EPFL Space Center

EPFL Space Center
Activities 2025

2025 IN REVIEW

In 2025, the EPFL Space Center continued to build strong momentum in education, research and innovation activities, further consolidating its position at the forefront of space training and development.

In education, the Minor in Space Technologies gained renewed visibility through the production of a promotional video, drawing 78 students to the program. The cohort benefited from a first engagement with Daniel Neuenschwander, newly appointed Professor of Practice, alongside his role as Director of Human and Robotic Exploration at the European Space Agency. 2025 also saw the creation of the ClearSpace Prize as a new recognition mechanism within the curriculum. A delegation of students was given the opportunity to represent EPFL at the EUCASS conference. EPFL Students were also widely present at the ESMATS conference held in Lausanne to learn more about space mechanisms and tribology with space processionals from all over the world. Once again in 2025, the EPFL Space Center stood out for its sustained excellence in educating the next generation of space professionals, combining a long history of success with a strong cultural and practical experience.

EPFL's space student associations continued to achieve outstanding results. The EPFL Rocket Team advanced its bi-liquid rocket program, targeting an altitude of 9 km at EuRoC 2026, with ongoing discussions with ESRANGE towards reaching 30 km and ultimately 100 km by 2028 to 2030, a trajectory that included an inspiring visit to Kiruna. The EPFL Spacecraft Team secured funding from the ChiWi Foundation to support a 80% engineer position, and is planning to launch with a Chinese launcher carrying a payload from Novoviz, a spin-off of the AQUA LAB. EPFL XPlore claimed first place at the 2025 European Rover Challenge, a remarkable achievement for the team. Meanwhile, Asclepios successfully conducted their annual analog mission in the Gotthard tunnel.

In research, two major projects reached successful completion. The Bridge SNF project on ground-based and in-orbit tracking for space debris capture produced a database of objects derived from astronomical images, alongside algorithms for light curve analysis and 6D pose estimation from orbital data. The REACT project, a direct ESA FLPP contract on environmental impact assessment of space transportation, delivered the ACT software, a space-specific LCA methodology, and gave rise to the EcoDeltaV spin-off.

Two new projects were launched in parallel: AGORA "Espace Commun", funded by the SNSF at 200 kCHF, aims to provide space sustainability content to French-speaking Swiss citizens aged 15 to 35 through social media, a dedicated webpage, a YouTube documentary, and two public events in 2026. TESSA, conducted in collaboration with the University of Bern, continues the work on 6D pose estimation while also developing adaptive optics for the Zimmerwald observatory and associated atmospheric distortion correction algorithms.

Our innovation activities demonstrated continued growth and maturation. The Space Innovation Network expanded to 40 members and began transitioning towards a project-based model, with initiatives underway through Innovaud and with Swissto12, as well as a new partnership with the CSA. The Center also supported high-profile inbound visits from international space actors including Voyager Space and Axiom, reinforcing Switzerland's position as a destination of choice for the global space industry.

The year was punctuated by several landmark outreach events. In January, the Swiss Space Sustainability Research Days gathered around fifty participants and yielded a conference paper and multiple presentations, reflecting strong community interest in this field. February saw Space Innovation's Annual Meeting, followed in March by the Space Sustainability: Bridging Initiatives and Perspectives gathering. In September, the Center co-organized ESMATS at the Swiss Tech Convention Center, welcoming nearly four hundred participants, a major milestone for our international visibility and for the Swiss space ecosystem more broadly.

Emmanuelle David,
Executive Director

Jean-Paul Kneib,
Academic Director

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Engineers Marnix Verkammen & Mathieu Udriot on duty for the EPFL Space Center at a conference in 2025.

INTERVIEW WITH MATHIEU UDRIOT & MARNIX VERKAMMEN

by Lucie Ryser

As we look back on a year filled with innovation, teamwork, and bold ideas, we're taking a moment to spotlight two people who have played a key role in shaping the EPFL Space Center's energy and vision. Before they set off toward new professional horizons in 2026, we sat down with Mathieu Udriot and Marnix Verkammen, two young engineers whose passion for space technology has left a lasting mark on our community. In this interview led by Lucie Ryser, they reflect on their experiences, share their inspirations, and offer a glimpse of what they believe the future of space holds.

Lucie Ryser: From your perspective, what are the main strengths of an institution like the EPFL Space Center?

Mathieu Udriot: The EPFL Space Center can count on two main advantages that cannot be found in industries : a large pool of brilliant and motivated students, and access to knowledge from state-of-the-Art research laboratories. It is satisfying to see successful student teams, combining the efforts of dozens of students to build something together (a sounding rocket, a rover, a CubeSat, an analogue mission, etc.), and advanced research projects related to space. The EPFL Space Center is perfectly situated to support the students, connect researchers, and manage technical projects with partners across Europe.

Marnix Verkammen: To add to this, the long existence of the EPFL Space Center has granted it over the years a great reputation and respectability in specific fields, particularly that of space sustainability. Most industry players and research institutes keep an eye on EPFL Space Center's activities and often initiate a first contact themselves for research projects. Moreover, the center has shown over the years that it not only brings research beyond the state of the art, but also that it is able to translate it into real industrial applications that make a difference: think of the ClearSpace project that spun out of EPFL a few years ago or today's REACT project.

How do you see the relationship between education, research, and industry within the space sector?

M.V.: The interactions are absolutely essential between those three pillars of the mission of EPFL.

Mathieu Udriot

M.U.: To give a very concrete example, we created and maintained a healthy relationship with entities from the three categories during the REACT project (the main one for which I worked during my time at the Space Center): EPFL and other academic partners brought in the specific knowledge required for the project, we worked with industry to develop software and study test cases. As for education: we (co-)supervised several student projects...

M.V.: In fact, I was hired after a master thesis on a topic related to the REACT project's objectives!

M.U.: On top of that, in terms of education, we infused our newly-acquired knowledge to create or update lectures and courses for master students, to prepare them at best for the industry after they graduate.

M.V.: Yes, it really is the mix of competencies and diversity that enabled us to successfully deliver the project with the expected high quality!

As children or teenagers, did you already dream of working in the space field?

M.U.: It was not the only option but yes I did (even without really knowing what "working in the space sector" meant at the time). As a kid, I cut newspaper articles about space missions and interviews of Claude Nicollier and glued them in a notebook that I still have at home ! It was all very inspirational and impressive with advanced technologies and exploration. Step by step, my path converged to EPFL, microengineering, and the Minor in space technologies, which led to my job at the EPFL Space Center, with an office on the same floor as Nicollier's : achievement unlocked !

M.V.: For me, there was obviously always that child's dream of becoming an astronaut... Until the realisation hit me that it would be relatively unlikely (he laughs). I have always been very much turned towards engineering and tinkering, with a particular enthusiasm for everything that flies. When I was around 14 or 15, I discovered the world or radio-controlled aeroplanes, which greatly increased my conviction that I had to go into the aerospace world! I started my Aerospace Engineering Bachelor with the idea that I would specialise into Green aviation - this was right after Bertrand Piccard's tour around the world in Solar Impulse 2. But, it was the amazing professor of my Orbital Mechanics course in my second year that made me fall in love with the space sector, its orbits and mathematics. So, my gaze was fully turned towards space, and has been ever since! But, the «green» and «sustainable» topics have never left me. Hence, my work in the REACT project and very soon in EcoDeltaV!

Is there a fun fact or scientific anecdote about space that has particularly fascinated or inspired you?

M.U.: I find that space is usually inspiring, with some missions which have a special place in my top-list. The James Webb Space Telescope with its 344 single point of failures that deployed properly is an extraordinary example (also of a nice interna-

tional collaboration). BIOMASS, launched earlier this year, is also special to me as I had the chance to work on some of its flying parts and structure panels during my internship at APCO Technologies in 2019. It is now measuring the forest biomass around the globe for a better understanding of our planet.

M.V.: I already mentioned that amazing professor that changed my mind about space, so let me tell you another anecdote that began changing my views. It was that of ESA's mission of Philae's landing on an incredibly far-away comet! I still remember watching the livestream in 2014 (I was still in high school then) and being equally amazed and then confused as the scientists in the room - it took them a bit of time to understand that Philae rebounded on the surface. It is incredible to me that I am now doing research and working in an industry that is able of such extraordinary and improably difficult feats! But, I hope I can contribute to managing this industry's environmental impact, in order for it to still be able to do all these great things for decades to come.

In your opinion, what major advancements can we expect in the space domain over the next decade?

M.U.: Space infrastructures are critical and this will stay true in the next decade. There will be a few very interesting robotic exploration missions in the solar system, maybe human feet back on the Moon for a while, but most of the activities will stay closer to Earth. I think we will see more investment for missions in Earth's orbit and more launch vehicles to deliver those payload in space. Unfortunately many of these payloads will be military or at least dual use… The workforce in the space sector should ideally focus on scientific Earth observation

Marnix Verkammen

missions, and other types of mission that improve the livelihood of citizens around the world.

M.V.: Indeed, that seems to be the general trend for orbits close to Earth and I have the same opinion about what Earth orbiting space missions should prioritise. But I see the scientific use of space shift more and more towards the Moon and its orbits. I am very much looking forward to the space station that will be built around the Moon and the first women to set feet on its soil. It will hopefully bring back enthusiasm for space science exploration and therefore for the industry at large. However, I hope we do this responsibly, and do not begin to litter another celestial body, or create lunar orbital debris. Besides all of this, the geopolitics and international competition also looms a bit too heavily at times, at the detriment of sustainability initiatives...

A heartfelt thank you to Mathieu and Marnix for sharing their insights, and even more importantly, for their dedication, curiosity, and enthusiasm throughout their years at the EPFL Space Center. We wish them every success as they embark on their next adventures, and we're excited to see where their passion for space will take them next. (Hint: EcoDeltaV, see page 26)

EPFL SPACE CENTER

The Center in a nutshell

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The EPFL Space Center is made up of two groups: eSpace and Space Innovation.

The mission of **eSpace** is to promote space-related research, support EPFL's space-affiliated professors, coordinate the Minor in Space Technologies, and manage the EPFL student teams.

The mission of **Space Innovation** is to support space industries, academies, and research and technologies organisations in Switzerland by coordinating and maintaining the network and offering access to cutting edge technologies, test facilities, continuing education and outreach activities.

Starting in 2026, eSpace becomes EPFL Space Center

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The eSpace logo, brand and name will progressively disappear and be replaced by EPFL Space Center's. The Space Innovation network will still be part of the Center, and will keep its own website and dedicated social media channels.

We will, of course, be sharing updates on these changes throughout the year to keep our audience and subscribers informed about our activities.

EPFL Space Center

EPFL Space Center team

- **Emmanuelle David**, executive director
- **Jean-Paul Kneib**, academic director
- **Lucie Ryser**, communication specialist
- **John Maxwell**, IT manager
- **Joanna Jermini-Howard**, events manager

eSpace

- **Candice Norhadian**, administrative specialist & student coordinator
- **Mathieu Udriot**, engineer & student coordinator
- **Marnix Verkammen**, research engineer
- **Pierre-Alain Maüsli**, student projects supervisor

eSpace Hosts

- **Andrew Price**, postdoctoral researcher
- **Stephan Hellmich**, postdoctoral researcher
- **Thai-Nam Hoang**, software developer
- **Cui Kaiqi**, visiting PhD student
- **Xiao-Shan Yap**, senior research scientist
- **Francesco Renis**, master's student

Space Innovation

- **Martine Harmel**, operations coordinator & secretary to Claude Nicollier
- **Gilles Feusier**, head of science and technology
- **Christian Cardinaux**, industry partnership manager
- **Volker Gass**, strategic initiative support

Part of the EPFL Space Center team for a summer BBQ on EPFL campus

eSpace is the group of the EPFL Space Center dedicated to the two core areas of education and research, bringing together students, professors, researchers, engineers, industries, and international space agencies. Its mission is to inspire the next generation of students in space-related projects and activities, develop novel space science and technology research topics in partnership with EPFL labs and beyond, and foster innovative space initiatives and projects.

In the area of education, eSpace supports EPFL's space-affiliated professors and students, coordinates the Minor in Space Technologies, and provides guidance and support to the EPFL student teams: the EPFL Rocket Team, the EPFL Spacecraft Team, and Xplore.

The Asclepios, Space@yourService, Callista and SSA teams do not have MAKE status; eSpace therefore does not supervise them directly but remains available for advice and, of course, follows their activities with great interest.

In the area of research, eSpace pushes space-related projects by supporting researchers with funding, information, and contact with the space community. eSpace boasts a team of experts and benefits from close collaborations with research laboratories and institutes at EPFL.

Within research and education, eSpace has identified areas of focus that are structured as hubs. The mission of the hubs are to coordinate activities related to each theme: to answer to the three pillars of EPFL — research, education and innovation; and to push interdisciplinary research at EPFL, in Switzerland and globally.

A Special Note of Thanks to Candice Norhadian

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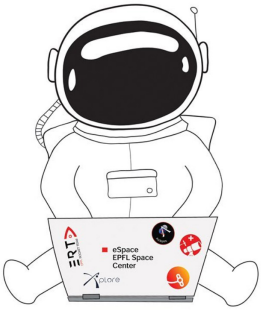
Ten years! That's how long Candice Norhadian has been the quiet engine behind eSpace. And anyone who's worked with her knows that «quiet» is perhaps the wrong word.

Over the course of a decade, Candice took care of so many things. She watched over the students (her beloved «petits»), kept the admin running smoothly, managed the premises, built and maintained the eSpace website, designed countless visuals, organised events, coordinated meetings, and fielded what can only be described as approximately one million questions from her colleagues (all of them answered, all of them solved). She was also the indispensable link with the Bureau Central, which, frankly, must feel lost now that she's no longer answering the phone.

Candice is many things: creative, autodidact, curious, endlessly efficient, and — let's be honest — a little scary. The good kind of scary. The kind where things get done, standards are upheld, and nobody dares to submit a half-finished form. Her dedication has been a guarantee of quality in everything eSpace puts out into the world.

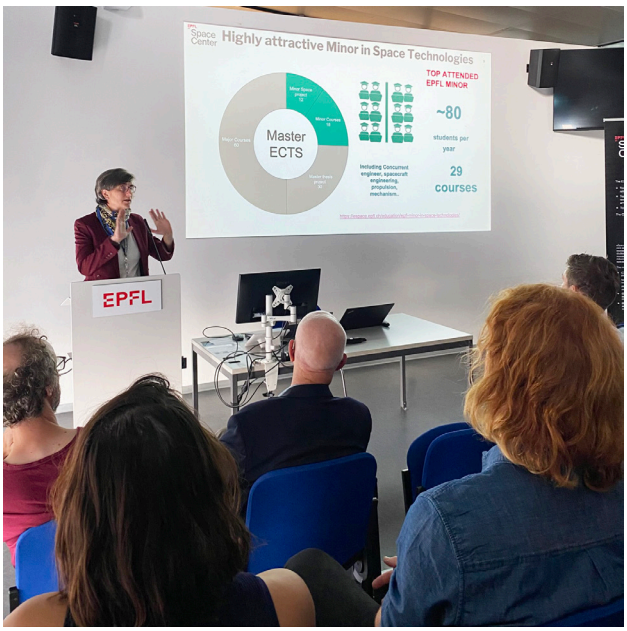
In 2026, she moves on to a new lab at EPFL. Candice, thank you. For the ten years, the creativity, the rigour, and yes, even the look that ment we did something wrong. We will miss you, and we wish you all the very best in the next chapter of your career.



The little astronaut created by Candice illustrated many Instagram posts throughout the years. © EPFL Space Center

Pierre-Alain Maüsli, Emmanuelle David and Candice Norhadian looking at a 3D printed model of the EPFL Rocket team thrust chamber.

Candice Norhadian designed the 20 Years Annuversary poster in 2023 © EPFL Space Center



16 September 2025: info session about the Minor in Space Technologies & pizza party. © EPFL Space Center

1. EDUCATION

eSpace

Space Innovation

1.1 Minor in Space Technologies

For the last twenty years, EPFL has offered the Minor in Space Technologies to foster and promote the awareness of space technologies and applications among students. The Center coordinates the minor to maintain a coherent and state-of-the-art coursebook, and its staff are directly teaching some of the core classes.

Open to all EPFL students regardless of their field of study and hosted by the Electrical and Electronic Engineering Section (SEL), the Minor continues to grow as a rich interdisciplinary programme and had 78 enrolled students in 2025. With 26 courses totalling 100 ECTS, students have the flexibility to tailor their learning while acquiring essential skills for the space sector, whether working on satellite projects or exploring sustainable space solutions.

A highlight of 2025 was the first visit of Daniel Neuenschwander, professor of practice in the School of Engineering, to EPFL, where he had the opportunity to interact directly with students, bringing valuable institutional and industry perspective to the programme.

To kick off the academic year, the Center organized an info session on Tuesday, September 16, on the EPFL campus. The evening combined a practical overview of the minor's courses with networking over pizza, and featured welcome remarks from Prof. Andreas Burg, an introduction by course coordinators Emmanuelle David and Mathieu Udriot, and a special guest talk by astronaut and programme lecturer Claude Nicollier. Alumni shared their experiences through lightning talks, and the evening also served as the occasion for the ClearSpace Prize award ceremony.

Finally, the EPFL Space Center collaborated with Galactic Studios to produce a new promotional video about the Minor. Featuring testimonials from alumni, industry professionals, and faculty members, the clip is now shown at events and booths and shared on the Center's YouTube channel, offering prospective students an engaging and authentic window into the programme.

Watch the video: https://www.youtube.com/watch?v=7Jz-Mv1Ca-A

1.2 Supervision of MAKE projects

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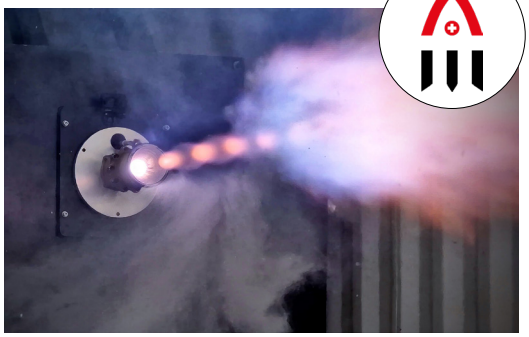
EPFL Rocket Team



First static fire tests for B1 engine, the first regenerative cryogenic engine ignition at EPFL. / The team at EUROC, launching Firehorn I.

The EPFL Rocket Team continues to expand the student rocketry field, strengthening its technical expertise while reinforcing the visibility of the EPFL community. The year was marked by a series of significant milestones, beginning with the official reveal of Firehorn, the team's first cryogenic bi-liquid rocket, introducing a new launch vehicle architecture.

In October 2025, the team participated in the European Rocketry Challenge, representing EPFL on an international stage and engaging with other student teams from across Europe. During the competition, the EPFL Rocket Team launched Switzerland's first cryogenic liquid rocket, marking a major achievement for both the team and the national space ecosystem.Preparations are currently underway for the next rocket. The test campaign for the new engine, designed to deliver 7.5 kN of thrust, will begin shortly at the testing facility, representing the next step in propulsion development.

Education remains central to the team's mission. In May 2025, the Space Race project was, for the first time, entirely organized and prepared by the team, offering first-year students an introduction to rocketry and contributing to the development of the next generation of aerospace engineers.

The Plasma Project reached important milestones this year, successfully testing one of its engines in optimal configuration inside the vacuum chamber of the EPFL Physic Section. The Icarus project continued advancing its Guidance, Navigation, and Control algorithms, with the objective of flying the hopper within the year.

EPFL Spacecraft Team

EPFL Spacecraft Team, 2025

In 2025, the EPFL Spacecraft Team achieved significant milestones across many areas of their mission development.

Following a major change in the timeline, they successfully re-designed both hardware and software to integrate a new payload: a Single Photon Avalanche Detector (SPAD) manufactured by Novoviz. This mission, named CHESS Pathfinder 0, will provide crucial insights into the testing and launch phases of a space mission; knowledge that will directly support the development of CHESS Pathfinder 1 and 2, their upcoming missions.

Regarding the satellite structure, they conducted vibration tests on a mass model of the 3U CubeSat at the University of Bern. These tests have yielded valuable data that will guide the continued development and refinement of the satellite's structural design.

Progress on the ground segment continued steadily, marked by the successful completion of the X–Y mechanism assembly together with the antenna dish. With the mechanical structure in place, the team initiated the development of the tracking software system that will ultimately allow the ground station to acquire and follow the satellite throughout its orbital passes. Looking ahead, installation of the complete X-band antenna system is planned for March 2026 on the roof of the BM building, at EPFL.

The EPFL Spacecraft Team continues to collaborate closely with ESA through the Fly Your Satellite program, and is on track to launch CHESS Pathfinder 0 in mid-2027.

The Spacecraft Team has received a 100,000 CHF grant from the ChiWi foundation for the hiring of a project manager to support two scientific missions. One, flying a Novoviz Single-Photon Avalanche Diode Camera; and Two performing ElectroMagnetic Compatibility Calibration in support of the Centre for the Protection of Dark and Quiet Skies to reduce unintended electromagnetic radiation.

EPFL Xplore

Photo of the rover on the day of the unveiling, 2 May 2025 / Photo of the team that participated in the ERC posing with the prizes they won, 31 August 2025.

In 2025, EPFL Xplore reached a historic turning point in the association's journey by securing first place at the European Rover Challenge with its rover Phoenyx and drone Zephyr, one of the leading international competitions in space robotics. This outstanding achievement marked the culmination of months of dedication and teamwork, as the association returned stronger than ever to the international stage. Alongside the overall victory, EPFL Xplore was awarded the Innovation Prize by the Municipality of Krakow and received the Excellency Award for the Drone Task after achieving the highest score among all competing teams.

Beyond competition results, the association strengthened its educational and outreach mission in space robotics with the second edition of the Xplore Rover Challenge, organized this time as an on-campus event. With the participation of several invited speakers, including Anca Rusu, Executive Director of Swiss Robotics, the event successfully promoted space robotics and related technologies to a broad audience of 100 to 200 visitors, ranging from families and high-school students to professors and EPFL students.

In parallel, the Xplore Research Pole reached a major milestone by concluding its long-term projects after three years of sustained effort, including the legged robot Chienpanzé and the plastic recycling machine Wall-E. This closure marks the end of a productive chapter and opens the door to new directions and ambitions for the association. Xplore Research is now fully open to student-led initiatives. Students are encouraged to propose, design, and lead their own projects, particularly in the field of space robotics. This shift reflects Xplore's core values and reinforces the association's mission to empower students to explore and shape the future of robotics in space.

"Joining EPFL Xplore three years ago, I was far from imagining the journey it would become. From taking part in the first edition of the Xplore Rover Challenge to competing at the European Rover Challenge, I gained hands-on experience in space robotics while working alongside an incredible team of passionate engineers. Over time, taking on more responsibilities within the association helped me grow both professionally and personally. With the continuous support of Maxime Rombach and Candice Norhadian from EPFL Space Center, whose guidance and availability were invaluable throughout this journey, we had the opportunity to take part in discussions and events, meeting ESA members, industry partners, and astronauts. Overall, this experience taught me the true meaning of passion, commitment, and responsibility."

Nour Larbi, president

1.3 Supervision of other EPFL space associations

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Asclepios Lab

The Asclepios team on EPFL campus

The Asclepios V mission was successfully conducted in late July and early August 2025, continuing the vision of simulating a human expedition to the lunar south pole. Once again, two dozen students participated in this international space simulation mission, either as analog astronauts or as members of the Mission Control Center (MCC). Participants had the opportunity to experience key aspects of human spaceflight operations, ranging from science and engineering to medical support, communication, and mission management. Building on the achievements of previous missions, Asclepios V further advanced the realism and complexity of operations, strengthening its contribution to the future of human space exploration.

2025 also marked an important evolution for the Asclepios community. The Asclepios Association has officially split into two complementary entities. Asclepios Mission will continue as the international branch responsible for organizing the mission, as well as recruiting and training astronauts. Meanwhile, Asclepios Lab has become an EPFL-recognized association supported by EPFL Space Center, working year-round on scientific and technical projects. Its first-year focus areas include four major projects: Spacesuit Design, Base Design (including the base, rocket room, and airlock), Launch and VR Simulations, and Environmental and Life Support Systems.

Space@yourService

The podium of the 2025 Astronomy on Tap quiz

In 2025, Space@yourService continued its mission to share space sciences with everyone through creative, fun, and accessible events. Their goal is to make space feel approachable, whether you're a newbie, a student, or passionate about the topic since childhood.

They hosted their immersive escape game, "Switzerland, We've Had a Problem!" twice in the EPFL SG Hall, splitting players between Mission Control and Lunar Base tents. Teams raced to restore communication, repair damaged systems, and conserve oxygen, all while solving space-themed puzzles.

This year's major new step was opening that experience to younger audiences. The escape game was adapted to children, allowing primary school students to take part and discover space missions through teamwork, hands-on challenges, and age-appropriate puzzles. Their enthusiasm confirmed how powerful playful learning can be.

The team also held the 12th edition of "Astronomy on Tap Lausanne" during the Semaine de l'Astronomie, mixing short cosmic talks with a relaxed bar atmosphere. This edition was made even more special by the welcoming the associations Astronomy on Tap Bern and Zürich, who joined Space@yourService for their dedicated space quiz, bringing extra energy, friendly competition, and great discussions throughout the evening.

Looking ahead, the team is excited to create all kinds of new activities and keep bringing space sciences to everyone!

Callista

Sky picture with telescopes during one of Callista's nightly observations

Callista's activities focus on amateur astronomy, including observations both on campus and in remote locations, alongside astrophotography. The association's radio astronomy group also runs practical sessions for physics students using a radio telescope built on the ELB building roof.

In 2025, Callista continued to organize the "Semaine de l'astronomie": a week full of conferences, workshops and nightly observations of the sky. This year, the event featured Claude Nicollier (former Swiss astronaut) and Jean-Paul Kneib (head of EPFL's astrophysics laboratory LASTRO).

In 2024, Callista joined the PANOPTES project, led by the STEM Inspire Hawaii organization which aims at building a network of small, automated telescopes to detect exoplanets and stellar flares, as an outreach project for students in Global South countries. In 2025, Callista developed a new prototype for the telescope, assembled it and carried out first observations. 2026 will see the unit being completed and fully tested before being permanently installed at the Astropléiades site.

Space Situational Awareness (SSA)

Night training observation on the roof of the Cubotron building.

The SSA project is an independent commission of Callista. It is more engineering focused, carrying astronomy projects aiming at studying satellites and space debris with ground telescopes. In 2025, the team continued to grow and projects developed well.

The main current goal of the SSA group is to build and install an astronomy dome to house a large telescope and be able to use it easily and remotely to carry out observations. This year, the design was revamped to be more manufacturable and safer. To test the configuration and validate the design, the team has started to build a small-scale model of the dome. This work will continue in 2026, with the objective to also start work on the real dome.

Another point of interest of the SSA project is the study of satellite images to acquire data on satellites and space debris. For this, two members of the team participated in the Space Sustainability Days organized by the EPFL Space Center in 2025 to present a poster and acquire new knowledge. New members have also been trained to use the telescopes (having to cope with bad weather and technical problems) and process astronomical images.

1.4 Supervision of master's and semester projects

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1.4.1 Master's projects

Fabio Nureconda
[Master] Exploration of Machine Learning applications for Life Cycle Assessment integration in early space mission eco-design
(supervisor assistant: Marnix Verkammen)
This Master Thesis project builds on a previous conference proceeding by EPFL Spacecraft students (Angelina Frolova, Antonio Zecchin, Lina Kuhlmann) and Marnix Verkammen on the conceptual development of and initial research into a streamlined ecodesign tool for cubesats. In this MSc study, Fabio investigated the integration of machine learning (ML) techniques to accelerate and improve eco-design for space missions and provide early-stage design guidance that adapts dynamically to evolving mission parameters. A major part of his scientific contribution resides in his development of a preliminary ML-based data augmentation algorithm for the generation of new Life Cycle Inventory datasets for space systems. Overall, the resulting work contributes to the first steps of the space industry towards a more agile and data-driven approach to early sustainable space system design.

Francesco Renis
[Master] Leveraging light-curves inversion for kinematic state estimation of uncooperative targets
(In collaboration with Politecnico di Torino, supervisors: Mathieu Salzmann and Professor Manuela Battipede, supervisor assistant: Andrew Price)
The growing number of space objects threatens mission sustainability, making precise real-time tracking essential for Active Debris Removal (ADR) and In-Orbit Servicing (IOS) missions. For an uncooperative target, a Vision Based Navigation (VBN) relative pose (attitude and position) estimation system coupled with a state estimator are likely required. Missions can further be supported by commissioning unresolved observations of the target to produce light curves which can then be used to extract rotation rates and axes of rotation.
This work performs the novel task of exploiting the light curves as kinematic priors to enhance the performance of the state estimator. An Extended Kalman Filter (EKF) and an Unscented Kalman Filter (UKF) are implemented. Light curve motion prior extraction and VBN pose estimation are simulated. Three independent studies are performed exploiting the motion priors: (1) Optimizing the Kalman filter tuning for specific kinematic scenarios; (2) Injecting the priors as an initial condition to improve convergence and steady state errors; and (3) Enhancing an outlier rejection function with supplementary proxy measurements from the priors.
Performance is evaluated on a custom synthetic light curve dataset based on the Atlas Centaur rocket body, and a private commercial dataset based on the Vega Secondary Payload Adapter from commercial collaborator, ClearSpace. Pose estimation results are simulated based on state-of-the-art machine learning spacecraft pose estimators. By exploiting kinematic priors, convergence time and steady state error reductions of 3× or more are exhibited for certain state components, dependent on the kinematic scenario and filter tuning. In general, several trade-offs are observed with kinematic priors providing the opportunity for the lowest steady state errors. This method has the potential to improve the pose estimation accuracy for proximity operations of uncooperative tumbling objects, supporting ADR and IOS missions, especially considering the mild assumptions required.

Pierre Ancey
[Master] Spacecraft Pose Estimation on the Edge
(supervisor: Mathieu Salzmann, supervisor assistants: Andrew Price and Saqib Javed)
Estimating the 6 degrees of freedom (6DOF) pose –translation and attitude– of a spacecraft, using a single camera image is a key enabling technology for space applications such as in-orbit servicing, active debris removal, in-orbit construction, and asteroid mining. Existing methods often depend on iterative PnP-based algorithms which, while precise, are computationally intensive and unsuitable for real-time deployment latencies due to their iterative nature. To address these limitations, we propose a novel transformer-based architecture which directly regresses the 6DOF pose. Our approach integrates bounding box priors and introduces specialized loss functions, achieving state-of-the-art performance among non-PnP-based methods while maintaining a focus on deployability. Derived specifically for bounding box priors, our loss functions result in an 112% improvement over previous loss functions with no reduction in generality. Additionally, we investigate the effects of model optimization techniques, such as quantization and pruning, to evaluate their impact on pose accuracy and inference speed across diverse hardware platforms including a server-grade GPU, a consumer GPU, and an edge device: the NVIDIA Jetson Orin Nano. We hope that this work will contribute to the development of efficient and reliable vision-based 6DOF pose estimation systems in the space community.

Bron Ward
[Master] LCA in early space systems engineering
(supervisor assistant: Mathieu Udriot)
This project built on the lessons learnt and methodology proposed for the 2025 edition of the ENG-411 course, tackled the identified knowledge / feasibility gaps, and leveraged on ongoing research at the EPFL Space Center around space sustainability in systems engineering.
Bron has developed a simplified design software that emulates the setup of a concurrent design facility, to converge on a spacecraft design with physical and environmental consideration. For given mission objectives, several domains of expertise are simulated, including a life cycle assessment discipline, and design choices are made by a genetic algorithm to explore, evaluate, and select potential design solutions over several iterations. In parallel with interviews with industry representatives, this helped Bron investigate were the LCA discipline shall be integrated to be most effective, and how different space system designs compare when adding a weight on the environmental impacts.

Sarah Marciniak

[Master] Development of AOCS sensor models and attitude estimation methods for future integration into MBSE tool

(supervisors: Gilles Feusier, Philippe Müllhaupt)

The project focuses on modelling satellite subsystems for attitude and orbit estimation. It includes the development of sensor models such as star trackers, gyroscopes, Sun sensors, global navigation satellite system (GNSS) receivers, and magnetometers. The operating principles of these sensors are studied in detail. Their interaction with the space environment is also analysed.

The project examines how these sensors interface with the on-board computer (OBC). Based on these models, attitude determination algorithms are developed. Orbit estimation algorithms are also designed and implemented. The work includes estimating position and velocity along the satellite's orbit. Different estimation techniques are explored for robustness and accuracy. The algorithms are integrated into an OBC model. This model is connected to the control segment of the Attitude and Orbit Control System (AOCS). Simulation environments are created to test and validate the system.

Various scenarios are used to assess performance under different conditions. Inputs such as initial conditions and orbital parameters are considered. Predefined satellite operational modes are also included. The system must handle variations in mission phases. It should also adapt to changes in sensor availability.

The main objective is to achieve reliable and accurate state estimation. The outcome is a functional AOCS sensor suite and estimator prototype. This prototype supports integration into a complete satellite digital twin.

1.4.2 Semester projects

- **Gunnar Dofri Vidarsson**, "Machine learning based orbit estimation from Seeing effect"
- **Julia Renard**, "Spectral rendering of space objects"
- **Sarah Mathilde Marciniak**, "Orbit fitting of satellites that cross the entire field of view"
- **Adrien Cadet**, "Orbit fitting of satellites crossing the entire field of view"
- **William Martin**, "Enabling the Geneva observatory for space debris observations"
- **Matthieu Tonneau,** "Preliminary assessment of pre-launch operations and logistics for a suborbital vehicle"
- **Ramon Heeb,** "Flatsat for the EPFL Spacecraft Team"
- **Ryan Svoboda**, "Mission analysis and feasibility study for the recovery system of a suborbital rocket"
- **Michaël Fuser, Antoine Marchand Truchot,** "Spaceshot project MBSE"
- **Haroun Naina**, "Measurement methods for FireHorn I exhaust emissions during horizontal propulsion test"
- **Clara Gloge, Aubin Mercier,** "Project PrOXISS - Proximity Operation eXperiment on the International Space Station feasibility study for uncooperative object capture in microgravity"
- **Martin Lemaire,** "Sustainability in space systems engineering"
- **Jérôme Mayolet**, "Sustainable missions to the Moon - Sustainable ISRU and human development on the Moon"; Annex: "Approaches to mitigate sustainability risks for long-term lunar developments"
- **Mathilde Simoni,** "Foundations for a digital twin of the CHESS CubeSat"
- **Thibault Bardet,** "Handbook on sustainable design practices for space missions and the launch segment"
- **Ryan Svoboda**, "Modeling of Propellant Feed and Combustion Chamber for Liquid Rocket Engines"
- **Julien Schluchter**, "Enhancing the Hold-Down and Release Mechanism (HDRM) for Satellite Solar Panels"
- **Matthieu Tonneau**, "Mission design, system requirements and feasibility study for a plasma thruster enabled payload for a suborbital rocket"
- **Melanii Cvetkovska**, "Environmental Control and Life Support System - Water Recovery and Management System"
- **Tania Rosset,** "Environmental Control and Life Support System - Water Recovery and Management System"

1.4.3 ClearSpace Prize

We are proud to announce the winner of the very first edition of the ClearSpace Prize, which recognizes excellence in a semester project or Master's thesis by an EPFL student who has made a significant contribution to scientific or technical progress in the field of space sustainability. Congratulations to William Martin, recipient of this inaugural award, for his outstanding semester project: "Enabling the Sauverny Observatory for space debris observations", supervised by Stephan Hellmich at the EPFL Space Center.

William's work stood out as a highly concrete and impactful contribution to improving our ability to monitor and address the growing challenge of space debris.

"This prize embodies our ongoing collaboration with EPFL to foster research excellence in the field of space sustainability. William Martin's project represents a rigorous and meaningful contribution to enhancing our technical capacity for space debris observation for the future of space operations." – Jacques Viertl, ClearSpace Switzerland Managing Director

This first edition of the prize was an encouraging sign of the momentum building around this important topic, and we're excited to see what EPFL students will achieve in the upcoming years.

Learn more about the ClearSpace Prize and how to apply:

Claude Nicollier and ClearSpace Prize winner William Martin

1.5 Continuing education: Space Sustainability course

In March 2025, EPFL hosted its second professional course on space sustainability — "Space sustainability: How to design more sustainable missions". Experts tackled the history of space sustainability and geopolitical challenges. Different tools and methods were presented and then used in group work. On the last day, the concepts of environmental social governance (ESG) and corporate social responsibility (CSR) were presented. After completing the course, the participants had a better understanding of the challenges of space sustainability, a concrete set of tools, and methods on how to better measure, analyse and act towards more sustainable space missions. The four day course also allowed in-depth exchanges with experts.
The target audience is composed of professionals — engineers, managers, or policymakers — with interdisciplinary backgrounds and a few years of working experience. The group work included a learning-by-peers dimension to the students and identified the challenges from other disciplines.
Proud of the success of this course and its fruitful collaboration with the UNIL-EPFL Continuing Education Department, the EPFL Space Center would like to extend its warmest thanks to the Extension School for its grant and support for business development.

The group work included a learning-by-peers dimension

1.6 Education plans for 2026

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1.6.1 EPFL's Minor in Space Technologies

Following the milestones achieved in 2025, the EPFL Space Center looks ahead to 2026 with an enriched course offering and deepened institutional partnerships, continuing to evolve the Minor in Space Technologies in response to the rapidly changing space landscape.

Offer a dynamic curriculum that engages EPFL students and professionals in applying innovative technologies to space science and mission design.

A highlight of the 2026 academic year will be the inaugural edition of Space Propulsion II, a new advanced course launched jointly with ETH Zurich and scheduled for the fall semester. This collaboration between two leading technical universities reflects our commitment to offering students access to complementary expertise and cross-institutional learning environments.

Returning to the program, Advanced Satellite Positioning will once again be taught by invited lecturer Gabriel Laupré (Space Campus). The course equips students with advanced knowledge of satellite-based navigation and positioning, competencies that are increasingly in demand across both space and Earth observation sectors.

Prepare the next generation of space professionals through immersive, hands-on learning and meaningful connections with industry partners.

In 2026, the EPFL Space Center will take part in the ESA Symposium on Space Educational Activities (SSEA), reaffirming our active role in shaping space education at the European level and offering students a platform to engage with the wider academic and institutional community.

in 2026, the EPFL Space Center plans to bring together the Swiss space education community at a shared stand during SSEA conference, and thank SXS for their support. This is an exciting opportunity to highlight the achievements of our students and MAKE teams, and to foster the kind of cross-institutional connections that have always been central to the Space Center's educational mission.

1.6.2 Strategic KPIs

To ensure program effectiveness and maintain high educational standards, we will track several key performance indicators.

Student demographics and engagement

- Comprehensive analysis of minor program enrollment, including gender distribution, academic background, and nationality diversity.
- Monitoring of ECTS-credited project supervision and completion rates.
- Tracking student participation and paper presentations at international conferences.
- Evaluation of student engagement in the new Space Sustainability course.

Academic development

- Assessment of student grant utilization for conference attendance.
- Tracking of research publications and conference presentations.
- Evaluation of the impact of the professor of practice position on student learning and industry connections.

Through these focused initiatives and careful monitoring of our performance metrics, we aim to strengthen our position in space technology education while preparing our students for successful careers in the rapidly evolving space sector.

Sutdents showcasing their work and crafting at the SPOT - Student Prototyping and Outreach Tank

2. RESEARCH

eSpace

Space Innovation

Space sustainability was the top research focus at eSpace in 2025, and will remain a central priority in 2026. eSpace's role within EPFL is to coordinate space-related research and provide support to space faculty across campus. In this capacity, eSpace manages a portfolio of research projects involving EPFL researchers, while also taking the initiative to connect EPFL's space professors with the broader Swiss and international space community, through event participation and organisation, conference presentations, and the identification and promotion of funding opportunities.

Among its research areas, eSpace places particular emphasis on space sustainability, a topic of growing urgency across research and industry alike. Today, over 1.2 million debris objects larger than 1 cm are estimated to be orbiting Earth, alongside more than 50,000 objects larger than 10 cm. Of these, only a small fraction are active satellites, leaving the vast majority of orbital space occupied by non-functional objects.

The rapid growth of the space industry has brought a surge of new actors and ambitious plans for large satellite constellations. Yet developing and enforcing responsible practices, guidelines, and norms remains a challenge in an increasingly complex regulatory environment. Without a meaningful shift toward more sustainable use of space, even without additional launches, the number of debris objects would continue to grow, as fragmentation events generate new debris faster than it can naturally re-enter the atmosphere.

Space sustainability, however, extends well beyond Earth's orbit. The growing frequency of launches and the constant flow of satellite re-entries have measurable environmental impacts here on Earth. Looking further ahead, the rapid expansion of activities on the Moon and beyond — largely driven by private and commercial interests — must also be considered as part of a responsible, longterm approach to space.

eSpace is a recognised leader in the space sustainability movement, and the sustainable use of space will remain a defining focus of its activities in the years to come.

2.1 Research projects

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The Sustainable Space Hub was established in 2023 to bring together several EPFL projects related to space sustainability that had previously operated without strong interaction. Since then, it has proven to be a success, attracting growing numbers of master's students and PhD candidates, and fostering connections between an expanding set of research projects.

The Hub links individual projects through a workflow built on three intertwined pillars: measure, understand, and act for space sustainability. Having completed an initial phase of mapping and consolidating existing work, it is now focused on launching new projects to address identified knowledge gaps in the field — and on positioning Switzerland as a European leader, particularly in life cycle assessment of future space systems, ecodesign, high-altitude atmospheric emissions, and cis-lunar sustainability. This ambition is well-founded: research groups across Switzerland bring complementary expertise that collectively spans the full breadth of space sustainability.

The Sustainable Space Hub
espace.epfl.ch/research/sustainable-space-hub/

This momentum was further amplified by the Swiss Space Sustainability Research Days (SSSRD), held in Les Diablerets, Switzerland, in January 2025 (see page 31). Organised at the initiative of the EPFL Space Center, the event expanded the Hub's vision to a national scale, federating activities around the topic across the country.

The Hub's regular **SSH coffee events** illustrate its role as a catalyst for community-building: researchers and students from different specialised domains come together, discover unexpected connections, and gain a broader understanding of the field — simply by meeting one another.

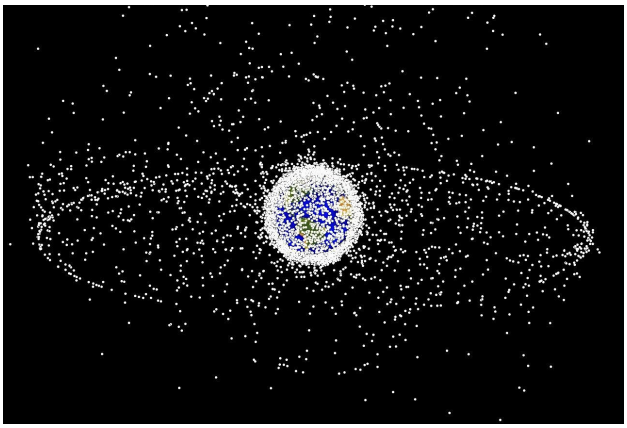
- 21 May — Summary and conclusions of the ESA Space Debris Conference and presentation of student projects ope nfor autumn 2025.
- 14 October — September 2025 space sustainability conferences recap.
- 10 December — Presentation of the student projects proposed for the spring semester.

All past SSH coffee events: https://espace.epfl.ch/series/sustainable-space-hub-coffee/

SSH Coffee session

Dark and Quiet Skies

As a partner and collaborator of the IAU Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference (CPS), the EPFL Space Center contributed to several studies that evaluate the growing impact of satellite interference on astronomical observations. Together with the SKACH team, tools to associate radio astronomy observations with satellite overflight information were developed in order to provide the RFI mitigation methods with relevant data required to identify contaminated observations. In collaboration with the University of Geneva, the Space Center participated to a study to detect space object observations in the data acquired with the CHEOPS space telescope. The 60 cm TELESTO telescope at the Observatory of Geneva received a number of hard and software upgrades in order to enable it for satellite tracking and precise brightness measurements.



Space debris in orbit

BRIDGE (accurate ground-based and in-orbit tracking for space debris capture)

This project is a collaboration between CVLab, LASTRO, and the EPFL Space Center. A major outcome of 2025 was the completion of a comprehensive database of objects extracted from astronomy pictures, integrating light curve analysis algorithms to support the physical characterization of observed space objects. In parallel, 6D pose estimation algorithms derived from orbital data were developed, advancing the project's core capabilities for accurate in-orbit tracking and debris capture preparation.

Contacts with Swiss industry partners continued throughout the year, consolidating the transfer of expertise to the Swiss space economy. CVLab pursued its collaboration with software company Klepsydra on the optimization and deployment of computer vision techniques for 6D pose estimation on space-grade hardware. The Space Center further advanced the partnership between Uni Bern, CVLab, and the Swiss space situational awareness (SSA) company s2a-Systems. The object database, built upon satellite and space debris detections extracted from the VST astronomical data archive, now provides a structured repository of detections, identification of known space objects, and lightcurves (time series of brightness measurements) enabling detailed physical characterization. Follow-up projects to expand the data analysis pipeline and incorporate additional astronomical data archives are underway.

REACT

REACT (gREen spAce logisitiCs Tool project) is a project funded by the European Space Agency (ESA) Future Launchers Preparatory Programme (FLPP) over a period of two years, started in November 2023. It is the direct continuation of the Green Space Logistics (GSL) project (2022-2023) that saw the development of the Assessment and Comparison Tool (ACT) proof of concept. ESA FLPP identified the upcoming need for life cycle assessment (LCA) tools within the space industry, which is now confirmed.

Known for its expertise in space sustainability, the EPFL Space Center was tasked to develop such a software, together with a strong consortium: Ateleris GmbH for the software development, PSI (Paul Scherrer Institute) for the LCA expertise, the University of Stuttgart for their expertise in launch vehicles and high altitude atmospheric impacts, ISAE Supaero for trajectory optimisation, and WaysEhead as consultant on the legal and economic trends.

The Assessment and Comparison Tool (ACT), developed by the consortium, is a unique tool in the space sector, paving the way towards increased consideration of the environmental impacts of space missions. It is a space-specific tool for simplified and prospective (screening) LCA in the space sector to give (visualised) guidance on eco-design and decision-making. This tool allows engineers to assess and compare the full life-cycle environmental impacts of rockets and space missions — from manufacturing and fuel use to atmospheric emissions and even the contribution to space debris.

ACT is a tool for simplified, space-specific, prospective Life Cycle Assessment (LCA), that can be used in early design phases. By making it easier to spot environmental “hotspots” and evaluate greener alternative technologies, ACT helps ESA and its partners make informed, sustainable choices — ensuring that our journey into space leaves the smallest possible footprint, both on Earth and beyond.

In 2025, the REACT consortium focused on the implementation of the software, following an Agile process to develop, test, and iterate on software features along several sprints.

The REACT team at the Final Presentation of the project at ESA FLPP’s headquarter in Paris. From left to right: Margaux Duperrey (ESA FLPP), Agata Jozwicka-Perlant (ESA FLPP), Marnix Verkammen (EPFL), Jan-Steffen Fischer (University of Stuttgart), Karin Treyer (PSI), Mathieu Udriot (EPFL, in front), Valère Girardin (ESA FLPP), Emmanuelle David (EPFL), Alice de Oliveira (ISAE SUPAERO), Erika Wolf (WaysEhead), Laszlo Etesi (Ateleris GmbH). Missing on the picture: Orell Bühler (Ateleris GmbH), Romain Sacchi (PSI).

ECODELTAV

Starting in 2026, the Assessment and Comparison Tool will be offered to industries in the space sector through EPFL Space Center’s and the University of Stuttgart’s newest spinoff: EcoDeltaV Sàrl. EcoDeltaV has been founded by EPFL Space Center’s Emmanuelle David, Mathieu Udriot and Marnix Verkammen and University of Stuttgart’s Jan-Steffen Fischer. The young company will first provide professional services with ACT, before releasing under licence the software as a service directly to industry players.

The team is uniquely positioned in the space sector, with a simplified, space-specific, prospective LCA tool that enables companies to comply with environmental requirements and regulations on sustainability.

https://ecodeltav.com/

Projects started in 2025, to be continued in 2026

The EPFL Space Center enters 2026 with a strong portfolio of ongoing projects and a clear ambition to broaden its funding partnerships. The following initiatives, launched in 2025, will continue to develop throughout the coming year.

AGORA – Espace Commun

Espace Commun is a science communication and outreach initiative aimed at raising awareness of space sustainability among French-speaking Swiss citizens aged 15 to 35. Developed in partnership with Galactic Studios and funded by the Swiss National Science Foundation (SNSF) with a grant of CHF 200,000, the project combines digital engagement with in-person events to make the topic of sustainable space use accessible and relevant to a broader public. In 2026, the project will deliver a dedicated webpage, original content for social media platforms, a YouTube documentary, and two public events. AGORA reflects the Space Center's commitment not only to advancing research, but to fostering an informed and engaged society around the future of space.
espace-commun.ch

TESSA

In collaboration with the University of Bern, the TESSA project continues to advance capabilities in satellite tracking and space object monitoring. Work in 2026 will pursue two parallel research tracks: refining 6D pose estimation techniques for the precise determination of object position and orientation in space, and developing adaptive optics solutions for the Zimmerwald Observatory, including the associated algorithms for correcting atmospheric distortion. Together, these efforts contribute to the broader challenge of space situational awareness and safe orbital operations.

ESA GSTP – Fault-Tolerant Deep Networks by Hardware-Aware Compression

Under the European Space Agency's General Support Technology Programme (GSTP), this project investigates how deep neural networks can be made more robust and efficient for deployment in space hardware. The focus is on hardware-aware compression techniques that maintain network performance while accommodating the strict constraints of space-grade systems. Work on this project will continue into 2026 as the team develops and validates its approaches.

2.2 EPFL space profs

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The Space Center sustained and deepened its engagement with Space Professors throughout 2025, a particularly significant year marked by ESA's Ministerial Conference in November. The Center actively participated in the consultation activities of the Swiss Space Office in the lead-up to the Ministerial, and subsequently followed and analyzed its outcomes — notably the creation of the new European Space for Resilience Program, a major strategic shift. A synthesis of these findings was shared with the Space Professors community to keep them informed of evolving funding and collaboration landscapes.

Building on the success of previous years, the Center organized again its dedicated ESA funding information session, providing professors with updated guidance on opportunities and processes. Targeted support was also provided to individual labs: the Center contributed to a proposal related to the European Space Deep Tech Innovation Center at PSI on materials, and assisted Prof. Michaud in the initiation activities of the SLICE MSCA Doctoral Network. Practical administrative support included the finalization of the ESA project overhead rate audit, with outcomes communicated to relevant stakeholders.

A highlight of the year was the summer launch of the Call for Ideas: Space Tech Enablers, an initiative designed to surface promising technology concepts aligned with ESA roadmaps, with project budgets ranging from 50 to 150k CHF. Five ideas were submitted across two focus areas — Space Logistics (systems of systems, debris mitigation, components and manufacturing) and Large Space Infrastructure (computing, power, thermal, structural, and autonomous operations). One project has already been selected for funding, and discussions are ongoing to support the remaining ideas to secure further fundings.

The EPFL Space Center managed an European Space Agency (ESA) Frame Contract for laboratory support, enabling the assessment of space compliance for technologies developed across multiple labs. A renewed version launched in 2025 supported seven activities, each funded between 50k and 100k EUR. These projects covered key areas such as photonics, electronic components, advanced manufacturing, and materials. The initiative strengthened the transition of academic research toward space-ready applications and higher technology readiness levels.

Throughout the year, the Center maintained its role as an active information relay, providing professors with targeted communications on ESA funding opportunities and broader industry developments

2.3 Papers, articles and presentations

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Publications from eSpace can be found on espace.epfl.ch and infoscience.epfl.ch.

[Journal paper] B. Y. Irureta-Goyena, E. Rachith, S. Hellmich, J.-P. Kneib, B. Altieri, C. Lemon, T. Saifollahi, O. Hainaut, W. Freudling, F. Dux, M. Micheli, F. Ocaña, P. Ramírez-Moreta, F. Courbin, L. Conversi, M. Millon, G. Verdoes Kleijn, M. Salzmann, "A method for asteroid detection using convolutional neural networks on VST images".

[Journal paper] L.F.P. Gonçalves, N. Billot, S. Hellmich, D. Barbosa, B. Coelho, A. C. M. Correia, A. Fortier, C. Broeg, A. Bekkelien, D. Ehrenreich, B. Merin, M. Günther, A. Heitzmann, W. Benz, "Space-based surveillance of Resident Space Objects with the CHEOPS space telescope".

[Conference presentation] M. Verkammen, M. Udriot, "The Assessment and Comparison Tool (ACT) – simplified, space-specific, prospective LCA", *Ecodesign Days 2025.*

[Conference paper] E. David, M. Erdem Burger, C. Finnlay, B. Guyot, S. Hellmich, L. Kleint, A. Losch, D. Mueller, C. Poirier, K. Treyer, M. Udriot, M. Verkammen, "Swiss Space Sustainability Research Days 2025: Outcomes and Strategic Roadmap", *11th European Conference for Aeronautics and AeroSpace Sciences (EUCASS),* Rome, Italy.

[Conference paper] M. Udriot, M. Verkammen, M. Lemaire, E. David, "Space sustainability in systems engineering and design processes - Industry overview and case study at EPFL", *11th European Conference for Aeronautics and AeroSpace Sciences (EUCASS),* Rome, Italy.

[Conference paper] S. Hellmich, E. Rachith, J.-P. Kneib, "Detecting Space Objects in the ESO VST Astronomical Data Archive and Extracting their Astrometry and Photometry", *11th European Conference for Aeronautics and AeroSpace Sciences (EUCASS)* [Conference paper] S. Hellmich, E. Rachith, J.-P. Kneib, "Detection and Characterization of Space Debris Using VST/OmegaCAM Archival Data", *9th European Conference on Space Debris*

[Conference paper] F. Renis, A. L. Price, M. Battipede, S. Hellmich, M. Salzmann, "Leveraging light-curve inversion for kinematic state estimation of uncooperative targets", *9th European Conference on Space Debris*

[Conference presentation] M. Verkammen, M. Udriot, "Inclusion d'une ACV dans la conception de missions spatiales : premières applications de l'outil ACT, développé à l'EPFL Space Center", *MCV - Congrès Management du Cycle de Vie 2025.*

[Handbook] M. Udriot, "SpaceMAKEr Environmental Sustainability Strategies"

[Presentation, class 1 - releasable to the public (ESA)] M. Udriot, M. Verkammen, K. Treyer, J.-S. Fischer, O. Bühler, E. David, "REACT Final Presentation - The Assessment

and Comparison Tool (ACT), Simplified, spacespecific, prospective LCA“

[Journal paper] A. Mallama, R. E. Cole, S. Hellmich, R. Spinner, J. Warner, J. Respler “Brightness Characteristics of the Qianfan Satellites and Evidence That Some Are Tumbling ”, *Harvard ePrint*

[Conference paper] E. David, S. Hellmich, C. Crichton, J.-P. Kneib, “The Importance of Dark and Quiet Skies in Swiss Astronomy and the dialog with the space industry”, *9th European Conference on Space Debris*

[Conference paper] E. Rachith, S. Hellmich, J.-P. Kneib, “Detection and Characterization of Space Debris Using VST/OmegaCAM Archival Data”, *9th European Conference on Space Debris*

Space Sustainability: Bridging Initiatives and PErspectives (BIP) workshop 2025

Sustainability series conference, round table with Christophe Bonnal, Liesbeth Casier, Athanasios Nenes, Susmita Mohanty and Olivier Dessibourg. © EPFL - Alain Herzog

3. COMMUNICATION AND OUTREACH

eSpace

Space Innovation

In its communication and outreach capacity, eSpace is responsible for promoting space-related activities that take place at EPFL. This includes organizing and promoting events, participating in meetings and conferences, creating and sharing news with the wider EPFL community, sharing opportunities with our space profs and student community, managing social media accounts, and liaising with the media.

3.1 Events

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3.1.1 Events organised by eSpace

6-8 January 2025 **Swiss Space Sustainability Research Days (SSSRD)**
The inaugural edition held in Les Diablerets brought together 55 experts from academia, industry, and government to tackle space sustainability challenges. Topics spanned Earth-space impacts, sustainability technologies, space weather, dark skies, and legal/ethical dimensions.
Key outcomes included a conference paper, several presentations, and a strengthened Swiss space sustainability community, reinforcing Switzerland's role in research coordination and knowledge transfer within the European space sector.
Speakers included representatives from EPFL, Unibern, the Swiss armed forces, Swiss FDFA, Amazon, Politecnico di Milano, and more.

SSSRD's scientific committee: Merve Erdem Burger, Clémence Poirier, Mathier Udriot, Emmanuelle David, Stephan Hellmich, Karin Treyer, Deborah Müller, Benjamin Guyot.

27-28 March 2025 **Space Sustainability: Bridging Initiatives and Perspectives**

With 2025 marking a pivotal year for space sustainability — including the ESA Space Debris Conference and the 7th Summit for Space Sustainability — this 1.5-day workshop brought together experts, policymakers, and social scientists to assess capacity-building initiatives in the field. Co-organized by Secure World Foundation, EPFL Space Center, and EU COST network FOGOS, it aimed to identify synergies, gaps, and fresh perspectives across existing approaches.
Participants mapped sustainability instruments across intergovernmental, national, and stakeholder levels, examining environmental, security, and equity dimensions. Over 13 initiatives were presented — from UNOOSA, ITU, and ESA to WEF, ERC projects, and NGOs. Panel discussions addressed information-sharing barriers, space traffic coordination, and environmental impacts. The event concluded with a reception hosted by the Swiss FDFA.

14 November 2025 **Sustainability series conference: Towards a Sustainable Space: Addressing the Challenges of the Final Frontier**

The EPFL Space Center hosted a conference on space sustainability at the Rolex Learning Center Forum, co-organized with Mediacom. The event coincided with a landmark week for Swiss space, including the 50th Anniversary of the ESA Convention and the inauguration of the European Space Deep-Tech Innovation Centre (ESDI). Executive Director Emmanuelle David opened by highlighting over a decade of EPFL's work advancing awareness, policy, and innovation for a safer orbital environment. Keynote speaker Christophe Bonnal addressed the environmental challenges of satellite re-entries: while 80% of materials vaporize — potentially harming the ozone layer — roughly 20% survive re-entry, risking impact on the ground.
A panel moderated by Olivier Dessibourg then explored the legal, ethical, economic, and ecological dimensions of debris management, featuring experts from MaiaSpace, Spaceport SARABHAI, EPFL, and the International Institute for Sustainable Development.

4-5 November 2025 **Visit of an Austrian delegation**

The EPFL Space Center co-hosted an Austrian delegation to Lausanne, for a two-day immersion into Swiss space technologies and innovation. The program included visits to EPFL, SWISSto12, and CSEM, as well as presentations from Swiss space startups and EPFL student teams. The event fostered rich exchanges between Austrian and Swiss stakeholders, exploring collaboration opportunities across the space sector.

11 December 2025 **Visit of an Italian delegation**

The EPFL Space Center, alongside other space actors such as SXS, Spacetalk and other industry representatives, welcomed a delegation of Italian space industry players from Emilia-Romagna at the Unlimitrust Campus on December 11. The visitors included companies, startups, and academics active in the space sector. The visit sparked fruitful exchanges between Swiss and Italian stakeholders.

3.1.2 Seminar series

The EPFL Space Center seminar series is a regular event that brings compelling scientists, entrepreneurs, students, policymakers and others in the space field to the EPFL community to share their exciting work and research. Seminars usually last an hour, including a Q&A session, and are hybrid events (online and in person).

- 05 March – Non-Volatile Photonics for Zero-Energy Programmable Optical Networks, with Hernán Furci
- 16 April – ESA's Concurrent Design Facility, an essential tool for studying future space missions, with Justin Bourgois

To watch all past seminars: https://www.youtube.com/playlist?list=PLVPS2mLGfqa18iAVjIlHzV57O38M2uNro

3.1.3 Events participated in by eSpace

- February – MINT VAUD
- March – Conference Astrochablais
- March – Workshop BIP
- March – Space Fresco
- March – ESA Space Debris Conference, Bonn, Germany
- May – Space Community Days + 50 years ESA
- June – Zero Debris Week
- June – EUCASS
- August – Visit to TUM
- August – Féerie d'une nuit
- September – Life Cycle Management Conference
- September – Ecodesign Days
- September – ESMATS (see p. 43)
- September – Swiss AI weeks
- September – IAC, Australia
- October – NASA Space Apps Challenge
- October – Future Space Transportation Autumn Session (FLPP), Paris

18-19 September 2025 Ecodesign Days - ESA ESTEC, The Netherlands

The European Space Agency (ESA) hosted the «2025 Ecodesign Days», gathering space professionals and enthusiasts ahead of the ESA Ministerial Council 2025. This 1.5-day event focused on advances in eco-design for space systems and greener space technologies. Participants discussed initiatives such as EcoStars, aimed at developing more sustainable satellite platforms, and had the opportunity to express interest in joining a consortium. A dedicated session on simplified Life Cycle Assessment tools — presented by EPFL Space Center's Marnix Verkammen and Mathieu Udriot — was highlighted as key to achieving ecodesign ambitions.
ESA also addressed the atmospheric impact of demise and launcher emissions, completing the long-term ecodesign vision.

June 2025 EPFL Space Center at EUCASS 2025

In June 2025, the EPFL Space Center participated in the 11th European Conference for AeroSpace Sciences (EUCASS) in Rome, sponsoring 11 students alongside staff contributions throughout the week.
Highlights included a presentation on integrating sustainability into space systems engineering, student mission design concepts, and a rocket team project on thrust vector control. Executive Director Emmanuelle David co-chaired a plenary session on space and climate, while other contributions covered debris tracking, the Space Sustainability Rating platform, launch sector sustainability, and investor perspectives on sustainable space ventures. The EPFL booth facilitated networking across students, researchers, and industry professionals. EUCASS 2025 reinforced that space sustainability is gaining traction across technical, policy, and financial disciplines — and the team returns to Lausanne energised for what's ahead.

The EPFL Space Center's delegation at EUCASS 2025

3.1.4 It will happen in 2026

May 8 **EPFL Space Day 2026 – «From Classroom to Cosmos»**
On May 8th, we are organizing a full-day event bringing together the EPFL space community around the theme «From Classroom to Cosmos.» The day will open with a keynote by Prof. Daniel Neuenschwander, followed by presentations from student teams showcasing their satellite and analog mission projects. The afternoon will feature a showcase of the EPFL Minor in Space Technologies, PhD lightning talks, and a spotlight on EPFL startups working in the space sector. The event will close with a roundtable discussion on EPFL's strategic vision for space. Throughout the day, an exhibition area and networking breaks will offer opportunities for the community to connect and exchange — across disciplines, generations, and ambitions.

September 24 **Espace Commun, avant-première documentaire, at Cinema City Club in Pully**
In collaboration with Galactic Studios, we are producing a one hour documentary on space ustainability and the challenges associated with the development of the space industry. It will be screened for the first time at this special event.

November 6 **Espace Commun, «L'affaire des méga-constellations», at Casino de Montbenon in Lausanne**
This show, which blends elements of courtroom drama and improv, aims to educate the public about space sustainability and encourage them to reflect on the issues involved—in a serious yet lighthearted and engaging way.

3.2 Communication channels

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3.2.1 In the media

In order to reach people who are interested and invested in space both at EPFL and within the larger Switzerland, as well as abroad, eSpace prioritizes its contacts with media outlets and is proud to have its work covered by both Swiss and international media in 2025.

Link to all media articles: https://espace.epfl.ch/news-and-events/in-the-media/

09.01.2025 – **RTS**
Capitaine Flamme

20.01.2025 – **SRF**
Elon Musk und seine Strategie - «Die Philosophie von SpaceX ist aggressiv und kommerziell»

30.01.2025 - **La 1ere (RTS)**
Le Conseil Fédéral veut une loi spatiale pour la Suisse

25.03.2025 - **Radio Cosmos by SKACH**
Episode 4: Un Ciel Sombre et Silencieux

10.04.2025 – **Swissinfo**
Why Switzerland's proposed space law matters

24.05.2025 - **Heidi.news**
Elon Musk largue ses poubelles au-dessus de nos têtes

28.05.2025 - **Karman blog**
Karman Fellow Lucie Poulet Explores Space Sustainability at EPFL Space Center

02.06.2025 - **Corriere del Ticino**
Quel patrimonio nella montagna

13.06.2025 - **TV5 Monde / également diffusé sur RTS**
C'est le chaos là-haut ?

23.06.2025 - **ITU / The UN Agency for digital technologies**
Space Connect: Can operators safely sustain the space boom?

07.10.2025 - **ITU / The UN Agency for digital technologies**
Sustainable space: 3 challenges for cooperation

Emmanuelle David on the TV5 Monde set for «C'est le chaos là-haut?»

3.2.2 News articles

eSpace publishes articles on the EPFL News channel and the eSpace website to share activities and news with the wider EPFL community.

16 May - **Busy month of March for space sustainability at EPFL**
17 June - **A look back at the sustainability series conference with Christophe Bonnal**
15 July - **EPFL Space Center at EUCASS 2025: highlights from a week of space innovation and sustainability in Rome**
27 August - **Fostering academic partnerships in space research: EPFL Space Center visits TUM's aerospace department**
10 September - **EPFL Xplore wins first place at the 2025 European Rover Challenge**
17 September - **ClearSpace Prize: "And the winner is..."**

Te read eSpace's latest news: https://espace.epfl.ch/news-and-events/news/

3.2.3 Newsletter

The newsletter presents eSpace's activities and events, along with interesting news from the wider field of space, to an audience of EPFL researchers and students, along with other stakeholders in Switzerland and internationally. It is sent out on average every three months.

3.2.4 Social media

eSpace has a presence on multiple social media channels: LinkedIn, Instagram, YouTube and Facebook. These platforms are a key channel in eSpace's communication mix, especially for the promotion of larger events, for sharing eSpace online seminars on YouTube, and disseminating eSpace project work. The year 2025 saw an increase in followers for all social media channels.

LinkedIn: eSpace's LinkedIn channel is used to share eSpace news and events, as well as events of interest to our community and relevant posts from our partners. The eSpace LinkedIn account has high engagement, in particular with members from the space industry, government, and EPFL students. In 2025, the number of followers increased almost 17%, from 3,729 to 4,352.

Instagram: eSpace's Instagram account is used for promoting eSpace events and activities as well as engaging with the student community by reposting videos and photos from student teams and offering encouragement during exams and welcoming students back from holidays. The Instagram account is by far the best of the eSpace social media accounts for engaging with the EPFL space student population. In 2025, the number of followers increased 7,3%, from 1,565 to 1,679.

Facebook: eSpace also has a Facebook page, which has less value with our target audience. eSpace decided to keep the account, but no longer invest much time nor energy in updating it. Its follower count remains steady at 1,240.

YouTube: eSpace also has a YouTube page to share videos from the Seminar Series as well as other informational videos from the unit.

“The Swiss Network for Space Innovators”

The year 2025 was marked by the consolidation of Space Innovation within the EPFL Space Center.

The team was very active to help its members individually on specific proposals and connecting people, be it businesses or students with members, underlining the usefulness of the Space Innovation network.

Objectives

Space Innovation enhances and connects a network of entities active in the space domain, with the goal of fostering Swiss space innovation, research and technology, education and outreach.

Its mission is to:
- strengthen the members’ space-related activities,
- offer opportunities to involve new players and new technologies.

Its core capabilities are:
- an established network in Switzerland,
- a strong link between industries, research and technology organizations and academia,
- sustainable national and international connections,
- access to heritage and cutting-edge technologies and expertise.

Its objectives are:
- to harness a strong network and ecosystem,
- to be heedful of its members’ needs,
- to foster and support innovative projects with the members and external partners,
- to represent its members nationally and internationally.

Advisory Board

The Space Innovation Terms of Reference were reviewed in 2025 to conform to new EPFL rules. As a consequence, the Steering Committee was replaced by an Advisory Board. In parallel, the new members of the board were elected in 2025. Representatives are now:

Industry representatives

Grégory Moura – Safran Timing Technologies
Muriel Richard – ClearSpace.Today
Beat Zahnd – Beyond Gravity

RTO representative

Eleonore Poli – CSEM

Academic representative

Gerhard Székely – HSLU


Industry
aerospacelab
almatech
APCO TECHNOLOGIES
astrocast
beyond gravity
clearspace today
CompPair
CYSEC
DPHI SPACE
Freezz
GENERAL ATOMICS SYNOPTA
KISTLER measure. analyze. innovate.
Lumartix SA
Menhir Photonics
micos Optical Systems for Space and Industry
RUAG
SAAB
SAPHYRION communication technologies
SCHURTER ELECTRONIC COMPONENTS
SpacePNT+
spacetalk
THE COUNTDOWN COMPANY
VENTURI SPACE
Viasat
SAFRAN
Swissto12
Academic
EPFL
University of Applied Sciences Northwestern Switzerland School of Engineering
Hes·so
HSLU Hochschule Luzern
OST Ostschweizer Fachhochschule
unine UNIVERSITÉ DE NEUCHÂTEL
RTO and Institutional
csem
Empa Materials Science and Technology
pmod wrc
Schweizerische Eidgenossenschaft Confédération suisse Confederazione Svizzera Confederaziun svizra
Swiss Armed Forces
Partners & Reciprocity
INNOVAUD
SWISSMEM SSIG
SPACE CITIES NETWORK

4.
SPACE INNOVATION NETWORK

4.1 Space Innovation members

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The Space Innovation network included 40 members in December 2025: 6 academic institutions, 5 research and technology organisations (RTOs), 26 industrial companies and 3 partners. As space increasingly becomes a cross-cutting topic, the ambition to broaden the network beyond traditional space contributors to include end-users and stakeholders has materialized through the creation of a new partner membership status.

New space topics have been generating significant interest in 2025, from quantum, optical, direct-to-device telecommunications, in-orbit manufacturing to space-based data centers, alongside the European shift towards a dual-use space strategy. These developments are opening new opportunities for the Swiss space ecosystem, which the Space Innovation network will continue to foster through its strong academia-industry-RTO-partner collaboration.

To learn more about Space Innovation's members: https://space-innovation.ch/network_services/our-members/

In 2025, the Space Innovation network welcomed the following new members:

Innovaud
Innovaud became a partner of Space Innovation in the summer of 2025.
Innovaud is the innovation and investment promotion agency for the canton of Vaud. Their main goal is to attract startups and scale-ups, SMEs and large tech companies to the region and help them establish their base and network. One of the goals is to maintain the high level of technology in the region and a dense innovation ecosystem. The proximity of EPFL, Unil and Heig-VD increases the attractiveness of the region. Innovaud is particularly interested in space businesses.

CSA
Under negotiation in 2025, CSA will become a full RTO member in 2026.
The Center for Space and Aviation Switzerland and Liechtenstein (CSA) is dedicated to shaping the New Space economy. As the International Space Station approaches its planned decommissioning by 2030, the transition toward the commercialisation and privatisation of Low Earth Orbit (LEO) will accelerate.
Future private space stations are expected to significantly reduce transportation and operational costs, enabling expanded research, development and large-scale industrial manufacturing in orbit. CSA has joined our network to actively contribute to this transformation and to support the emerging industrial ecosystem in LEO.

Lepto
Lepto is a deep-tech company developing ultrathin, energy-efficient and lightweight terahertz (THz) devices. The company designs and manufactures THz optical components, including filters, polarizers and advanced custom devices, tailored for satellite communications, Earth observation and future 6G networks.
Lepto also provides consulting services in advanced photonics and terahertz technologies to aerospace, telecom and research partners.

4.2 Services to members

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In 2025, the Space Innovation team actively supported its members through a broad and personalized range of services. Staff conducted over fifteen member visits encompassing direct opportunity sharing, targeted conference reporting, access to test facilities, communication of members' profiles to strategic partners, and consistent network outreach. The intensity and variety of these engagements made 2025 a particularly active year, underscoring the team's ongoing commitment to delivering operational value and tailored support to each member.

Student Support
Space Innovation helped students across Switzerland by facilitating industry-linked projects with local businesses, as well as internships and placements within Swiss companies.

ESA Projects
Space Innovation supported members across a range of ESA-related activities, including proposal development, ESA-Star administration, connections with ESA collaborators, and the coordination and administrative set-up of call-off orders under the ESA Frame Contract.

Space Innovation initiated a webinar on ESA and European funding for space projects with collaborators from the EPFL Research Office, SXS and Euresearch. The Session was held on June 12th and was widely followed by the Swiss Space community.

International Collaborations and Partnerships
On the international front, Space Innovation welcomed and coordinated delegations from Italy, Austria, and Korea, hosting visits both on EPFL premises and with Swiss space entities. The team also maintained close collaboration with key global partners, including Space Exchange Switzerland (SXS), the Swiss Space Industry Group of Swissmem, the SERI/Swiss Space Office, Swissnex, and various embassies, to advance Switzerland's position in the global space sector.
Additionally, Space Innovation co-organised the European Space Mechanisms and Tribology Symposium (ESMATS) in partnership with CSEM, Almatech, and the European Space Agency, held from 24 to 26 September 2025.

Space Innovation Test Facilities Database and Available Infrastructure
Space Innovation's space test facilities database is accessible to its members via the SI Extranet.

The database includes:
• Over 400 identified test equipment items, categorized by type and key characteristics
• More than 300 laboratories worldwide, including over 130 in Switzerland and more than 140 across Europe

In 2025, Space Innovation's thermal vacuum facilities were actively used by various members. These facilities supported a range of activities, including qualification testing of space hardware and bake-out operations. Currently, the following thermal vacuum chambers are available to the space community:

• **Thermal Vacuum Chamber 1**: Diameter 180 mm × Length 240 mm, temperature range from -50°C to +120°C
• **Thermal Vacuum Chamber 2**: Diameter 640 mm × Length 420 mm, temperature range from -65°C to +140°C

For inquiries, members can contact Gilles Feusier directly. In addition, Space Innovation operates a small clean room. While it is equipped to meet ISO 7 standards, it does not include active cleanliness monitoring (i.e., no particle counter). This facility is also available upon request.
Furthermore, a wide range of additional testing equipment is accessible at EPFL through the support of the EPFL Space Center.

2025 by the numbers:

135 services

44 connections made

6 supports on ESA billing

13 shared knowledge resources

22 conferences attended

8 supports for proposal

7 uses of test facilities

2 outreach events

24 visits

9 student projects

5. ACTIVITIES

eSpace

Space Innovation

2025 was a busy but thrilling year for the Space Innovation team. Throughout the year, the team's core mission remained unchanged: delivering dedicated services to its members.

Representing them nationally and internationally, the team fostered valuable connections, provided support on ESA billing and project proposals, while demand for test facilities continued to grow, reflecting the expanding needs of the community. To further enhance collaboration, the team launched a dedicated Extranet, a central hub for conference reports, presentation slides, and a comprehensive test facilities database.

The Space Innovation Network is currently transitioning towards new key projects, including one developed in collaboration with Innovaud and another in partnership with SWISSto12, alongside a growing relationship with the Center for Space and Aviation Switzerland and Liechtenstein (CSA).

The network also plays an active role in supporting visits from international companies exploring opportunities in Switzerland, such as Voyager Space and Axiom.

On the field, the team attended preparatory events leading up to the ESA 2025 Ministerial, with detailed reports shared with members after each milestone, first via email, and now accessible on the new Extranet. The team also contributed to the organization of the European Space Mechanisms and Tribology Symposium at EPFL and represented the network on the international stage at IAC 2025 in Sydney and the New Zealand Aerospace Summit, actively supporting the Geneva bid to host IAC 2029.

Extranet
The Extranet is a new collaborative tool dedicated to network members, accessible through restricted access. It offers a growing library of conference reports prepared by the Space Innovation team, providing members with key takeaways from major events without having to attend. Members can also find curated summaries of funding opportunities relevant to the Swiss space ecosystem, as well as a comprehensive database listing test equipment and facilities available across Switzerland and Europe. This tool is designed to enhance collaboration throughout the network. All feedback and suggestions are welcome and can be communicated directly to the team. For access requests, please reach out to Christian Cardinaux.

6. COMMUNICATION AND OUTREACH

Space Innovation remained active in the following communication and outreach activities.

6.1 Events

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6.1.1 Events involvement

24 février – 2 mars 2025 MINT Vaud

MINT Vaud is an interactive and fun fair designed to spark enthusiasm for mathematics, computer science, natural sciences, and technology (MINT) among children and teenagers (both girls and boys) in grades 5 through 8 (ages 8–12).
The EPFL Space Center had a booth there in collaboration with our colleagues from SXS and SKACH.

11 March 2025 Annual Meeting

On March 11, 2025, Space Innovation successfully hosted its Annual Meeting at HEIG-VD/HES-SO in Yverdon-les-Bains, bringing together its network's members - leading voices from the Swiss space community - for a day of knowledge-sharing, innovation, and collaboration.
The morning began with a tour of HEIG-VD's state-of-the-art laboratories, showcasing cutting-edge research across embedded systems, high-performance acquisition, adaptive optics, orbital debris tracking, directed energy, and advanced composite manufacturing. These demonstrations highlighted the depth of technical expertise within our network and set the tone for a highly stimulating day.
Following a convivial lunch, attendees were treated to a captivating aeromodelling demonstration by Prof. Sylvain Pasini, seven-time Swiss Champion in F3P indoor aerobatics — a moment that perfectly illustrated the crossover between precision engineering and human performance.
The afternoon featured Space Innovation's review of the past year's achievements and strategic outlook, including the presentation of our new governance structure. Key topics included ESA's statement for a responsible space sector, and a series of member presentations spanning healable composites, reconfigurable cryptography for satellites, 3D-printed actuators, and partnership opportunities with the Swiss Armed Forces.
The event concluded with a networking aperitif, fostering the connections that drive our community forward. Space Innovation extends its sincere thanks to HEIG-VD/HES-SO, all speakers, and participants for contributing to such a memorable and productive gathering.

The Space Innovation team during the Annual Meeting.

Visit of HEIG-VD's laboratories

27 March 2025 **EPFL Engineering Industry Day 2025**

The EPFL's School of Engineering and Vice Presidency for Innovation and Impact organized the EPFL Engineering Industry Day on Thursday March 27th, 2025. This event, that has now become annual, strengthen the bridge between academia and industry, offering a dynamic platform for PhD students, researchers, professors, and industry leaders to engage in meaningful discussions and explore innovative collaborations.
The EPFL Space Center marked its presence with a well situated stand to showcase EPFL space knowhow and ties to businesses, research and technology organizations and other Swiss academia. With many people stopping by the stand, it was also an opportunity for the members of Space Innovation to place their flyers in perfect view. Further outcome on the event can be browsed on the general EPFL website, but for EPFL Space Center and Space Innovation, it was definitely a success and we look forward to the next edition.

Gilles Feusier at our booth during the EPFL Engineering Industry Day 2025

10 April 2025 **TecDay at Gymnase de Beaulieu**

This spring, Space Innovation visited high school students in Lausanne to showcase career opportunities in the space sector and spark young people's interest in the field. John Maxwell, our IT Manager, brings real passion to these visits, guiding students through two engaging activities: an immersive tour of the International Space Station via virtual reality headset, and a drone piloting exercise simulating spaceflight.

John Maxwell doing his presentation on space and asking the question «Who can besome an astronaut» to an attentive teenage audience.

29 - 31 May 2025 **Fantasy Basel, the Space to be!**

In 2025, 97,000 people visited Fantasy Basel —the Swiss Comic Con—, which is an ideal outreach opportunity for REAL space to promote activities. Organized by the Swiss Space Museum, the space exhibition area with more than 1,000m2 featured experiments, artifacts, fantastic large-scale models, technology demonstrations and much more. Here the visitors met experts from science and technology and experienced exciting talks and panels on the Space Stage. Claude Nicollier, once again gave an exciting presentation attended by an audience of galactic warriors and manga enthusiasts.

Claude Nicollier signing autographs at Fantasy Basel 2025.
© Swiss Space Museum - Guido Schwarz

Fantasy Basel 2025. © Swiss Space Museum - Guido Schwarz

24-26 September 2025 ESMATS 2025

A Historic Edition for the Space Mechanisms Community

Space Innovation is proud to reflect on the remarkable success of the 21st European Space Mechanisms and Tribology Symposium (ESMATS), held from 24 to 26 September 2025 at the SwissTech Convention Center in Lausanne. Co-organised with EPFL, CSEM, Almatech, and ESA, this milestone edition marked the highest attendance in the symposium's history, welcoming nearly 400 participants from across the global space mechanisms community — a significant step up from the 300 attendees recorded at the 2023 Warsaw edition.

Established as a biennial event since 1983, ESMATS returned to Switzerland after 20 years, celebrating a region whose mastery of precision mechanisms spans from centuries of watchmaking tradition to the cutting edge of today's space technologies. Under the chairmanship of ESA's Lionel Gaillard and co-chaired by Space Innovation's Gilles Feusier, the event brought together leading voices from the field, including representatives from the Swiss Space Office, the Canton of Vaud, EPFL, CSEM, and Almatech.

The programme combined outstanding technical content with memorable highlights, including a live demonstration of an ultra-light aircraft, a showcase of EPFL Xplore's European-champion rover, and a conversation between French spationaut Jean-François Clervoy and Swiss astronaut Claude Nicollier — bringing a deeply human dimension to the symposium.

Participants enjoyed an evening at the Olympic Museum, opened with an apéro featuring swisshorn musicians and a pleasant view over Lake Geneva and the Alps. The gathering concluded with a Gala dinner, offering a memorable blend of Olympic heritage and Swiss hospitality.

The event was further enriched by the support of main sponsors APCO, Beyond Gravity and Harmonic Drive SE.

Preceding the symposium, two days of specialised training courses — the ESA Advanced Mechanisms Design Course and the Space Tribology Course — reinforced European engineering expertise and helped cultivate the next generation of specialists in mechanisms and tribology. Across three days of sessions, exchanges, and social events, ESMATS 2025 affirmed its standing as the premier gathering for space mechanisms engineering worldwide.

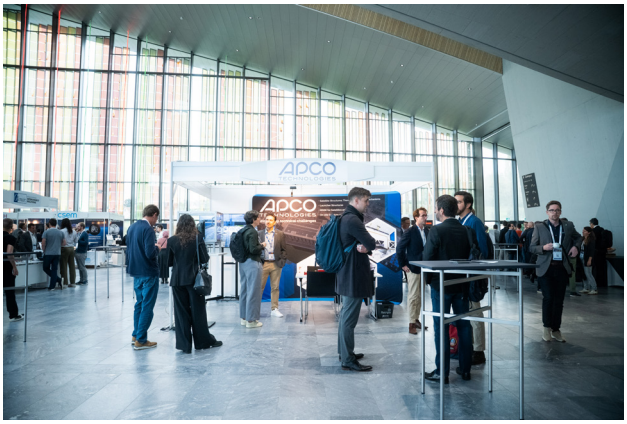
eSpace

Space Innovation

The ESMATS Organizing Committee and Team
Photo: Adriano Koch | Roasted Agency

ESMATS audience. Photo: Adriano Koch | Roasted Agency

Jean-François Clervoy and Claude Nicollier, two astronauts on stage! Photo: Adriano Koch | Roasted Agency



ESMATS exhibition area, gathering more that 30 exhibitors and sponsors. Photo: Adriano Koch | Roasted Agency

30 August 2025 Féérie d'une nuit

The team never misses an edition of Féerie d'une nuit, an event led by former Callista member and EPFL alumnus Clément Chadourne. Every summer, volunteers from the committee gather at the Signal de Bougy to set up their space-themed craft booths. Martine Harmel specializes in air-powered paper rockets made on the booth by children visiting the park. It's the perfect opportunity to test their knowledge of space and share some stories about astronauts with them. In the evening, enthusiasts bring their sometimes enormous telescopes for an evening of stargazing.

Martine Harmel helps kids make paper rockets, during the "Féérie d'une nuit" event

4 September 2025 ESA BIC CH - info session

Space Innovation co-organized the ESA BIC Switzerland Info Event, showcasing the incubation program for Swiss start-ups with space connections — featuring alumni speakers, program insights, and a live Q&A.

6.1.2 Seminars and conferences attendance

Conferences and seminars are key to creating new collaborations for the members and staying at the cutting-edge of funding possibilities and technology. In 2025, Space Innovation attended several conferences, workshops and events, including:

ESA CMIN Preparatory Events

In the lead-up to the ESA 2025 Ministerial Conference, the team actively participated in industry days held at ESTEC as well as events organized by the Swiss Space Office (SSO). Following each event, detailed reports were made available to members on the Extranet, ensuring the network stays informed on key developments shaping the future of European space policy and programmes.

29 September to 3 October - IAC Sydney

Christian Cardinaux attended IAC 2025 in Sydney to represent the network and explore collaboration opportunities with partners in the Asia-Oceania region. On site, the team supported the SXS Swiss Booth and participated in a Space Cities Network session, showcasing the value of international collaboration. The event was also an opportunity to actively support the Geneva candidacy to host IAC 2029. Members wishing to rally the Swiss space ecosystem behind this bid are encouraged to reach out to Raoul Keller (SSIG).

7-8 October - Aerospace New-Zealand Summit

Following IAC Sydney, the trip continued to the New Zealand Aerospace Summit, where a small Swiss delegation pursued collaboration opportunities in a more focused setting. The visit included tours of Kea Aerospace, Dawn Aerospace and the University of Canterbury. Organized by the ChristchurchNZ team through the Space Cities Network, the programme showcased remarkable agile innovation capabilities and ease of access to rapid testing facilities. Several companies presented success stories built on split intercontinental teams, with engineering carried out in Europe and integration and rapid testing cycles conducted in New Zealand.

6.2 Communications channels

6.2.1 News articles

Space Innovation publishes articles on its website to share activities and news with the wider EPFL community.

21 January – EPFL Space Center's MOOC: "Space Mission Design and Operations" – A journey of knowledge

3 February – EPFL Space Center promotes Emmanuelle David to Executive Director

11 February – Innovation for advanced manufacturing and space technologies

17 March – Space Innovation annual meeting 2025

31 March – EPFL Engineering Industry Day 2025

2 December – Looking back at an exceptional edition of ESMATS 2025 in Lausanne

Keep up to date with our news here: space-innovation.ch/about-us/news/

6.2.2 Newsletter

The newsletter presents Space Innovation's activities and events, along with interesting news from the wider field of space, to an audience of stakeholders in Switzerland and internationally, along with EPFL researchers and students. It is sent out on average every three months.

In addition to the newsletters aimed at a wide audience, Space Innovation regularly sends emails to its members to inform them about specific opportunities and events.

6.2.3 Social media

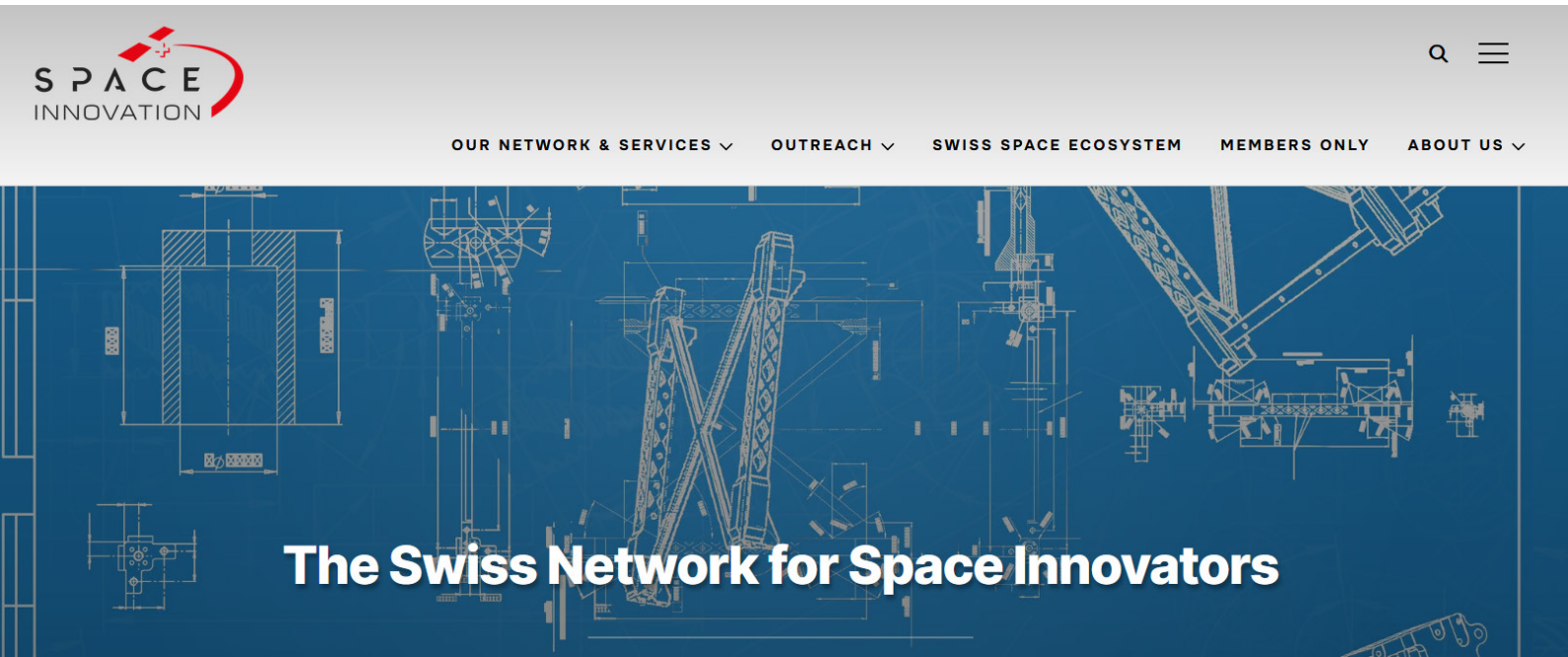
Space Innovation has a presence on multiple social media channels: LinkedIn, Instagram, YouTube and Facebook. These platforms are a key channel in Space Innovation's communication, particularly for promoting larger events, sharing Space Innovation's efforts and involvement in several projects, and sharing important information about its members. The year 2025 saw an increase in followers for all social media channels.

LinkedIn: Space Innovation's LinkedIn channel is used to share news, as well as events of interest to our community and relevant posts from our members. The Space Innovation LinkedIn account has high engagement, in particular with members from the space industry, government, and the EPFL community. In 2024, the number of followers increased 8.6% from 6,714 to 7,291.

Instagram: Space Innovation's Instagram account is used for promoting events as well as engaging with the community by posting videos and photos from our activities and team, promoting our members. In 2024, the number of followers increased 1,8%, from 1,564 to 1,592

Facebook: Space Innovation also has a Facebook page, which has less value with our target audience. Its follower count remains steady at around 2,875.

YouTube: Space Innovation also has a YouTube page to share videos from projects as well as other informational videos from the unit.



EPFL SPACE CENTER
LOOKING AHEAD

Strategic objectives 2025-2028

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Objective 1
Offer cutting edge space education

→ Promote EPFL Space Education minor and Make projects.
→ Develop one course for continuing education of space system engineering.
→ Develop with ETH Zurich the space tech masters, especially leveraging experience and existing courses from the minor.

Objective 2
Enable future discoveries & tech transfer

→ Develop a Space Innovation program with funding.
→ Maintain and increase the network of members.
→ Strengthen continuous research and further develop the long-term research strategy by supporting at least one large proposal.
→ Enhance access to ESA fundings.

Objective 3
Maintain and develop space sustainability leadership

→ Strengthen the Sustainable Space Hub by continuing current eSpace project on the topic and also including future and emerging aspects such as satellite mega constellations and increasing lunar and interplanetary space activities. Some in collaboration with EPFL labs, especially on the topics of sustainable lunar activities, and atmospheric impacts of the space sector.
→ Develop student competence groups with coordinated semester and master projects.
→ (Co-)organise an event with the other sustainibility hubs at EPFL.
→ Inform and collaborate with international institutions based in Switzerland and to Swiss policy-makers, especially regarding the upcoming Swiss Space Law.
→ Strengthen the Sustainable Space Hub by continuing current eSpace project on the topic and also including future and emerging aspects such as satellite mega constellations and increasing lunar and interplanetary space activities. Some in collaboration with EPFL labs, especially on the topics of sustainable lunar activities, and atmospheric impacts of the space sector.

Objective 4
Engage with the public, media and policy makers

→ Organise two major space conferences and one minor workshop per year.
→ Increase media presence.
→ Engage with the public- participate to two MINT activities per year
→ Represent EPFL in international forums (IAF, SCN).
→ Develop project with general public (one event per year and content creation).

In 2026, the EPFL Space Center will deepen its role as the integrative hub for EPFL and the Space Innovation network by advancing four core objectives.

Objective 1 — Offer Cutting-Edge Space Education: We will launch the APCO Prize for the Minor in Space Technologies, co-deliver the new Space Propulsion Course II with ETHZ, debut the Systems Engineering course, and host the Minor Workshop in February.

Objective 2 — Enable Future Discoveries & Tech Transfer: We will submit a proposal for Innobooster funding, consolidate and expand Space Innovation membership services, launch the Marie Curie DN SLICe with LPAC, initiate two discovery projects per year, and update ESA funding guidance pages.

Objective 3 — Maintain and Develop Space Sustainability Leadership: We will kick off TESSA — Technologies to Enhance Space Situational Awareness — optimize ground-based observation capabilities, and supervise 3–5 high-quality master's and semester projects focused on space sustainability.

Objective 4 — Engage with the Public, Media and Policy Makers: We will host the EPFL Space Day on May 8, a community-focused event limited to EPFL associations, startups, labs, and space initiatives. We will conduct a lycée visit on February 2, participate in Journée de la Technique in September, launch the ESPACE COMMUN social media platforms, website and events, and increase collaboration with the IAU CPS.

Together, these actions will ensure our work remains technically rigorous, socially engaged, and ecologically responsible — shaping a sustainable and inclusive future for space.

THANK YOU!

Thank you to everyone who helped us make 2025 such an exciting year! To our eSpace team and staff, Space Innovation teammates, all our motivated students, dedicated researchers, EPFL colleagues, participants at our seminars and events, and all our partners who have trusted us to develop new projects - we could not have done this without you. We look forward to continuing our great work together!

EPFL Space Center Advisory Board

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The EPFL Space Center's Advisory Board is composed of seven external experts who identify subjects of strategic importance to the Center in order to explore with the Center the best way to conduct collaborative activities with partners, and to provide advice on the development of the Center's program of activities.

Camilla Colombo
Politecnico di Milano

Etienne Deffarges
Entrepreneur

Peter Guggenbach
SWISSto12

Chiara Manfletti
Technical University of Munich

Susmita Mohanty
Spaceport SARABHAI (S2)

Thomas H. Zurbuchen
ETH Zurich

Daniel Neuenschwander
Professor of practice

Ludovic Monnerat
Swiss Armed Forces

EPFL Space Center Steering Committee

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The Steering Committee is composed of three members of EPFL with connections to space, whose role it is to guide the Center's strategic development.

Andreas Burg
EPFL Telecommunications Circuits Lab

Edoardo Charbon
EPFL Advanced Quantum Architecture Lab

Mathieu Salzmann
EPFL Computer Vision Lab

Annex

AQUA	Advanced Quantum Architecture Laboratory	aqua.epfl.ch
LASPE	Advanced Semiconductors for Photonics and Electronics Lab	laspe.epfl.ch
LASTRO	Astrophysics Laboratory	lastro.epfl.ch
BIOROB	Biorobotics Laboratory	biorob.epfl.ch
CCLAB	Composite Construction Laboratory	cclab.epfl.ch
MCSS	Computational Mathematics and Simulation Science	mcss.epfl.ch
LSMS	Computational Solid Mechanics Laboratory	lsms.epfl.ch
CVLAB	Computer Vision Lab	cvlab.epfl.ch
CHILI	Computer-Human Interation Lab for Learning and Instruction	chili.epfl.ch
EPSL	Earth and Planetary Science Laboratory	epsl.epfl.ch
EMC	Electromagnetic Compatibility Laboratory	emc.epfl.ch
ESL	Embedded Systems Laboratory	esl.epfl.ch
ECEO	Environmental Computational Science and Earth Observation Lab	eceo.epfl.ch
EERL	Extreme Environments Research Laboratory	eerl.epfl.ch
FlexLab	Flexible Structures Laboratory	flexlab.epfl.ch
TOPO	Geodetic Engineering Laboratory	topo.epfl.ch
ICT4SMG	ICT for Sustainable Manufacturing Group	ict4sm.epfl.ch
IIG	Immersive Interaction Research Group	iig.epfl.ch
LSI	Integrated Systems Lab	lsi.epfl.ch
LAMD	Laboratory for Applied Mechanical Design	lamd.epfl.ch
LARA	Laboratory for Automated Reasoning and Analysis	lara.epfl.ch
GalSpec	Laboratory for Galaxy Evolution and Spectral Modelling	lara.epfl.ch
LPAC	Laboratory for Processing of Advanced Composite	lpac.epfl.ch
LIS	Laboratory of Intelligent Systems	lis.epfl.ch
LMM	Laboratory of Mechanical Metallurgy	lmm.epfl.ch
LPI	Laboratory of Photonics and Interfaces	lpi.epfl.ch
K-Lab	Laboratory of Photonics and Quantum Measurements	k-lab.epfl.ch
LRESE	Laboratory of Renewable Energy Science and Engineering	lrese.epfl.ch
LMTM	Laboratory of Thermomechanical Metallurgy	lmtm.epfl.ch
MAG	Microwaves and Antennas Group	mag.epfl.ch
LCM	Mobile Communications Laboratory	lcm.epfl.ch
MMSPG	Multimedia Signal Processing Group	mmspg.epfl.ch
NAM	Nanophotonoics & Metrology Laboratory	nam.epfl.ch
PHOSL	Photonic Systems Laboratory	phosl.epfl.ch
PVLAB	Photovoltaics and Thin Film Electronics Laboratory	pvlab.epfl.ch
APHYS	Physics of Aquatic Systems Laboratory	aphys.epfl.ch
PowerLab	Power and Wide-Band Gap Electronics Research Lab	powerlab.epfl.ch
PEL	Power Electronics Laboratory	pel.epfl.ch
RFIC	Radio Frequency Integrated Circuits Laboratory	rfic.epfl.ch
RGL	Realistic Graphics Lab	rgl.epfl.ch
RRL	Reconfigurable Robotics Laboratory	rrl.epfl.ch
SPC	Swiss Plasma Center	spc.epfl.ch
TCL	Telecommunications Laboratory	tcl.epfl.ch
TIC	Tribology and Interfacial Chemistry	tic.epfl.ch
VITA	Visual Intelligence for Transportation	vita.epfl.ch

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