health

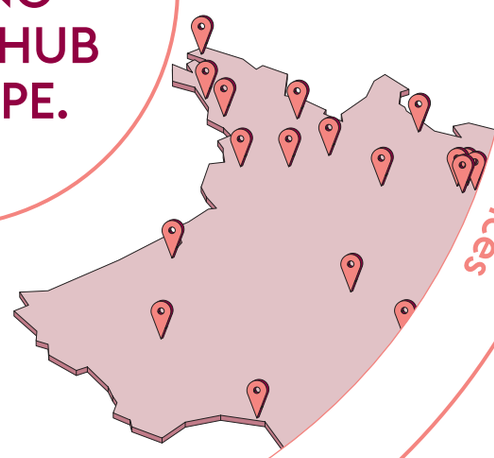
Topic neuroscience





UNIVERSITÉ PARIS-SACLAY, A TECHNOLOGICAL HUB IN EUROPE.





Topic social sciences

Topic spectrometry

RMN-THC

Very high field Nuclear Magnetic Resonance

Influence

World

UPSaclay members:
CEA, CNRS, Inserm

<ir-rmn.fr>

RNMSH

National network of Houses for Human Sciences

Influence

France

UPSaclay members:
All members

<msh-reseau.fr>

With more than 20 major research infrastructure sites located in and around Université Paris-Saclay, its member institutions offer a comprehensive range of research and development facilities in all fields.

Publication director **Gilles Bloch**
Managing editor **Marie-Pauline Gacoin**
Editor-in-chief **Sophie Félix**
Art Direction **The Shelf Company**
Proof reading **Hélène Wilkinson**
Printing **Stipa**