



INSTITUT  
POLYTECHNIQUE  
DE PARIS

# 2023

## ANNUAL REPORT

ÉCOLE POLYTECHNIQUE



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**ANNUAL REPORT**  
**2023**  
École Polytechnique

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# CONTENTS

06



## EDITORIAL

Introduction by Laura Chaubard

08



## FOCUS

- 08 - Closer ties with our Armed forces
- 12 - Equal opportunities: a new acceleration
- 16 - The Climate Plan: implementation is advancing well
- 22 - Modernizing the campus
- 24 - Institut Polytechnique de Paris



28



52



64



## OUR MISSIONS

- 30 - Education
- 38 - Research
- 48 - Innovation

## OUR PARTNERSHIPS

- 54 - Business Partnerships
- 58 - International partnerships

## REPUTATION



**Laura Chaubard,**  
*President of École Polytechnique*

## New milestones in our development

**In a fast-changing world, the guiding mission of École Polytechnique is more pertinent now than ever:** to train elite engineers and scientists who are capable of getting to the heart of the action, and ready to put their multidisciplinary expertise to work in the interests of the greater good.

The strength of our research and the quality of our innovation ecosystem, assets which inform all of our training programs, have earned l'X a national and international reputation for excellence.

**In 2023, École Polytechnique continued to implement the ambitious strategy laid out in the Objectives and Performance Contract 2022-2026 (COP)** signed with our supervising authority, the Ministry for the Armed Forces.

**Our work has been focused on three key priorities: to prepare our students as effectively as possible for the challenges of the future and issues of sovereignty, to reinforce the excellence of our research** by collaborating ever more closely with our partner schools from the Institut Polytechnique de Paris (IP Paris), and to **transform our campus into a space which is attractive**, innovative, exemplary in its environmental performance and open to the world.

**Our portfolio of courses has been expanded** in fields which will be of strategic importance in the future, including cybersecurity, AI and quantum technologies, with the addition of a new Advanced Master's program in Public Sector Data. **Our teaching programs are constantly being enriched and updated**, maintaining our standing as France's leading engineering school.

**Our research partnership with IP Paris also continues to go from strength to strength**, confirming our position as a prominent institution at the global level, ranked among the world's top 40 universities. **Four new**





**teaching and research chairs were created last year.** They are testament to our determination to remain at the cutting edge of technological and scientific advances, and to consolidate our close relationships with our economic and industrial partners.

Better still, **two researchers based at I'X laboratories, Josselin Garnier and Sandrine Bony, have been elected to the Académie des Sciences.** These prestigious honors are testament to the excellence of our teaching staff.

**In 2023, the school also made good on its commitment to promote sustainability and diversity.**

One year after publication of our Climate Plan, I'X awarded its first sustainable development certificates to students and pupils. This initiative is a natural extension of our past efforts, particularly the work of our interdisciplinary center Energy4Climate, and our development of a Living Lab on campus which hosts prototypes for smart grid technology, solar-powered agriculture and carbon capture.

Meanwhile, all members of administrative and technical staff at I'X have received special training on the subject of environmental responsibility, and took part in our inaugural X-CSR challenge.

The **launch of the IP Paris Equal Opportunities Center**, supported by Orange, further reinforces our commitment to the republican ideal of making excellence accessible for all, in true meritocratic fashion.

**Elsewhere, the first edition of our Public Sector Jobs Forum** brought together more than 50 representatives of some thirty public institutions, giving students and pupils the chance to learn more about career opportunities in the public sector, and the potential for putting their expertise to work in the public interest in one of its many and varied forms.

**I would like to thank the entire faculty and staff for all of the successes they have achieved this year, and for their unwavering commitment to École Polytechnique. My thanks also go out to all**

**of our donors and partners**, who contribute invaluable resources for the benefit of our courses, our research and innovation programs and our work to make the campus a more pleasant and sustainable place.


This year, École Polytechnique is celebrating 230 years of history while remaining resolutely focused on the future. A future which will be written in collaboration with the Institut Polytechnique de Paris and its member institutions.

*The guiding mission of I'X, more pertinent now than ever*





# CLOSER TIES WITH OUR ARMED FORCES



The close bond between École Polytechnique and the Ministry for the Armed Forces has become even stronger, in an uncertain context defined by multiple crises where mastering strategically critical technologies is more important than ever before. The strength of that relationship was also in evidence in the success of our first Public Sector Job Forum, responding to the growing interest of our students in government work.

The school has strengthened its ties with the Ministry for the Armed Forces, our supervising authority. With regard to research, **the dynamic** initiated in 2021 with the **foundation of the Interdisciplinary Center for Defense and Security (CIEDS)** has gained pace with the help of **Operation CIEDS 2023**.

**The creation of two new research and teaching Chairs in “High Energy Density Physics and Inertial Fusion” and the “Architecture of Complex Systems” has further strengthened this dynamic.**

**And in terms of training, École Polytechnique has also bolstered its teaching programs on essential defense technologies** – not least among which are AI, cybersecurity and also nuclear and quantum technologies. Preparations are now underway for a new teaching unit on defense and sovereignty issues, which will be compulsory for all engineers.

**The school has reinforced opportunities for contact and collaboration between engineering students and the armed forces** throughout the duration of their courses, their internships and their extracurricular activities. **The personal development and military training requirement** familiarizes them with **the values of the defense community**: the importance of hard work and overcoming one's limits, the strength of the collective.

**In 2022-2023, 80% of Polytechnique students undertook personal development and military training courses with the armed forces:** Various departments of the Ministry for the Armed Forces, the Directorate General for Armaments, the Directorate General for External Security, the Army, the Air and Space Force, the Navy, the Gendarmerie Nationale and the Paris Fire Brigade.





## Resounding success for the first Public Sector Job Forum at I'X

This event, open to students at I'X and the other member schools of the Institut Polytechnique de Paris, gave attendees the chance to chat with 50 representatives from over thirty public sector institutions.

A conference entitled "Public Service: A Career for the Future" was the first highlight of the day. The conference heard from Émilie Piette and Catherine Sueur, both X96 alumnae and now, respectively, careers development director for senior civil servants as the Interministerial Delegate for Senior Government Personnel (DIESE) and head of the General Inspectorate for Public Finances, contributing to the effective and rigorous management of the public purse and, since 2006, to the modernization of government. The round-table discussion was chaired by Vincent Martigny, head of the Public Affairs Program at École Polytechnique.

Students then had the chance to meet representatives of the various public institutions in attendance, with discussions focused on seven key themes: Environmental and Energy Sustainability, Economy and Finance, Digital Technologies, Defense and Security, Education and Culture, Territorial Development, Health and Solidarity. The professionals explained their work, discussed career opportunities and shared some of their own experiences.

The closing address came from Stanislas Guerini, Minister for Transformation and the Civil Service, bringing the curtain down on a day which illustrated the enthusiasm of our students for careers in the public sector.



# HIGHLIGHTS

6 MARCH



## LECTURE BY EMMANUEL CHIVA, DIRECTOR GENERAL FOR ARMAMENTS

Addressing classes X20 and X21, Emmanuel Chiva, Director General for Armaments, highlighted the challenges which France currently faces in matters of defense, the work required to strengthen and transform the armed forces, and the resulting need for engineers capable of adapting effectively to new circumstances and the imperatives of a wartime economy.

25 APRIL

## PUBLIC SECTOR JOB FORUM



Closing address from Stanislas Guerini, Minister for Transformation and the Civil Service, Round-table discussion with Émilie Piette, Catherine Sueur and Vincent Martigny



14 JULY

## L'X AT THE 14 JULY PARADE

The École Polytechnique's delegation to the 14 July military parade included 286 student engineers from the class of 2022.

22 MAY

## CEREMONIAL FLAG PRESENTATION FOR THE X2022 CLASS





11 DECEMBER

## CREATION OF A NEW CHAIR FOR HIGH ENERGY DENSITY PHYSICS AND INERTIAL FUSION

École Polytechnique and the Military Applications department at the CEA have joined forces to establish this new chair in "High Energy Density Physics and Inertial Fusion," training engineering students in high energy density physics and nurturing the emergence of new research collaborations on subjects such as inertial confinement fusion and the physics of magnetized plasma.



22 JUNE

## CREATION OF A NEW CHAIR DEVOTED TO THE ARCHITECTURE OF COMPLEX SYSTEMS

This new teaching and research chair devoted to the architecture of complex systems was officially launched at the Le Bourget Aeronautical Fair, in a ceremony attended by Sébastien Lecornu, Minister for the Armed Forces, and Emmanuel Chiva, Delegate General for Armaments. Dassault Aviation, Dassault Systèmes, Naval Group, Nexter (KNDS) and the Defense Innovation Agency (AID) are sponsors and partners of this new chair.



29 JUNE

## OPERATION CIEDS 2023 ATTRACTS OVER 200 PARTICIPANTS AT L'X

Jointly organized by École Polytechnique and its partners, Operation CIEDS brought together over 200 participants this year: researchers, doctoral students and postdoctoral fellows at IP Paris laboratories, representatives of the Ministry for the Armed Forces and the Ministry of the Interior, businesses and start-ups and a number of innovation experts. A wide range of themes were addressed over the course of the round-table discussion, presentations, workshops and poster sessions: Technological Sovereignty and Defense Strategy; Mechanics, Materials and Energy; Sensors, Robotics and AI; Communications and Security; Health and Biology.



# EQUAL OPPORTUNITIES: A NEW ACCELERATION



In order to steer ever more young women and men towards elite-level scientific courses, and to continue attracting the brightest talent, École Polytechnique is deeply committed to promoting diversity and gender equality.

École Polytechnique's efforts to promote equal opportunities took on a new dimension in 2023. Our Equal Opportunities team joined forces with sister structures from all of the other IP Paris Schools to launch a new combined Equal Opportunities Center, which now coordinates all of our efforts in this direction.

The school has greatly reinforced its awareness-raising and upstream support actions, in the hope of persuading more promising young students to apply. Two of our flagship initiatives, 'Operation Monge' and the 'Girls, Math & IT Day', have taken on a new dimension.

École Polytechnique has also maintained its commitment to combating gender-based and sexual violence, with awareness raising initiatives throughout the year as well as a helpline and a new survey of students on all programs.

The school continues to promote gender equality, and for the first time this year published figures on the pay gap between men and women.





# HIGHLIGHTS



5 JUNE

## LAUNCH OF THE EQUAL OPPORTUNITIES CENTER

The official launch was held at Orange HQ, with guests including Isabelle Rome, Minister for Gender Equality, Diversity and Equal Opportunities, and Christel Heydemann, CEO of Orange, the Center's biggest donor.



2 DECEMBER

## INTERVIEWS FOR EXCELLENCE AT L'X

École Polytechnique welcomed almost 700 middle and high school students from across the Ile-de-France region for the Interviews for Excellence event.

Charitable association "Interviews for Excellence" organizes discussion events where professionals meet middle and high school pupils from a diverse array of cultural, territorial and social backgrounds, encouraging them to apply for the most prestigious courses and institutions.





### *JANUARY - MARCH*

#### **OPERATION MONGE: REACHING OVER 23,000 HIGH SCHOOL STUDENTS**

The third edition of Operation Monge involved 530 high schools all over the country, a hundred more than in 2022.

Organized by École Polytechnique's Equal Opportunities Center with support from l'AX, our alumni association, this event invited students from the X2022 class to explain what it is like to pursue scientific studies at the highest level, and particularly engineering, to more than 23,000 high school pupils.

### *8 MARCH*

#### **TWICE AS MANY PARTICIPANTS IN THIS YEAR'S 'GIRLS, MATH & IT DAY'**

'Girls, Math & IT Day', held to coincide with International Women's Day in 2023, attracted 240 high school students - almost twice as many as in 2022. Held every year since 2012, our 'Girls, Math & IT Days' give high school students with a talent for science to learn more about careers in the fields of math and IT, pushing back against some of the stereotypes associated with scientific disciplines and introducing them to female scientists already working in these fields.



### *23 - 27 JANUARY*

#### **50 MIDDLE SCHOOL STUDENTS FROM ESSONNE SPEND THEIR WORK EXPERIENCE WEEK AT L'X**

École Polytechnique hosted 50 middle school students from the Essonne département for their work experience week. The young interns had the chance to discover academic life at an engineering Grande École, with immersive observation time in several laboratories, as well as the military dimension of the institution through discussions with senior Army personnel and a visit to the Mus'X museum. This program is part of our efforts to promote social and gender diversity at l'X.





**30 OCTOBER -4 NOVEMBER**

## 'EQUAL OPPORTUNITIES' STUDY CAMP ORGANIZED BY L'X

L'X organized a study camp especially for students enrolled in scientific preparatory classes, in partnership with the Union of scientific prep teachers.

The initiative welcomed 25 first year scholarship students, offering advanced individual tutoring to help them fine-tune their working methods, enhance their knowledge, gain in self-confidence and feel more positive about the rest of the year and the examinations at the end of it.



**8-14 JULY**

## 40 HIGH SCHOOL PUPILS GET AN INSIDE EXPERIENCE OF L'X

The X-Science Camp gave 40 high school pupils an immersive experience of life at an engineering Grande École. The goal: to encourage them to pursue scientific studies at the highest level, and to believe in their abilities.

Throughout the week they tackled math problems, sporting challenges and a series of workshops designed to boost their self-esteem. Isabelle Rome, Minister for Gender Equality, Diversity and Equal Opportunities, was the official patron of the 2023 edition of our "Math Camp."



# CLIMATE PLAN: IMPLEMENTATION IS ADVANCING WELL

Since the publication of our Climate Plan in 2022, École Polytechnique has been working on all fronts to advance the environmental transition: Education, Research, Innovation.

## THE 10 OBJECTIVES OF OUR CLIMATE PLAN

Current state of the project:



### EDUCATING AND INSPIRING



Including applied training on sustainability issues in 100% of qualifying programs



Tripling the number of mandatory training hours in sustainability across all programs



Training our staff and helping them to implement the ecological transition on a day-to-day basis







## DEVELOPMENT AND INNOVATION



Creating a campus which serves as an example of the transition in action, capitalizing upon our research and innovation communities



Maintaining a climate action fund to support transition initiatives at l'X

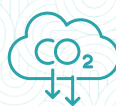


Integrating the sustainable development paradigm into 100 % of our strategic research projects .



Producing an annual map of all research conducted across IP Paris on subjects relating to environmental issues and their impact.

## REDUCTION AND RESPONSIBILITY



Reducing greenhouse gas emissions from energy use by 20% per campus user



Ensuring that 50% of all purchases meets sustainable buying criteria



Allowing only non-motorized forms of transport in the heart of the campus.



On the educational side, the school has now incorporated teaching units providing a systemic vision of environmental issues into all of our teaching programs. At the start of the 2024-2025 academic year, all 2nd year engineering students will sit a new compulsory module entitled 'Engineering Sustainability.'

There are also a range of thematic teaching units offered to engineering students in their third year of study (Sciences and Environmental Challenges, Energies of the 21st Century), as well as our Master of Science and Technology programs.

Thanks to the enthusiastic support of their teachers, and in partnership with BPIFrance, a number of students were able to produce climate change adaptation strategies for businesses which are particularly vulnerable; others contributed to the economic evaluation of the environmental policies adopted by the City of Paris.







On campus, the implementation of our energy saving plan has already allowed us to reduce gas consumption per square meter by 13%.

A new block of ultra-low emission housing has been developed.

The addition of 180 new bicycle parking spaces, the creation of a new cycle track and a brand new bike repair station are all part of our efforts to make the center of the campus a car-free zone.

**All administrative and technical staff at I'X have been educated about key environmental issues,** and two pilot departments – catering and communication – received specific environmental responsibility training in 2023.

Testament to our unflagging efforts to integrate socioenvironmental criteria into our procurement policies, École Polytechnique received an Innovation in Purchasing Award for our Building Management Systems (GTB) program, aimed at optimizing our heating, ventilation and cooling consumption with the help of an artificial intelligence tool developed by Accenta.

**In the field of research and innovation,** the interdisciplinary center Energy4Climate (E4C), founded in 2019, saw the schools of the Institut Polytechnique de Paris (of which I'X is a founding member) joining forces with the CNRS and numerous partners engaged in climate action.

E4C has continued to develop its "living lab" on campus, with the installation of new demonstration systems for smart grid technologies, solar-powered agriculture and carbon capture.

In collaboration with the Pierre-Simon Laplace Institute for Climate Sciences, E4C has established a media lab to house resources and open data on climate issues.

In 2023, the center successfully organized its 4th student challenge and its 2nd Summer School.

In addition to this high profile center, **a growing number of laboratories at I'X are signing up to the Labo 1.5 scheme,** devoted to better understanding and reducing the environmental impact of scientific research.



# HIGHLIGHTS

30 NOVEMBER - 12 DECEMBER

## ÉCOLE POLYTECHNIQUE AT COP 28

École Polytechnique attended the 28th Conference of the Parties on climate change (COP 28) in an observational capacity, as an independent, non-governmental research organization.

The school was represented by a delegation of students headed by Patricia Crifo, Professor at École Polytechnique and Deputy Director of the Energy4Climate Interdisciplinary Center.



5 APRIL

**POLYTECHNIQUE STUDENTS ATTEND THE PROGRESS UPDATE MEETING WITH FRANCE'S 50 BIGGEST INDUSTRIAL CO<sub>2</sub> EMITTERS.**

A delegation of twenty-plus Polytechnique students attended the meeting hosted by Roland Lescure (X87), Secretary of State for Industry, with the directors of the 50 French industrial sites which produce the most greenhouse gas emissions, where they presented their strategy for reducing their emissions by 50% by 2030.



15 NOVEMBER

**AN ARCHITECTURAL PLAN FOR THE XSEAO2 CARBON CAPTURE PLATFORM**

École Polytechnique has been collaborating with École Penninghen since October 2022 to produce a demonstration model for the XSeaO2 program, and a winning design has now been selected.

Financed by the Ifker fund, the goal of the XSeaO2 program is to extract the CO<sub>2</sub> dissolved in seawater and use it to produce synthetic fuels.





**10-11 OCTOBER****OPERATION “LOW CARBON” AT THE LE MAGNAN CANTEEN**

In order to raise awareness of the greenhouse gas emissions generated by the food we eat, the campus canteen “Le Magnan” served a “low carbon menu” for two days in October, with a choice of three vegetarian options and one poultry dish. This operation also provided an opportunity to reflect more broadly on the environmental impact of our food. From now on, Le Magnan will display details of the carbon footprint of each menu throughout the year.

**6 JUNE****FIRST CLIMATE CHALLENGE ORGANIZED BY M’NEXT.**

In collaboration with the NeXt engineering student society, M’NeXt, the association for MSc&T students, held its first Climate Case Study challenge focusing on hydrogen and its role in the energy sector.

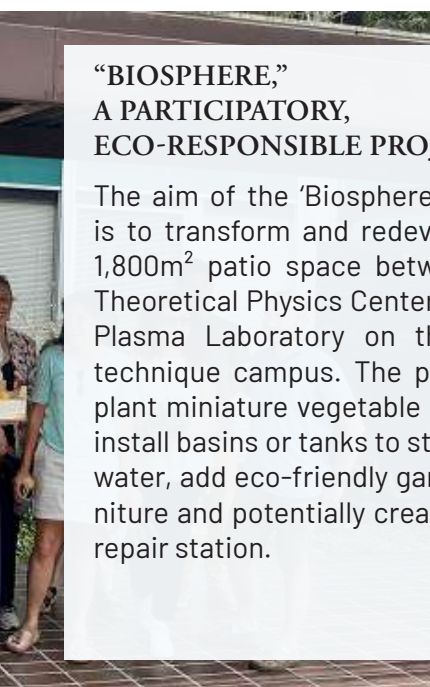
Students were invited to form hybrid project teams and get to grips with a feasibility and impact study for a fictional company named Titus®, devoted to developing hydrogen-powered buses.

**2 OCTOBER****ÉCOLE POLYTECHNIQUE LAUNCHES ITS X-CSR 2023 CHALLENGE**

École Polytechnique launched a call for proposals for its first X-CSR Challenge, founded to champion environmental initiatives launched by l’X staff, and ultimately to provide financial backing for the most promising projects.

**“BIOSPHERE,” A PARTICIPATORY, ECO-RESPONSIBLE PROJECT**

The aim of the ‘Biosphere’ project is to transform and redevelop the 1,800m<sup>2</sup> patio space between the Theoretical Physics Center and the Plasma Laboratory on the Polytechnique campus. The plan is to plant miniature vegetable gardens, install basins or tanks to store rainwater, add eco-friendly garden furniture and potentially create a bike repair station.



# MODERNIZING THE CAMPUS



## A new shared learning center

**In order to ensure that the campus meets the highest international standards, is exemplary in matters of sustainable development, and provides a positive experience for all users, École Polytechnique's property management department is constantly working to modernize and renovate the school's infrastructure and facilities.**

**A major driver of our efforts to achieve carbon neutrality by 2050, renovating the school's facilities allows us to adapt them to new teaching methods and student practices, in keeping with our growth objectives.**

The new Shared Learning Center (BEM) recently completed on the Polytechnique campus will be shared by a total of seven higher education and research institutions: École Polytechnique, AgroParisTech, Télécom Paris, Télécom SudParis, ENSTA Paris, ENSAE Paris and the Institut d'Optique Graduate School.

With a total surface area of 10,000m<sup>2</sup> and the capacity to host 1,470 students, the building contains a main lecture theater with 250 seats, three 80-seater amphitheatres and fifty classrooms over three floors. Its vast, transparent façade, lush interior vegetation and open, airy design foster a sense of close connection with the environment.

The seven engineering schools united in this ambitious, innovative project decided to pool some of their teaching spaces in order to optimize the footprint of the building and the usage of the facilities, committing to the responsible use of resources.

Designed by Japanese architect Sou Fujimoto and French architects Manal Rachdi, Nicolas Laisné and Dimitri Roussel, this building serves as a focal point where different elements of campus life can converge and meet: students, lecturers, researchers and visitors.





## A solar farming center

This new scheme is based around a 40kWc solar panel array installed on an experimental site measuring some 700m<sup>2</sup>. The goal is to experiment with different forms of agriculture in close proximity to solar panels. The solar panels are fitted with trackers, allowing them to shift position to maximize sun exposure.

Led by a team of researchers from the Energy4Climate Center and the Laboratory for Dynamic Meteorology, with support from the Property Management Department and several external partners, this project will allow for multidisciplinary research into optimizing the positioning of solar panels, as well as the micro-climate created by solar agriculture systems, including studies of the impact on plants and water resources.

## Heat renovation

Technical renovations to staff accommodation on campus has succeeded in reducing and decarbonizing their energy consumption. The four buildings in question, built in the mid-1970s, were poorly insulated and fitted with single-glazed windows.

The renovation work included the addition of external insulation, the replacement of all of the original window frames and a thorough overhaul of the ventilation system.

These four buildings will soon house one of the demonstration models developed by the Energy4Climate center. The center's researchers have developed a new model of mini smart grid for heating and electricity, which they plan to power with renewable energy.



# INSTITUT POLYTECHNIQUE DE PARIS



**Thierry Coulhon,**  
*Interim President  
of the Board of Directors  
of the Institut  
Polytechnique  
de Paris*

*"École Polytechnique, a founding member of the Institut Polytechnique de Paris, contributes to the success of IP Paris in two areas of crucial importance: providing the very highest standard of teaching, and nurturing cutting-edge research. Its two centuries of expertise and high international profile are major assets for our Institute, in the service of France's industrial and digital sovereignty, and green reindustrialization."*

## L'X is a major contributor to the breakthroughs made by IP Paris

The directors of École Polytechnique, along with the entire staff and the broader Polytechnique community, have continued to demonstrate their commitment to the development and success of the Institut Polytechnique de Paris.

École Polytechnique's 23 laboratories are major contributors to the development and reach of IP Paris' six interdisciplinary centers, including the two launched in 2023: Materials for Society (M4S), devoted to new materials and the Interdisciplinary Center for Connecting Sciences, the Public, Imaginations, Research and the Arts (SPIRAL).

École Polytechnique recently hosted the international colloquium REFLEXIONS, organized by IP Paris to reflect upon the role of regulation in the fight against global warming, and in the sustainable transition more broadly.

The launch of the IP Paris Equal Opportunities Center, in June 2023, benefited from the full support of École Polytechnique. The purpose of this new center is to coordinate and develop actions and initiatives launched by member schools, pursuing our ambitious policy in this domain.

L'X also hosted this year's Science Festival, a chance for people to meet researchers from the Institut Polytechnique de Paris.







## IP Paris, a catalyst for the development and reputation of I'X

Successful project applications, ERC Grants and new and renewed research Chairs across IP Paris as a whole all have benefits for the laboratories and researchers of I'X.

### **Cross-disciplinary training project DaTSHHealth picked up by France 2030**

IP Paris recently secured a very significant contract in the field of digital health, in the form of the DaTSHHealth project. This program of high-level cross-disciplinary training for engineers, focusing on the comprehension and utilization of health data, is part of the France 2030 investment strategy.

### **Renewal of the partnership between Hi! PARIS and CapGemini**

In late September 2023, CapGemini renewed its support for the Hi!Paris interdisciplinary center for research into artificial intelligence. This renewed partnership will allow the center to continue to pursue its work in the fields of innovation, research and education, creating new opportunities for the scientific community and finding new ways to make artificial intelligence and data science work for the benefit of society.

### **The "Prématuration IP Paris" call for projects, a major opportunity for researchers at I'X**

The Institut Polytechnique de Paris recently launched the 5th round of its "Prématuration" call for projects, designed to spot and support innovative research and teaching projects. A unique opportunity for researchers from I'X's laboratories to present proof of concept for their latest projects.

# HIGHLIGHTS

9 JUNE

## SECOND REFLEXIONS COLLOQUIUM HOSTED AT ÉCOLE POLYTECHNIQUE



The 2nd edition of the REFLEXIONS colloquium, organized by the Institut Polytechnique de Paris and hosted at l'X, brought together many academics and scientific experts, senior civil servants, private sector executives and representatives of civil society. Together they sought to understand, and resolve, a range of regulatory issues relating to climate change and the sustainable transition more broadly.

1 SEPTEMBER

### MINISTER FOR HIGHER EDUCATION AND RESEARCH VISITS IP PARIS

Sylvie Retailleau, Minister for Higher Education and Research, visited the IP Paris campus to learn more about the institute's achievements in teaching, research and innovation. While visiting École Polytechnique's innovation and entrepreneurship Center, the Minister also had a chance to meet entrepreneurs, researchers and students keen to present their innovative projects.







3 JULY

## INAUGURATION OF THE MATERIALS FOR SOCIETY (M4S) CENTER

The M4S Center seeks to tackle some of the major societal challenges in the field of materials science.

21 JUNE

## LAUNCH OF THE NEW SPIRAL INTERDISCIPLINARY CENTER, BRIDGING THE GAP BETWEEN ART AND SCIENCE



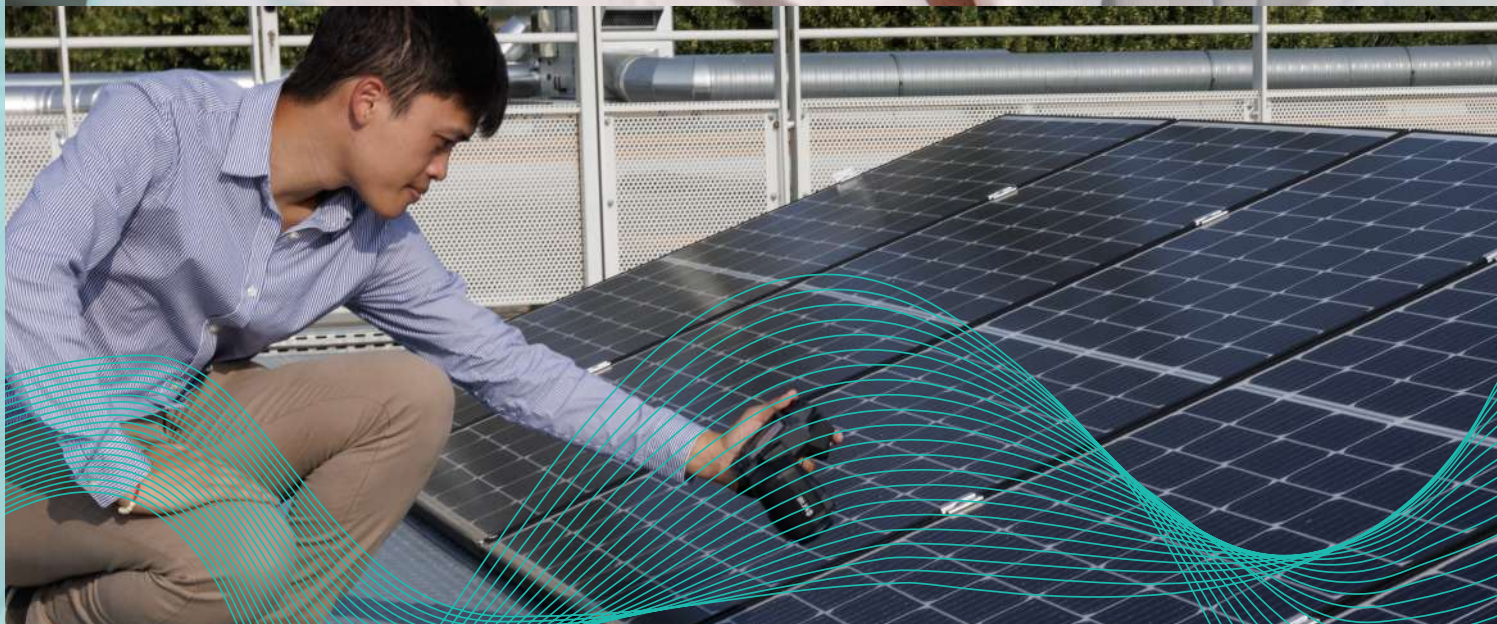
13-14 OCTOBER

## A SUCCESSFUL SCIENCE FESTIVAL

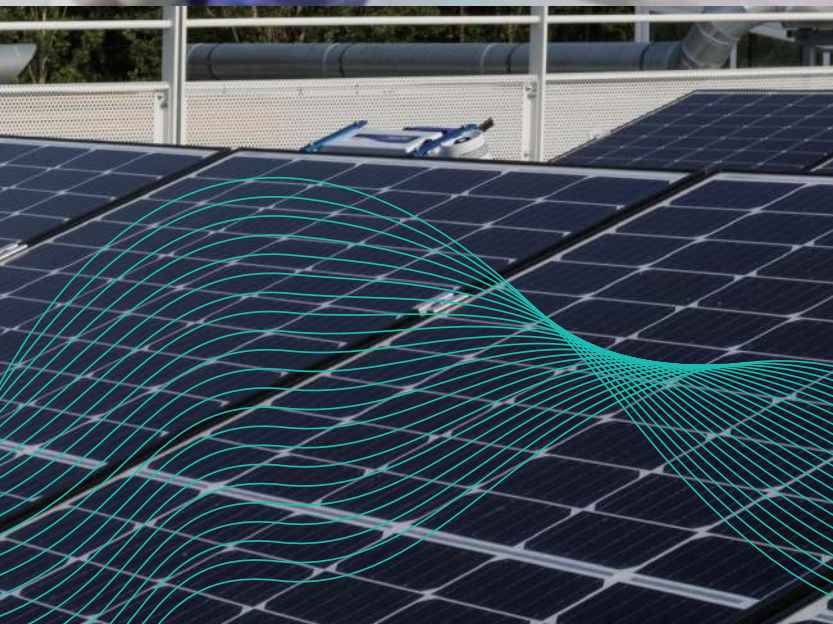
Hosted at the École Polytechnique, in partnership with the CNRS, Inria and Sciences2024, and supported by the l'X Foundation and the Ministry for Higher Education and Research, the Science Festival (Fête de la Science) attracted almost 1,400 visitors, including many school pupils, with events and discussions on the theme of science and sport. Almost 200 members of IP Paris, CNRS and Inria laboratories were on hand to interact with the public and lead the numerous scientific demonstrations. There was also a Sport & Science exhibition showcasing the latest edition of the Science en Bulles comic book, as well as the work of the Sciences2024 research program, focusing on the many ways that science can contribute to sport.











# OUR MISSIONS

1 - EDUCATION

2 - RESEARCH

3 - INNOVATION







# 1

OUR MISSIONS

## EDUCATION



**3,845**  
STUDENTS



**519**  
LECTURERS AND  
RESEARCHERS



**45%**  
INTERNATIONAL  
STUDENTS



**24%**  
FEMALE STUDENTS







Renowned for the diversity of its teaching programs, l'X has continued to cement the reputation of its courses and adapt them to the challenges of the digital and ecological transitions, as well as the challenge of strengthening French and European sovereignty in these areas. All École Polytechnique programs are highly selective and are based on a multidisciplinary scientific approach with strong ties to research.

The School is continuously updating and expanding its portfolio of courses. Recent additions have focused on domains which will be of great importance in the near future, including artificial intelligence, cybersecurity and quantum technologies.



## Attractive programs with strong reputations

Since our new courses were first launched in 2017 – Bachelor, MSc&T, Executive Master – they have continued to go from strength to strength.

There were 437 students enrolled on the Bachelor program in 2023, including 157 new students joining for the 2023-2024 academic year, at 10% increase on the previous year. 63% of Bachelor's students are international students, hailing from 40 nationalities, and with 35% women it is the most gender-balanced program at I'X.

The school's historic engineering program welcomed 548 students in the Class of 2023, including 21% international students from 20 different countries, 20% of whom are female.

Our nine different MSc&T programs, two-year courses with teaching in English, now have 370 students including 226 freshers, a 22% increase on 2022. With 70% overseas students and 47 different nationalities represented, the MSc&T programs are the most international courses on offer at I'X, with an average 29% female students.

2023 marked a new milestone in the development of our Executive Master's program, with the launch of a second year-long course taught 100% in English. This executive diploma now welcomes around sixty participants from all over the world each year, with an average of 30% women and 32% international students.



## HIGHLIGHTS

### Graduation ceremonies

Marking the culmination of all the hard work that goes into studying at I'X, graduation ceremonies are organized for students, their course directors and teaching staff at the end of the academic year, usually in June.



**31 MAY**  
MSc&T graduation



**16 JUNE**  
X2019 engineering program graduation



**23 JUNE**  
Bachelor's program graduation





# New programs and changes to the curriculum



Determined to continue with the diversification and internationalization of our recruitment efforts, while also ensuring that our educational offering is closely attuned to the great societal challenges of the day, École Polytechnique launched more new courses last year and continued to adapt and fine-tune existing programs. In this spirit, I'X contributed to the creation of the multidisciplinary higher education program (CPES), a demanding higher education program on "data science, health and society" coordinated in partnership with the Academy of Versailles, HEC Paris, Université Paris-Saclay and ENS Paris-Saclay.

We also launched two new MSc&T programs, a Data & Finance dual diploma with HEC Paris and a Data Economy program in collaboration with Telecom Paris and ENSAE Paris. Our Executive Education department is currently preparing to launch several new programs in 2024, including the 'Data and AI for Management' diploma, which is already shaping up to be a great success.

## A new center of excellence in cybersecurity

In order to meet the growing demand for trained specialists in matters of cybersecurity, École Polytechnique has established a portfolio of courses compatible with the ambitions set out by France's Ministry for the Armed Forces, particularly the cyberdefense division (COMCYBER). The aim is to establish I'X as an internationally renowned center of excellence for academic research, innovation and teaching in this field.

When classes resume in September 2024, 120 students will join EPITA's Bachelor's program in cybersecurity, organized in partnership with I'X. Offered at EPITA since 2021, this degree program benefits from the close collaboration of École Polytechnique, particularly the constant renewal of its teaching content. Complementing EPITA's long-established expertise in vocational training, École Polytechnique is enriching the program with teaching units informed by world-leading scientific research, all condensed into a three-year course for talented students.

The Ministry for the Armed Forces is actively involved in nurturing this new talent pool, under the aegis of COMCYBER. Of the 120 students enrolled on the program, 30 will be selected to join the Cyberdefense stream and work for the ministry after graduating. The ministry will also cover their tuition fees, on the condition that they serve in the reserves during their studies, that they

successfully complete the course, and that they then sign up as officers for a period of 5 years. The 30 selected students will complete their third year of studies on a work-study basis, spending time with the armed forces.

Meanwhile, within the Polytechnique's flagship engineering program, a new 40-hour teaching unit for first-year students entitled 'Global Equilibria, Sovereignty and Defense Challenges' incorporates a special focus on cyber-security.

The Cybersecurity MSc&T will also take on a brand new form in 2024, with a much greater focus on concrete cybersecurity problems.

The Executive Master of Science in Cybersecurity, a program launched in partnership with Orange which welcomed its second intake in 2023, has now been strengthened by a new partnership with Accenture.

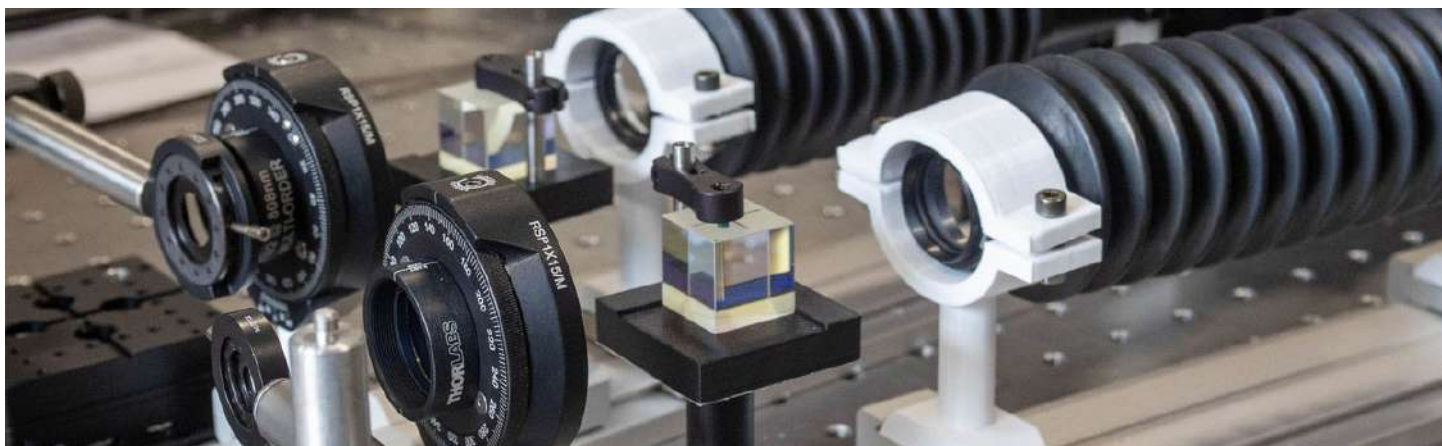
The strategy developed with the Ministry for the Armed Forces to transform our school into a center of excellence in cybersecurity also includes plans to recruit ten additional faculty members and research engineers to our computing laboratory (LIX) over the next four years, bolstering our research teams and maintaining the close connection between teaching and research of which the school has always been so proud.

# HIGHLIGHTS

11 SEPTEMBER

## THREE GROUP SCIENCE PROJECTS FROM THE X2021 CLASS RECEIVE HONORS

A shortlist of ten promising group science projects was compiled by our teaching and research departments, from the 112 projects put forward by the X2021 class. A panel of experts from the worlds of academia, business and the media selected the three winners at a final showdown on 11 September.



## POLYTECHNIQUE ENGINEERING STUDENTS AND THE CHALLENGE OF DESIGNING INNOVATIVE TECHNOLOGIES.

As part of the course taught by Charles Baroud, lecturer and researcher at the Hydrodynamics Lab (LadHyX\*), students in the third year of the Polytechnique engineering program learn about the process of creating new technologies. They get to grips with the conceptual aspects of innovation from an engineering perspective, with a particular focus on recent developments such as frugal innovation and open technologies. They also learn the fundamentals of mechanical and electronic fabrication tools, as well as how intellectual property works. They take part in several projects over the course of the teaching unit. These projects include building small machines, which become increasingly complex as the course progresses. The objective is to take a difficult (and misunderstood) problem and find a technological solution, then implement that solution.







**20 APRIL**

Christine Lagarde, President of the ECB

## CONFERENCES WITH PRESTIGIOUS SPEAKERS ALL YEAR ROUND

Since the very beginning, École Polytechnique has prided itself on its tradition of openness and multidisciplinary. We welcome many visiting speakers throughout the year, often including senior government figures and international leaders, politicians, representatives of civil society, business and entrepreneurship, and of course leading researchers. These conferences are organized with the help of the student society 'Les Tribunes de l'X', and are open to engineering students as well as to all other students enrolled on programs at l'X and our fellow schools within IP Paris.



**7 SEPTEMBER**

Valérie Pécresse, President of the Ile-de-France region



**7 SEPTEMBER**

Emmanuel Moulin, General Director of the French Treasury



**16 FEBRUARY**

Roland Lescure, Secretary of State for Industry

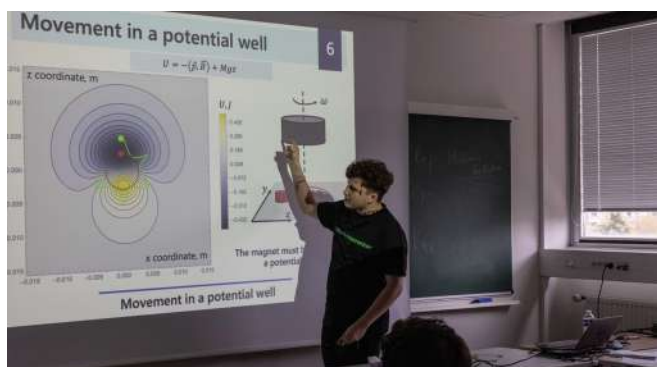


## OUR STUDENTS IN INTERNATIONAL SCIENTIFIC COMPETITIONS



Qualification for the International Physics Tournament 2023

L'X hosts the 3rd edition of the French Chemistry Tournament



L'X hosted the fifteenth edition of the International Physicists Tournament (IPT)



## SPORTING COMPETITIONS

19 OCTOBER

ÉCOLE POLYTECHNIQUE WINS THE COUPE DE L'X

Organized by the Bureau des Sports, the 2023 edition of the Coupe de l'X drew over 2,500 students from 24 engineering schools, business schools and universities across the Greater Paris area. L'X emerged victorious, topping the medal table ahead of HEC Paris and ENS Paris-Saclay.





## OUR STUDENTS HAVE GOT TALENT!



**20-21-22 APRIL**

X-Broadway 'Singing in the Rain'



Campus life is enlivened by countless cultural events, shows and exhibitions, throughout the academic year.



**14 FEBRUARY**

Bachelor Speech Contest



**24-25 MAY**

X-Systra fencing challenge



**29 APRIL-1ST MAY**

Jumping X-HEC





# 2

OUR MISSIONS

## RESEARCH



**23**

LABORATORIES



**1,800**

RESEARCH STAFF



**2830**

PUBLICATIONS

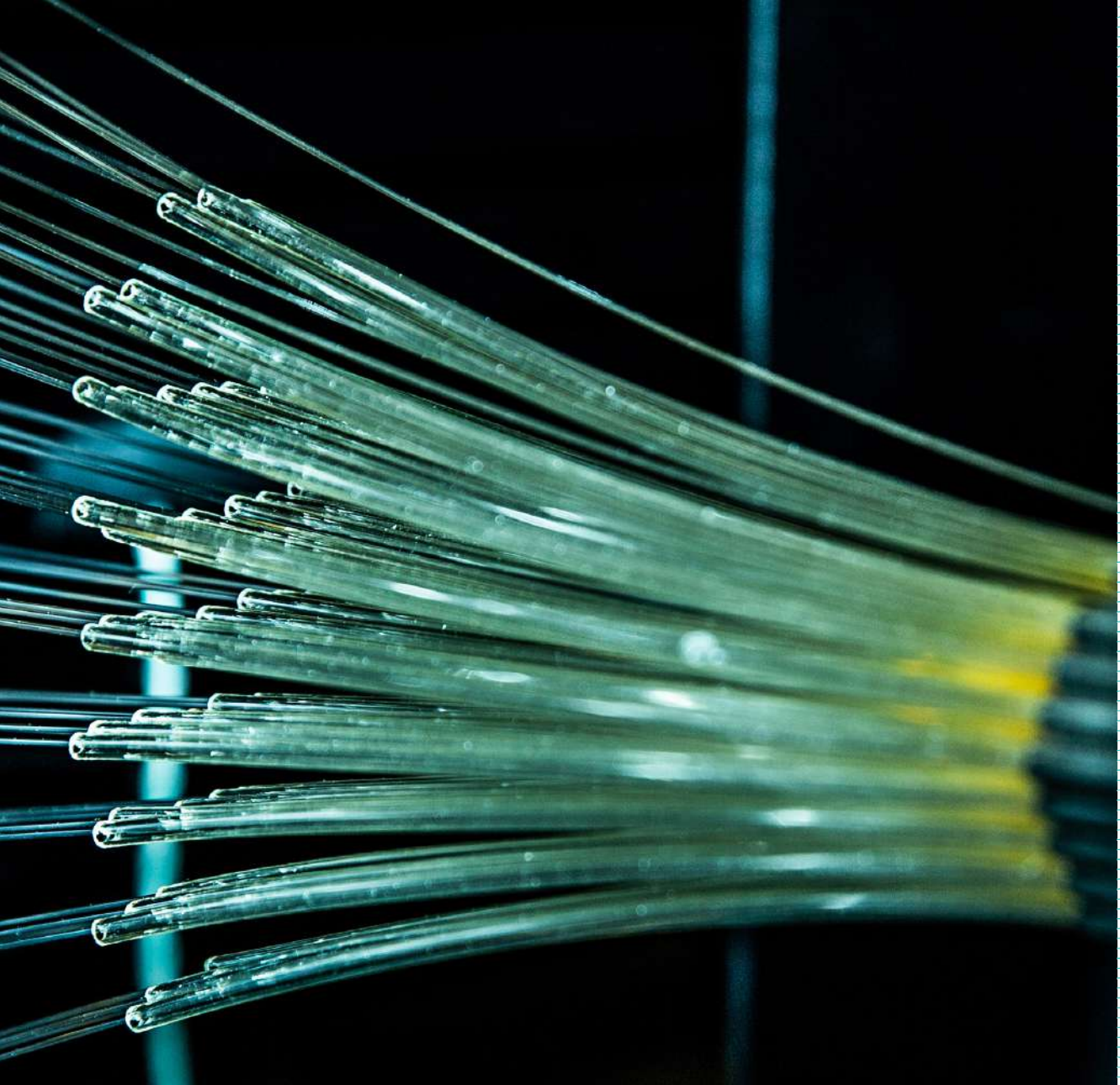


**71%**

INTERNATIONAL  
CO-PUBLICATIONS







École Polytechnique's 23 laboratories were major contributors to IP Paris' research strategy, not least through their involvement with the launch of two new interdisciplinary centers: Materials for Society (M4S), devoted to new materials and the Interdisciplinary Center for Connecting Sciences, the Public, Imaginations, Research and the Arts (SPIRAL).

X researchers once again stood out by producing new knowledge, disseminated in numerous top publications. Many of our researchers received prestigious awards and funding, combining scientific research with innovation and entrepreneurship.





## A new interdisciplinary center for materials science

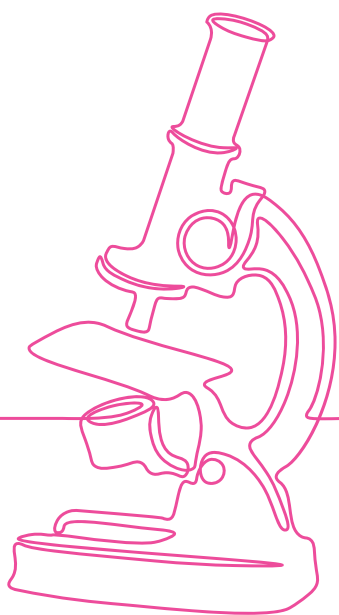
Several laboratories at l'X were directly involved with the launch of the new 'Materials for Society' (M4S) center, bringing together researchers from the fields of physics, materials chemistry, mechanics, applied mathematics and all areas of engineering, united by a determination to tackle shared problems by means of ambitious interdisciplinary projects.

Launched on 3 July 2023, M4S aims to meet the growing demand for new materials which not only offer innovative properties, but are also optimized and adaptable, designed and produced using original methods which integrate a whole life cycle approach.

Founded with funding from the French government under the Excellence - France 2030 project (Sciences and Technologies - Polytechnique Paris, or STEP2) and managed by the National Research Agency (ANR), M4S will benefit from the multifaceted expertise of École Polytechnique's laboratories.





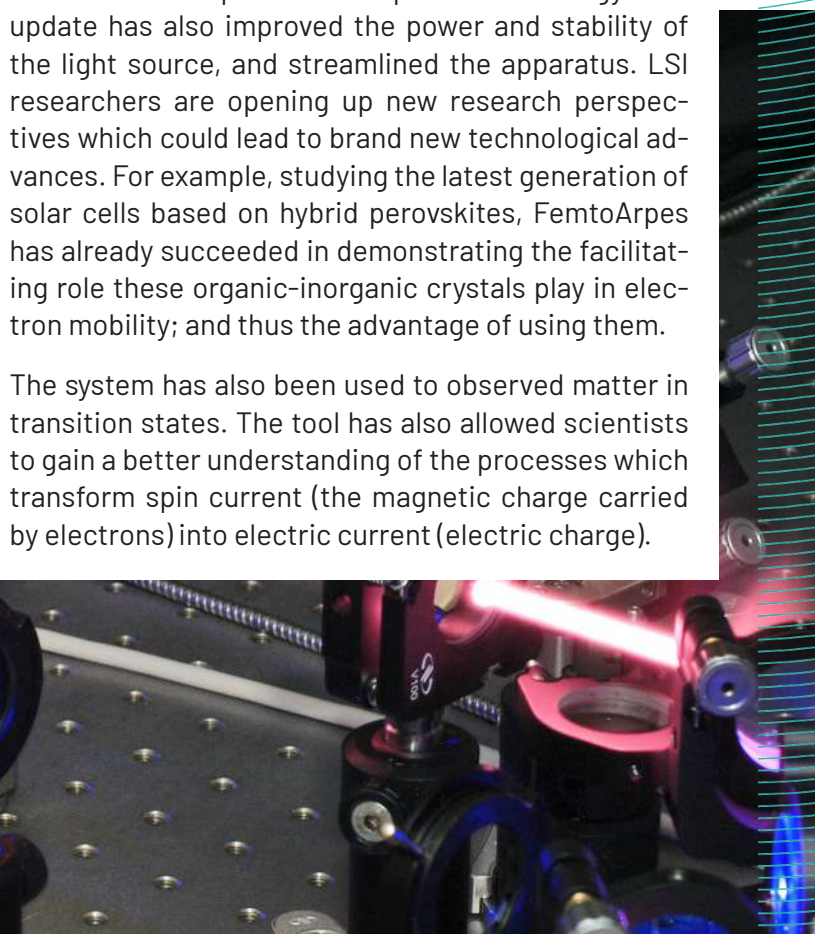
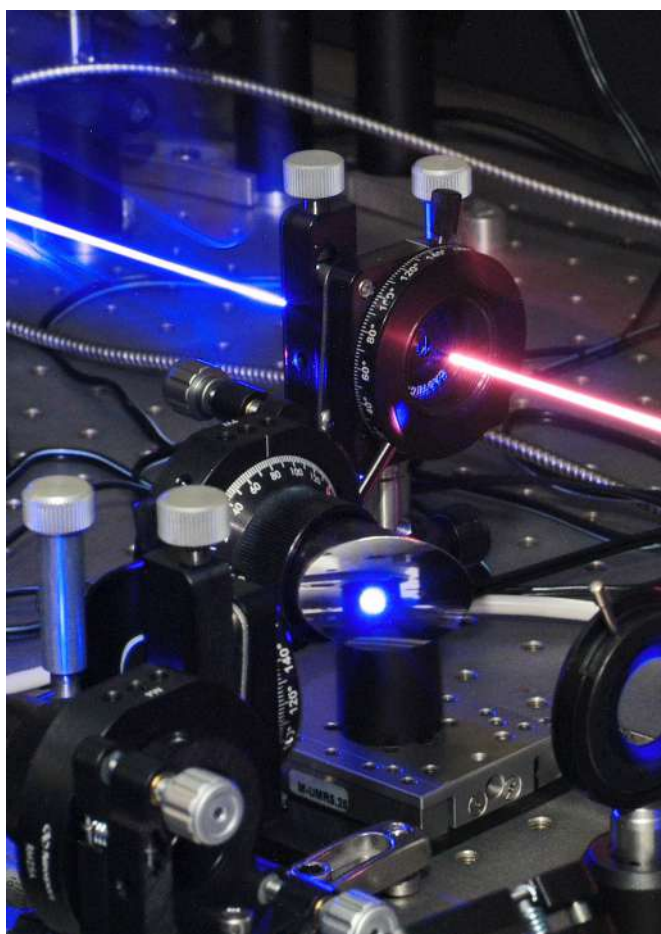


## A €500,000 grant for a new laser

At the Irradiated Solids Laboratory (LSI), Luca Perfetti's team is currently studying in minute detail, and in real time, the movement of electrons through materials with the help of the FemtoArpes instrument (Femtosecond Angularly Resolved PhotoEmission Spectroscopy). Utilizing the principle of photoemission, this system benefited from a 500,000 Euro grant from the Ile-de-France region. Among other things, this grant allowed for the installation of a new source which will enable the LSI to maintain its reputation as a leading player in this field.

FemtoArpes was the only instrument of its kind in France when it was first installed, but in the intervening years similar systems have become fairly commonplace in research institutions. The new and improved FemtoArpes system still delivers femtosecond pulses, but now with unprecedented power and energy. The update has also improved the power and stability of the light source, and streamlined the apparatus. LSI researchers are opening up new research perspectives which could lead to brand new technological advances. For example, studying the latest generation of solar cells based on hybrid perovskites, FemtoArpes has already succeeded in demonstrating the facilitating role these organic-inorganic crystals play in electron mobility; and thus the advantage of using them.

The system has also been used to observed matter in transition states. The tool has also allowed scientists to gain a better understanding of the processes which transform spin current (the magnetic charge carried by electrons) into electric current (electric charge).



## Award-winning researchers



**Josselin Garnier**

Researcher at the Center for Applied Mathematics (CMAP) and Professor at École Polytechnique



**Sandrine Bony**

CNRS Research Director at the Dynamic Meteorology Laboratory (LMD)



**Tatiana Novikova**

Laboratory of Physics of Interfaces and Thin Films (LPICM)



**Margaux Zaffran**

Third-year doctoral student

Many scientists conducting their research at École Polytechnique received awards in 2023. Among these honors, **Josselin Garnier** and **Sandrine Bony** were elected to the Académie des Sciences. A researcher at the Center for Applied Mathematics (CMAP) and Professor at École Polytechnique, Josselin Garnier was elected to the Applied Sciences intersectional chapter. Specializing in modeling and the study of random phenomena, in 2021 Prof. Garnier received the scientific prize from the Simone and Cino Del Duca Foundation for his work on wave dispersion in complex media, for imaging purposes. Sandrine Bony, CNRS Research Director at the Dynamic Meteorology Laboratory (LMD), was elected to the Sciences of the Universe chapter. A CNRS Silver Medal winner in 2018, Sandrine Bony is a climatologist whose research has focused particularly on the role of clouds in the climate. In March 2023 she also received an ERC grant for her Maestro project, devoted to furthering our understanding of atmospheric convection.

At just 27 years of age, **Margaux Zaffran** is a third-year doctoral student with EDF R&D, Inria (PREMEDICAL project team) and the Center for Applied Mathematics. Last year she received the L'Oréal-Unesco Young Talent Award for women in science, for her work on predictive models for electricity prices. A publication authored by a team led by **Tatiana Novikova** at the Laboratory of Physics of Interfaces and Thin Films (LPICM) received the Best Article of 2023 award from the European Optical Society. The team's research has demonstrated that Mueller matrix microscopy, combined with new methods of machine learning and statistical analysis, can be used to help diagnose pathologies in gastric tissue.

**Stéphane Gaubert**, Inria research director at CMAP, and **Oana Goga**, a CNRS researcher based at LIX, were honored by the Académie des Sciences with the Prix Michel Montpetit – INRIA and the Prix Lovelace Babbage respectively. Launched in October 2022 and funded by an ERC grant, the MOMENTOUS project led by Oana Goga is studying the risks associated with the targeting of information by AI, using randomized controlled trials on social media.

**Pauline Rossi** and **Pierre Boyer**, both professors in the Economics Department at École Polytechnique and researchers at CREST, were nominated for the Young Economis of the Year award in 2023.



**Stéphane Gaubert**

Inria research director at CMAP



**Oana Goga**

CNRS researcher at LIX



**Pauline Rossi**

Professor in the Economics Department at I'X and researcher at CREST CNRS



**Pierre Boyer**

Professor in the Economics Department at I'X and researcher at CREST CNRS







## OMEGA lab receives the CNRS Cristal Collectif award

The OMEGA laboratory (Organization of Advanced General Microelectronics) received recognition of its teamwork and expertise in the use of microelectronics for both quantum and astrophysics, securing the Cristal Collectif Research Support label from the CNRS.

The Cristal Collectif is awarded to research support teams who have worked on projects whose technical precision, collective dimensions, applications, innovations and reputation are particularly noteworthy. The award encompasses two categories: "Direct Support for Research" and "Research Accompaniment."

OMEGA UAR3605 is a microelectronics design center jointly operated by CNRS/IN2P3 and École Polytechnique. It is home to a team of a dozen microelectronic engineers, designing sophisticated ASICs for use in nuclear physics, particle physics and astrophysical detectors. Since the performance of detectors hinges on that of their associated electronics, their readings require specific microelectronic circuits, integrating both analog (low noise amplifiers, shaping filters, comparators etc.) and digital functions (data digitization).

### WINNERS

// **Sylvie Blin**, microelectronic engineer - Astroparticles and Cosmology 1 (APC)

// **Stéphane Callier**, microelectronic engineer

// **Selma Conforti Di Lorenzo**, microelectronic engineer

// **Christophe de La Taille**, scientific director, microelectronic engineer

// **Pierrick Dinaucourt**, IAO/CAO manager, training coordinator

// **Frédéric Dulucq**, deputy director and platform manager, microelectronic engineer

// **Abdelmowafak El Berni**, microelectronic engineer

// **Anne-Myriam Lubin**, administrative and financial director, preventive safety assistant and communications officer

// **Gisèle Martin-Chassard**, quality and sustainable development director, microelectronic engineer

// **Ludovic Raux**, spin-off manager, microelectronic engineer

// **Nathalie Seguin-Moreau**, director of the unit, microelectronic engineer

// **Damien Thienpont**, technical director, microelectronic engineer

# Recipients of grants from the European Research Council



European Research Council

**Camille Duprat**

Hydrodynamics  
Laboratory (LadHyX)



**Roland Rathelot**

Center for Research  
in Economics and  
Statistics (CREST)



## ERC CONSOLIDATOR

The aim of the ElCapiTex project, led by **Camille Duprat**, is to gain a better understanding of how the properties of a paper-like material are modified when it gets wet, and how these effects can be managed in order to create materials with controlled characteristics. **Roland Rathelot** studies information frictions and their consequences for the workings of the labor market. With the QFTinADS project, **Balt Van Rees** plans to take the “bootstrap” strategy to new lengths, with the goal of better understanding quantum field theory using very general coherence conditions. Founded by **Maks Ovsjanikov**, the VEGA project is devoted to computer-assisted analysis of three dimensional forms.

**Balt Van Rees**

Center for  
Theoretical Physics  
(CPHT)



**Maks Ovsjanikov**

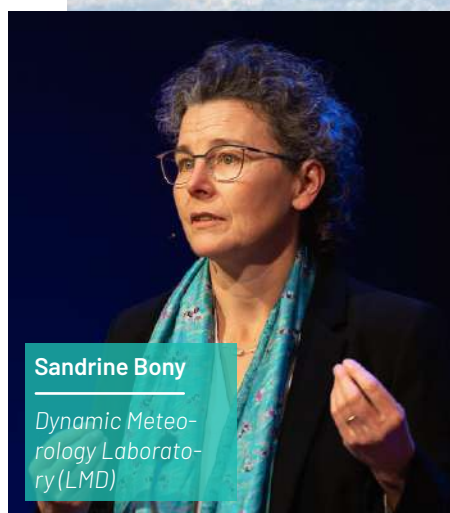
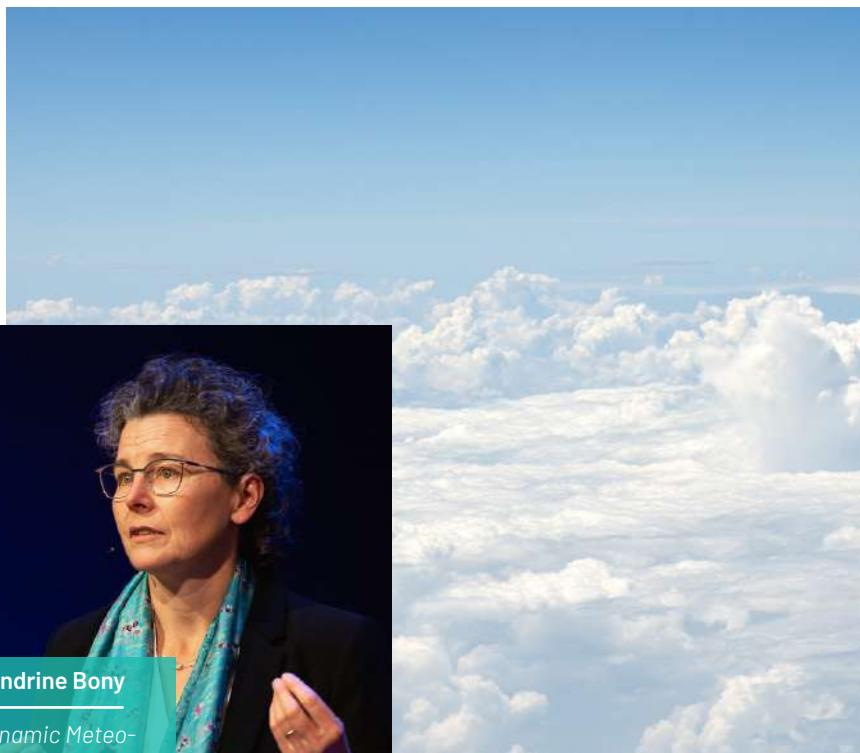
Computer Science  
Laboratory (LIX)



Credit: Sharp, Nicholas, et al. “Diffusionnet: Discretization agnostic learning on surfaces.”







**Sandrine Bony**

Dynamic Meteorology Laboratory (LMD)

## ERC ADVANCED

The MAESTRO project, led by Sandrine Bony, seeks to better understand cloud configurations and convection processes.

The clouds formed by convection processes in the atmosphere affect the interchange of energy between the Earth and space, and thus the climate, by tempering the reflection of solar radiation and thus contributing to the greenhouse effect.

## ERC SYNERGY

WHIRLS is a project led by an international team of scientists including Sabrina Speich, with the aim of studying the influence of ocean gyres on the climate.



**Sabrina Speich**

Dynamic Meteorology Laboratory (LMD)

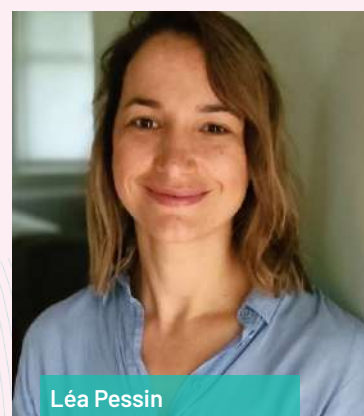
## ERC STARTING GRANT

Olesia Dmytruk's project, backed by the CNRS, focuses on the topological phases of matter. The grant received by Léa Pessin, backed by GENES, will allow her to study social inequalities in work-life balance strategies.



**Olesia Dmytruk**

Center for Theoretical Physics (CPHT)



**Léa Pessin**

Center for Research in Economics and Statistics (CREST)



3

OUR MISSIONS

# INNOVATION



**5,000 M<sup>2</sup>**

FACILITIES DEVOTED  
TO PROMOTING  
ENTREPRENEURSHIP,  
INNOVATION AND  
PROTOTYPING



**200**

START-UPS  
SUPPORTED  
SINCE 2015



**25%**

OF START-UPS ON  
THE NEXT40 LIST  
ORIGINATED WITHIN  
THE LX ECOSYSTEM.







L'X's ecosystem of entrepreneurship and innovation is powered by the entrepreneurial spirit of our graduates, galvanized by the support of our X-UP incubator and the excellence of our research and teaching. Our entrepreneurs can count on the support of our alumni community, not least in the form of the Polytechnique Ventures investment fund.

The involvement of numerous X start-ups in innovation and tech fairs, both in France and worldwide, further enhances our reputation for entrepreneurial excellence.

Officially endorsed by French Tech Tremplin and Innov'UP 2023, our X-UP incubator is recognized for its know-how and impact in the tech sector. These two labels (Innov'UP issued by the Ile-de-France region, and French Tech Tremplin by French Tech and BPI France) will help us to continue supporting and funding entrepreneurs into 2024.



## Impressive entrepreneurial dynamism

École Polytechnique has now firmly cemented its position as a major force for innovation, with a quarter of the start-ups listed in the Next 40 2023 involving Polytechnique alumni, as well as no fewer than 7 French tech unicorns, i.e. start-ups which are valued at over one billion Euros.

Also worth noting are the record-breaking funding rounds completed by some of the start-ups hatched at I'X, such as Mistral AI, in spite of the tensions created by the economic slowdown and rising interest rates. Polytechnique Ventures, the risk capital fund created by fellow alumni of I'X in 2020 and devoted to supporting our entrepreneurial ecosystem, recently finalized its first early stage investment fund, with 36 million Euros invested in 13 start-ups.



## First batch of French Tech 2030 entrepreneurs hosted at I'X

École Polytechnique hosted a seminar for the first laureates of the French Tech 2030 program, in the presence of secretary of state for digital development Jean-Noël Barrot. The event brought together representatives of the program's institutional partners – the General Secretariat for Investment (SGPI), the Directorate General for Enterprise (DGE), Mission French Tech and BPI France – along with 125 selected start-ups, 16 of whom were hatched in the innovation and entrepreneurship ecosystem right here at I'X.

A key component of the France 2030 strategy, the French Tech 2030 program announced its first intake of young businesses in June 2023. The President himself made the announcement, reiterating the program's ambition to nurture start-ups in areas of industrial and strategic importance such as the ecological transition, digital technologies, healthcare and agriculture.



## Presence at the biggest innovation events

École Polytechnique is a regular presence at all of the major innovation events in France and around the world, such as VivaTech (Europe's largest tech fair), Paris-Saclay Spring and the Consumer Electronic Show in Las Vegas, the world's most prestigious tech event.



# HIGHLIGHTS

5 JULY

## I-LAB 2023: FIVE START-UPS LAUNCHED BY LX ALUMNI RECEIVE AWARDS

Five start-ups created or run by X alumni were awarded at the 24th i-Lab innovation competition, funded by the Investments for the Future Program and run by Bpifrance. The five winners were Defants, Amphitrite, AI Stroke, Hekat and Quantum, the latter two also winning Grands Prix at the I-Lab 2023 contest.



14 - 17 JUNE

## THE FOLLOWING X START-UPS ATTENDED VIVATECH:



Several start-ups from the school's innovation and entrepreneurship ecosystem were present at VivaTech 2023, the 7th edition of this annual trade fair which cemented its reputation as Europe's leading event in the field, attracting 150,000 visitors to beat its 2022 attendance record by a massive 50%.



## MISTRAL AI, FOUNDED BY TWO X GRADUATES, RAISED €500 MILLION IN 2023

Mistral AI, a highly promising French AI specialist co-founded in February 2023 by two members of the X Class of 2011, Arthur Mensch and Guillaume Lample, along with ENS graduate Timothée Lacroix, had already raised funding of almost 500 million Euros within 8 months of its creation, in the wake of the AI boom which began with the release of ChatGPT in November 2022.



1<sup>ST</sup> - 2 JUNE

## ELEVEN START-UPS FROM L'X AT PARIS-SACLAY SPRING



Eleven start-ups from École Polytechnique took part in the 2023 edition of the Spring innovation and entrepreneurship fair at the Plateau de Saclay campus, hosted by HEC Paris. The program included project presentations and meetings with investors. These promising young companies, equally committed to disruptive innovation and sustainable development, were all incubated at X-UP and/or founded by X graduates. Their work focuses on six sectors of strategic significance: health & biotech, foodtech, greentech, mobility, digital technologies and newspace.





**5 - 18 JANUARY**

## POLYTECHNIQUE START-UPS AT CES 2023

A select group of French start-ups attended the 2023 Consumer Electronic Show in Las Vegas, and among their number were three gems supported by the École Polytechnique's innovation and entrepreneurship Center as well as the R&D division of Valeo, who have been working for years to develop safer, cleaner and smarter transport solutions.



**25 OCTOBER**

## WELCOMING THE 16<sup>TH</sup> CLASS OF X-UP START-UPS

The members of the 16th intake are now settled into their new home at X-UP, École Polytechnique's business, entrepreneurship and innovation center.

Over the next ten months, seven entrepreneurs working on potentially disruptive innovations will follow a special program designed for deeptech start-ups in the seed phase.

**30 NOVEMBER AND 14 DECEMBER**

## X-UP LAUNCHES ITS NEW THEMATIC NETWORKING EVENT, ECOSYSTEM DAYS

École Polytechnique's innovation and entrepreneurship Center launched its first series of open, themed networking events - the Ecosystem Days - with two conferences: the first devoted to questions of intellectual property and the second focusing on dilutive funding











## OUR PARTNERSHIPS

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4 - BUSINESS  
PARTNERSHIPS  
5 - INTERNATIONAL  
PARTNERSHIPS

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# 4

OUR MISSIONS

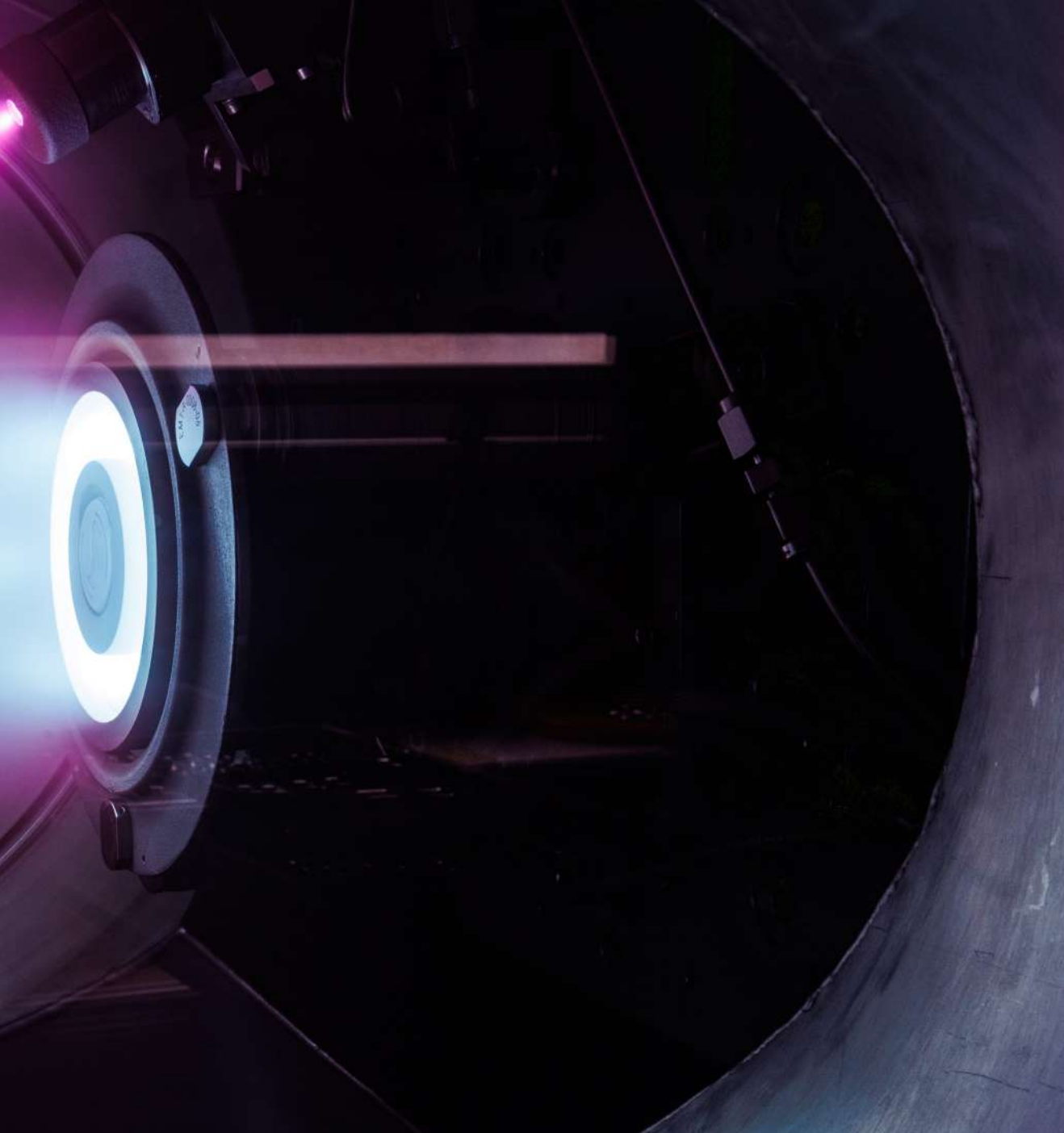
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# ***BUSINESS PARTNERSHIPS***

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Ever since its foundation, École Polytechnique has maintained close ties with the business world - not least by means of the many alumni who go on to careers as leaders of industry in France and further afield, and those who create some of our most promising start-ups.

The school's close relationship with the business sector contributes to the professional integration of our graduates. The school and all its stakeholders are eternally vigilant when it comes to guaranteeing academic independence within our research partnerships, and ensuring that we address the great societal challenges of the day in a balanced manner, not least the ecological transition and the need to protect biodiversity.



## Four new Chairs

The school established four new teaching and research Chairs in partnership with private backers in 2023, testament to our determination to remain at the cutting edge of scientific and technological progress, and to consolidate our close ties with our economic and industrial partners. The Chair for **High Energy Density Physics and Inertial Fusion** was established in partnership with the military applications division of the CEA. The Chair for **High Frequency Plasma Acceleration** is devoted to laser and plasma physics, accelerator engineering and the development of scientific and industrial applications. The **Chair for Responsible, Trustworthy Artificial Intelligence** is supported by Crédit Agricole. The **IP Paris Chair for the Architecture of Complex Systems** is supported by Dassault Aviation, Dassault Systèmes, Naval Group, Nexter (KNDS) and the National Agency for Defense Innovation (AID).



## A new joint laboratory



**École Polytechnique, CNRS and Safran Electronics & Defense have joined forces to establish a joint laboratory for the study of Hall Effect Thrusters (COMHET).** Drawing upon the rich and longstanding collaboration between the three partners in the Plasma Physics Laboratory (LPP - CNRS, École Polytechnique - Institut Polytechnique de Paris and the Sorbonne), internationally recognized for its work in this field, COMHET's ambition is to develop technological improvements to Hall effect thrusters.

## 20 years of patronage

Grappling with energy and environmental risks is one of the great challenges of our age. EDF, École Polytechnique and the Polytechnique Foundation first formed a partnership in 2003, and renewed it in 2008, to establish two teaching and research chairs. Both are focused on the energy and ecological transition, and last year the Chair for Sustainable Development and the Chair for Sustainable Energies celebrated their 20th and 15th anniversaries respectively.

While public-private research partnerships are now commonplace, the creation of the first EDF-backed chair at École Polytechnique in 2003 was an innovative collaborative project.

Twenty years later, l'X now has more than 30 chairs devoted to societal, economic and environmental issues in a vast array of fields, from data science and artificial intelligence to energy and the ecological transition, engineering and life sciences, economic innovation and responsible management, finance, transport, space, innovative materials and the place of the arts in society.



# HIGHLIGHTS

**29 MARCH**

## INAUGURATION OF THE CHAIR FOR “HIGH FREQUENCY PLASMA ACCELERATION”

École Polytechnique, the Institut Pierre Lamoureaux and the École Polytechnique Foundation have united to establish a new international research chair in high frequency plasma acceleration. The chair's work will be focused on laser and plasma physics, accelerator engineering and the development of scientific and industrial applications. Plasma acceleration is an emerging technology which could potentially allow for a dramatic reduction in the size of electron accelerators, currently measured in kilometers.



**2-3 OCTOBER**

## X-FORUM 2023: THE POLYTECHNIQUE BRAND STILL HIGHLY SOUGHT AFTER BY EMPLOYERS

X-Forum is an annual event held on campus for students at École Polytechnique and the Institut Polytechnique de Paris, and this year's edition attracted almost 2,000 (including 1,000 current X students) and over 150 businesses and international universities.

**16-19 NOVEMBER**

## LX HOSTS THE 3<sup>RD</sup> EDITION OF SPACECON

Founded by X alumni and supported by the Astronautix student society, the École Polytechnique Space Center (CSEP) and the 'Space: Science and Challenges' program, this event brought together major players from the space industry and research community.



**24 OCTOBER**

## “AUDIOMOBILITY 2030” PROJECT PRESENTED AT THE AUTO INDUSTRY DAY

The “Audiomobility 2030” project, of which our Center for Applied Mathematics (CMAP) is a member, was one of the winners of the Coram 2022 call for projects. It was also one of the projects presented at the Auto Industry Day organized by PFA (Automobile Platform) at the Carrousel du Louvre, Paris. The aim of the CORAM 2022 call for projects is to support research and development led by businesses in the automobile and road transport sectors.





# 5

OUR MISSIONS

## INTERNATIONAL PARTNERSHIPS

École Polytechnique has continued to work with our European partners to tackle the challenges of sustainability, as part of the EuroTech alliance of which I'X held the rotating presidency until June 2023. We have also continued to nurture our partnerships with elite institutions of higher education all over the world, while reasserting our commitment to the most important international university networks (U7+, Alliance, RESCIF). The International Relations department is always particularly attentive to the quality of services provided to students, lecturers, researchers and international staff on campus, with very exacting standards.







## Strong European standing

From January through June 2023, École Polytechnique held the rotating presidency of the Eurotech university alliance, a group comprising six of the continent's leading science and technology universities - l'X, the École Polytechnique Fédérale in Lausanne, Eindhoven University of Technology, the Danish Technical University, the Technical University of Munich and Technion, the Israel Institute of Technology.

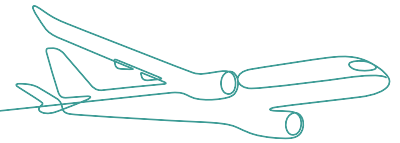
During the presidency, the school hosted the symposium "EuroTech Universities: An Alliance Working for Global Sustainability," bringing together directors, researchers and lecturers from the six members of the alliance to discuss the initiatives their institutions are taking to accelerate the transition to a more sustainable world, as well as EuroTech's joint plan of action. In the wake of this event, the presidents of the six partner universities jointly issued a "Sustainable Development Declaration" comprising seven points.

EuroTeQ is a European university founded in 2020 by École Polytechnique and 5 academic partners, with the support of the European Commission which has now approved proposals to expand the alliance to welcome in two more institutions - HEC and IESE Business School - along with two associate members - the Institut Polytechnique de Paris and EPFL, while also extending the present funding agreement until 2027. During its initial launch phase, EuroTeQ Engineering University focused on the initial training provided to engineers of the future. The second phase will see this approach expanded to encompass continuing education.





## Stronger international partnerships and alliances



As coordinator of student initiatives under the aegis of the U7+ international network, École Polytechnique co-organized the U7+ student challenge on the sustainable development goals, hosted on the campus of the University of Ottawa. The competition involved eight teams from Canada, France, Japan, Ghana, Ivory Coast, India and the USA. In online format, École Polytechnique also organized the third edition of the U7+ student forum, bringing together over fifty students and experts from twenty different universities. The forum was devoted to discussing the commitments that universities can make to become drivers of innovation in matters of peace and security.

In Paris, meanwhile, École Polytechnique took part in the celebrations to mark the twentieth anniversary of the transatlantic Alliance program. Launched in 2002 with the backing of the Ministry for Foreign Affairs, members of the Alliance include Columbia University, École Polytechnique, Sciences Po and the University of Paris 1 - Sorbonne. To mark the twentieth anniversary of this program, researchers from the four partner universities took part in a conference focusing on the challenges posed by climate change, entitled "Climate Change: Toward A Paradigm Shift?"

Delegates from member institutions of the RESCIF network (network for excellence in engineering sciences in the French-speaking world), with which I'X is affiliated, gathered at École Polytechnique to discuss various aspects of their international collaboration and decide upon next steps.

## A first class welcome



In recognition of the great quality of the teaching of French as a Foreign Language (FLE) at École Polytechnique, an interministerial commission this year renewed our FLE Quality certification, with the highest possible score on all criteria.

École Polytechnique's Department for Languages and Cultures, responsible for providing language classes and cultural education to all of the students enrolled on our many courses of study, is now integrated with the International Center for French Language and Culture at the Institut Polytechnique de Paris, of which I'X is a founding member.

Buoyed by the success of the online course 'Studying in France', our Center for Online Teaching and Learning launched a new, more advanced MOOC in 2023. Entitled 'Understanding France - Advanced French Language and Culture', it is devoted to French and French-speaking cultures.





# HIGHLIGHTS



**20** COLUMBIA ALLIANCE *Years*  
*Ans*

COLUMBIA UNIVERSITY  
ÉCOLE POLYTECHNIQUE  
SCIENCES PO  
PARIS 1 PANTHÉON-  
SORBONNE

**13 MARCH**

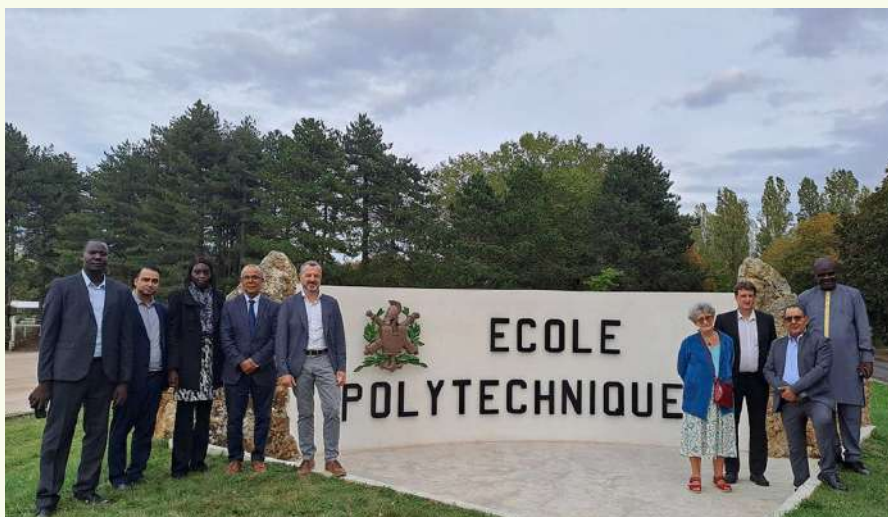
## 20 YEARS OF TRANSATLANTIC COLLABORATION WITH THE ALLIANCE

The Alliance, of which École Polytechnique is a founding member, celebrated 20 years of international collaboration in Paris. To mark the occasion, a conference on the challenges posed by global warming brought together researchers of international standing from the four partner universities.

**12-14 OCTOBER**

## NETWORK FOR EXCELLENCE IN ENGINEERING SCIENCES (RESCIF) MEETS AT L'X.

École Polytechnique was happy to welcome delegates from the member institutions of the network for excellence in engineering sciences (RESCIF), hailing from across the French-speaking world. Topics for discussion included the recent summer school on the theme of entrepreneurship, hosted in July 2023 at St. Joseph University, Beirut, as well as the results of the call for projects open to RESCIF joint laboratories.



**16 JUNE - 7 JULY**

## L'X HOSTS THE U7+ STUDENT FORUM ON PEACE AND SECURITY

At the third edition of the U7+ student forum, participants reflected on what they could do to make sure that their universities step up to their roles as catalysts for innovation in matters of peace and security.

Hosted and co-organized by École Polytechnique, the Forum was held online between 16 June and 7 July. It brought together students and professors from the members of the U7+ Alliance all over the world.





28 MARCH

## EUROTECH SUSTAINABLE DEVELOPMENT SYMPOSIUM HOSTED AT L'X

École Polytechnique, which held the rotating presidency of the EuroTech Universities Alliance in 2022-2023, organized a symposium on the theme of sustainable development. Hosted at our Paris campus, "EuroTech Universities: An Alliance Working for Global Sustainability" saw contributions from researchers, lecturers and directors affiliated with the six partner universities.







**16 JUNE - 7 JULY**

### FRAMEWORK AGREEMENT FOR THE POLYTECHNIQUE-BERKELEY EXCHANGE PROGRAM

École Polytechnique and the University of California, Berkeley have signed a framework agreement with a view to reinforcing their international cooperation. Both institutions have established programs allowing students on the engineering programs at I'X and Berkeley to conduct research exchanges in their respective electro-technical and computing departments. The program has secured backing from the I'X Foundation, with financial assistance for participating students.



**17-21 APRIL**

### EUROTECH POSTDOC2 BRINGS TOGETHER POSTDOCTORAL RESEARCHERS FROM ALL OVER EUROPE

École Polytechnique hosted a five-day seminar for 35 postdoctoral researchers on the EuroTech Postdoc2 program. Based at universities all over Europe, these postdoc researchers traveled to our campus to meet their peers and take part in workshops designed to help them prepare for the next steps in their careers.

### EIFFEL BURSARIES: THIRTEEN X STUDENTS IN THE CLASS OF 2023

In 2023, thirteen international students from École Polytechnique received Eiffel bursaries from the Ministry for Europe and Foreign Affairs in recognition of their excellent academic performance. These bursaries are testament to the international standing of I'X, consistently attracting the best international students to its master's programs.







# REPUTATION

In France, École Polytechnique confirmed its leading position in various engineering school rankings and strengthened its reputation with French and international employers. Institut Polytechnique de Paris further improved its leading position in international rankings, and the reputation of our graduates with employers is as solid as ever.

## ÉCOLE POLYTECHNIQUE IN UNIVERSITY RANKINGS



### L'X, FRANCE'S NO. 1 ENGINEERING SCHOOL

École Polytechnique takes first place for French engineering schools in the Figaro, Usine Nouvelle and L'Étudiant rankings.

**LE FIGARO**

**l'Étudiant**

**L'USINE NOUVELLE**







## INSTITUT POLYTECHNIQUE DE PARIS IN UNIVERSITY RANKINGS

**NUMBER 38 IN THE WORLD, NUMBER 2 IN FRANCE**

**NUMBER 10 IN THE WORLD, NUMBER 1 IN FRANCE** for graduate employability

**IP PARIS IN THE WORLD'S TOP 30** for 4 disciplines and in the Top 50 for 4 others.



**IP PARIS 34<sup>TH</sup> IN THE WORLD AND 1<sup>ST</sup> IN FRANCE**

In the ranking of the most international universities



**ANNUAL REPORT**

**2023**

École Polytechnique

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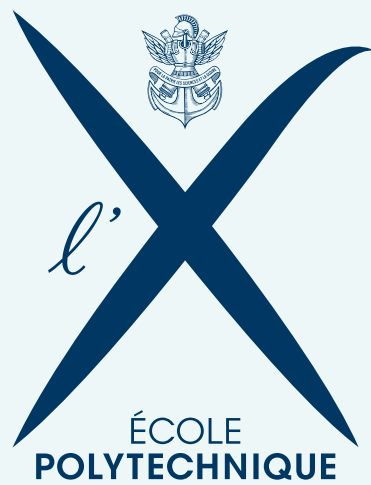
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