

# Activity report 2025



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# Portrait

## World-class research in the heart of the Alps

**The dialogue between science and society has never been as important as it is today, at a time when uncertainty seems to have taken pride of place. At Sion, the research areas chosen - green chemistry, renewable energies, the environment and health - are complementary and are leading to major advances in these fields. The flexibility and innovation of the Valais region are strengths that our researchers are making full use of to achieve major breakthroughs.**

When I arrived in 2015 with my laboratory, I went from the bubbling ecosystem of San-Francisco to a building under construction south of Sion station with a head full of questions. Almost 10 years later, the south of Sion and the campus have been completely transformed, thanks in particular to visionary and proactive policies. From a few dozen researchers, we have grown to several hundred. From a single institution on the campus, we have grown into a complete ecosystem with the HES-SO Valais-Wallis, which has established itself in our immediate vicinity, as well as the newly-created Energypolis SA, which is there to convert our research into functional societal and commercial applications.

The world is facing many societal challenges, and global warming is obviously one of them. Temperatures are rising and ecosystems are suffering as a result. Without claiming that technology is the solution to everything, it is clear that without major scientific advances, the consequences for humanity will be disastrous. At the EPFL Valais Wallis Campus, our research focuses largely on sustainability and resilience. For example, notable advances in carbon capture using different technologies, seasonal energy storage and innovative sensors for observing the environment have already been observed on campus. EPFL not only aims for scientific excellence, but also a constructive dialogue with the applied sciences, of which the neighbouring School of Engineering is a perfect example.

The year 2024 saw a number of awards go to our researchers in Sedun. In the field of health, for example, Prof. Fridhelm Hummel received the prestigious » *Fürst Donnersmarck research prize for Neurorehabilitation* « . In the field of hydrogen, MER Jan Van Herle's group received the » *Hydrogen TCP award of excellence* « , a major step forward in the direction of seasonal storage of renewable energy.

With the third phase of EPFL Valais Wallis confirmed for June 2024, which will see the arrival of six new chairs specialising in the field of energy, the future of the campus is extremely promising, particularly as we are now passing the threshold of the critical size needed to operate effectively and, above all, to attract talent from the Valais and beyond. We can proudly say that almost 70% of our staff have chosen to live in the Valais and are thriving in our mountains.

May the adventure continue on such a wonderful path!



**Wendy Queen**

Chair of the Campus Committee

## **A centre of research and innovation in the heart of the Valais**

**Since its arrival in 2015, EPFL Valais Wallis has experienced continuous growth to the great satisfaction of all the partners involved. 2024 is no exception to the rule, with the launch of the 3rd development phase of the Sedun campus, illustrating the exceptional dynamism of this ecosystem.**

Because of its geographical location, the Valais is in the front line when it comes to coping with global warming. The frequency and intensity of extreme events in this continental and alpine environment are likely to continue to increase. To mitigate the environmental and social consequences, politics, industry and academia will need to develop new and innovative ways of working together, and that's what EPFL Valais Wallis is all about.

Since 2012, when the first collaboration agreement between EPFL and the Canton of Valais was signed, the campus has evolved considerably. In 2024, the third amendment to the basic agreement was ratified, confirming that six new professorships (the equivalent of a research team specialising in a highly specialised field) would be coming to Valais. By 2032, the total number of professorships located in the Valais will have risen to at least 22, bringing some 450 researchers to the site. A new building is due to be constructed on the campus in the near future to accommodate this growth. If the current trend continues, three-quarters of this talent could settle close to the campus and become part of local life.

There are already many collaborations with industry and policy-makers, and these will continue to develop, particularly in the area of decarbonisation, a chemical process that is absolutely essential if we are to move towards the 'net zero' promised by the Swiss government for 2050. A detailed understanding of climatic phenomena and their impact, smart grids, innovative materials with low electricity consumption, high-efficiency solar panels, the batteries of the future, etc. are just a few of the concrete examples of new technologies that will be developed. These are just some of the concrete examples of products resulting from research carried out in Sion.

The development of EPFL Valais Wallis, made possible by the vision of a few bold pioneers, is strongly supported not only by the EPFL Management, but also by the Valais and Sédun authorities. These synergies, which also exist with other players on the site such as Energypolis SA and the HES-SO Valais-Wallis, point to a myriad of positive developments for the entire region, with innovations exported well beyond our cantonal borders. The adventure has only just begun.



**Léonard Evéquo**

Chief Operating Officer

## Perspective

**20 years ago, what Valaisan would have bet that today, in Sion, we would have one of the most dynamic campuses in Switzerland, bringing together EPFL, HES-SO Valais-Wallis, Energypolis SA, UNIL and many private players? When the first agreement between the State of Valais and EPFL was signed in 2012, it provided for 11 professorships, around a hundred employees and EPFL investment of €100 million over 10 years. At the end of this period, EPFL has more than doubled the number of researchers initially agreed and has invested more than 200 million in research in Valais.**

This development is already guaranteed to continue with the signing of the 3<sup>rd</sup> phase, which was confirmed in June 2024. Between now and 2032, six new professorships are expected on the Valais campus. A new building is to be constructed for this purpose.

Active collaboration with our neighbours, in particular the HES-SO Valais-Wallis and Energypolis SA, is on the increase, resulting in recognised demonstrators and the creation of start-ups with international potential. Active coordination with the State of Valais and the City of Sion is also enabling us not just to dream, but to realise the vision of a sustainable campus within a dynamic ecosystem, in the heart of the Alps and, of course, the revolutionary Ronquoz XXI district.

The numerous awards won by the professors working in Sion, as well as the critical mass already achieved by 2024, all point to a bright future for this dynamic campus. There are many challenges ahead, and governance will have to adapt on a day-to-day basis to the growing importance of the campus, but all the signs are green for the EPFL to consolidate its presence in Sion and thus add considerable value to the local ecosystem.



# Financial figures

**The figures below show the main financial indicators for the campus, expressed in millions of Swiss francs (MCHF). They reflect the annual budgets, cumulative contributions and structural investments made by EPFL and the Canton of Valais to support the scientific, technological and infrastructural development of the site.**

**51.6**

MCHF de coûts totaux de  
fonctionnement

**13.8**

MCHF de fonds tiers obtenus

**504.8**

MCHF d'investissements totaux  
cumulés

**283.2**

MCHF d'apport cumulé de l'EPFL

**125**

MCHF de financement cumulé du  
Canton du Valais

**96.6**

MCHF de bâtiments mis à  
disposition par l'État du Valais

## **Our laboratories**

# School of Architecture, Civil and Environmental Engineering (ENAC)

## Extreme Environments Research Laboratory (EERL)



### **Prof. Julia Schmale**

Extreme Environments  
Research Laboratory (EERL)

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*Atmospheric Science*

Laboratory

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## **Our mission**

Extreme environments are particularly sensitive to climate change and are transforming at accelerated rates. This can have important global repercussions. EERL aims to create integrated process understanding by investigating interactions between the atmosphere, cryosphere, biosphere, ocean, land and anthroposphere. The goal is to characterize climate-change relevant and vertically-resolved processes that are directly influenced by humans, and natural processes that are simultaneously undergoing change due to climate forcing. The enhanced process understanding will enable us to better simulate the fate of extreme environments in the context of global change and resulting implications for society.

	<b>Research topics</b>
<b>1</b>	We investigate the molecular-level chemical composition of aerosols with cutting edge instrumentation to determine the sources of the aerosol particles.
<b>2</b>	We study the vertical thermodynamic structure of the atmosphere and how aerosols are dispersed from the surface to higher altitudes where they participate in cloud formation.
<b>3</b>	We develop new analytical methods and facilities for vertical atmospheric measurements, notably a tethered balloon, the EERL helikite.

# Our key projects



## ORACLES

How are clouds formed in Antarctica? To answer this question we performed tethered balloon observations at Neumayer III station for the second season in a row.

- Alfred Wegener Institute
- Institute for Tropospheric Research, DE

[View the project](#)



## GreenFjord

Using the Swiss research sailboat Forel, we studied the ocean-ice-atmosphere interactions in Southern Greelandic fjords. This year, we deployed our new automated tethered balloon facility, AVATAR, to measure the vertical distribution of aerosol particles.

- ETHZ
- UZH
- UNIL
- Narsaq International Research Station

[View the project](#)



## Tara Polar Station

The TPS will drift for 18 months in the central Arctic Ocean ten times to observe the sea ice decline over the next 20 years. The EERL takes a leading role in atmospheric observations to understand the impact of aerosols on climate change.

- CNRS
- The Weizmann Institute
- Tara Ocean Foundation
- Takuvik
- ETHZ
- and many more...

[View the project](#)



## Our results and highlights

1

### ***New Developments***

- The EERL developed in collaboration with the startup Invisible Light Labs (Vienna, Austria) and the LESC laboratory at EPFL a new technology to measure aerosol chemical composition. Using nanoelectrical membrane systems coupled to Fourier transform infrared spectroscopy (NEMS-FTIR), we are now able to measure picograms of aerosol mass. The system is so light weight that it can be flown on EERL's tethered balloon facility.
- Julia Schmale was invited to the National Institute of Polar Research in Japan to discuss the future missions of the new icebreaker Mirai II.

2

### ***Awards***

- Roman Pohorsky received the Environmental Engineering Doctoral School Thesis Award as well as the Early Career Scientist Award of the European Aerosol Society
- Dr. Benjamin Heutte received the poster award at the Faraday Discussions conference of the Royal Chemical Society, UK
- MSc Lorenzo Comi obtained the master thesis award of the Société Suisse des Ingénieurs et des Architectes, Vaud.
- Lionel Favre won a photograph award by the journal Nature in the category « Scientists at work »

3

### ***New Funding***

- We are partners to two newly funded Swiss Polar Institute Flagship Programs: ARKTIS for Tara Polar Station and DOMINO for Antarctic research.
- We were also funded by the BNP Paribas foundation in collaboration with French partners for the Tara Polar Station.

# Team & talents

## **Lab team size**

EERL has currently 17 members.

## **General skills**

EERL members have educational backgrounds in engineering, meteorology, chemistry, physics and environmental science. We seek people that think creatively, love challenges, like to be outdoors in polar regions and care about environment and people.

## **Skills developed by the scientific team**

Our skills comprise building new scientific instruments, developing analyses codes, illustrating our science results and capturing our research with stunning images.



## Regional and social impacts

**1**

Our research helps to improve climate model simulations to better anticipate global challenges of climate change.

**2**

Our focus on air quality can help identify challenging weather patterns that exacerbate local pollution, particularly in winter when temperature inversions lead to high pollution in the Rhone Valley. In addition, we can quantify the impact on air pollution of Saharan dust events and long-range transported fire emissions.

**3**

Our routine observations in Valais at ALPOLE can guide operators of solar panels when a lot of dust deposition and hence lower performance is expected.

# Perspectives and challenges

## ***Priority 1***

Study the decline of Arctic sea ice and the implications for weather in Europe

## ***Priority 2***

Understand how fast and when Antarctica will react to climate change

## ***Priority 3***

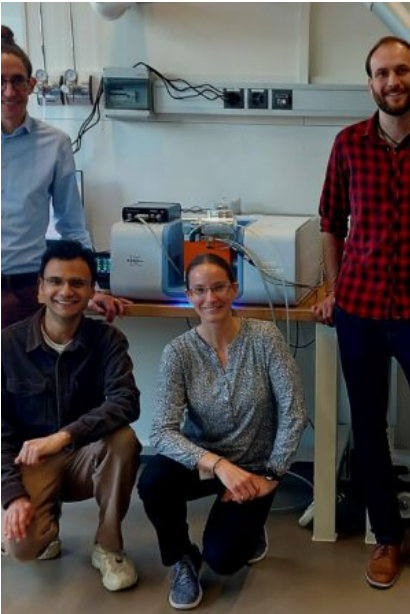
Cultivate a regenerative mind set to tackle sustainability challenges

## ***Future Needs***

New instruments that deliver high quality data and are light weight need to be developed long-lived batteries for autonomous science stations are required anti-icing materials that are environmentally friendly are needed.

## ***Industry Partnerships***

We seek partnerships with industry and start ups to work on solutions for our three main challenges.



# Laboratory of Catchment Hydrology and Geomorphology (CHANGE)



## **Prof. Sara Bonetti**

Laboratory of Catchment  
Hydrology and  
Geomorphology (CHANGE)

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*Ecohydrology, Landscape  
evolution, Modeling*

Laboratory

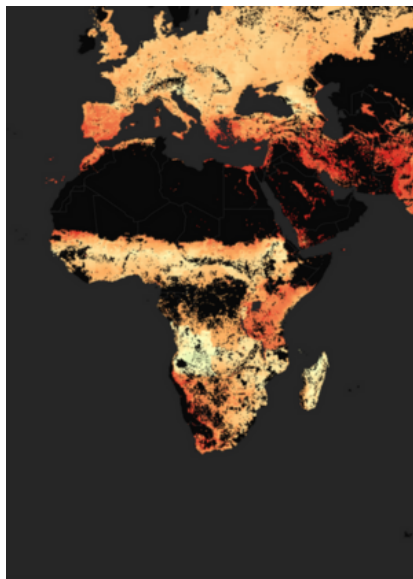
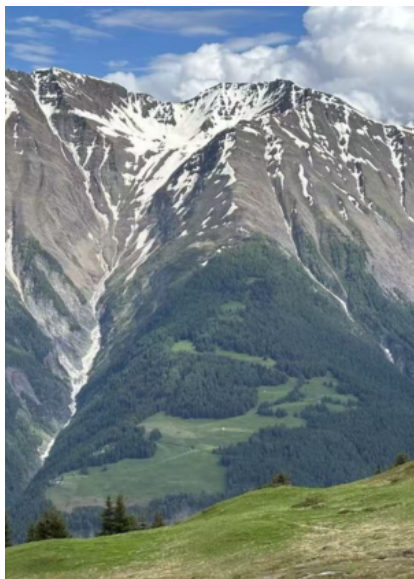
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## **Our mission**

At CHANGE we seek to improve current understanding and forecasting capabilities of land surface processes in natural and managed ecosystems. Our ultimate goal is the definition of adaptation strategies to future-proof soil and water resources in light of increasing anthropogenic and climatic pressures.

	<b>Research topics</b>
<b>1</b>	<p>Catchment water, carbon, and nutrient dynamics. We study the interactions between soil-plant dynamics, climatic variability, land erosion in natural and managed ecosystems, with applications ranging from forestry, to agriculture, and climate.</p>
<b>2</b>	<p>Ecohydrology of agroecosystems. We use and develop mathematical frameworks to tackle interlinked challenges of food security, climate change adaptation and mitigation, and environmental sustainability in agroecosystems.</p>
<b>3</b>	<p>Landscape evolution and soil erosion. We are interested in understanding how landscapes evolve through multiple erosional and depositional processes and how these ultimately affect (and are affected by) vegetation and soil carbon dynamics.</p>

# Our key projects



## SOCscape

We combine newly designed monitoring campaigns in Alpine catchments with state-of-the-art detailed numerical modeling to evaluate the dynamics of soil carbon redistribution, fluxes, and stocks in topographically complex landscapes. More here:

<https://www.epfl.ch/labs/change/research/assessing-soil-carbon-dynamics-in-landscapes-of-complex-topography-socscape/> .

## SMART-AGRI

By leveraging detailed numerical modeling of soil-plant dynamics, we quantify the benefits of different climate-smart agricultural practices, and identify the combinations of practices that concurrently optimize crop production, climate change mitigation, and preservation of environmental resources in different soils and ecoregions. More here: <https://www.epfl.ch/labs/change/research/global-quantification-of-the-benefits-of-climate-smart-agriculture-under-future-climates-smart-agri/>

## Carbon removal in wetland restoration

We are developing a process-based framework that links hydrological and vegetation drivers with wetland micromorphology to assess their role in the net ecosystem carbon exchange, thus providing a tool to quantify carbon fluxes in wetland systems. More here:

<https://www.epfl.ch/labs/change/research/carbon-removal-in-wetland-restoration/>

- ETH Zurich
- WSL
- UNIL

[View the project](#)

- Imperial College London
- University of Cyprus

[View the project](#)

- SOIL Lab (EPFL)
- ProNatura

[View the project](#)

## Team & talents

### Lab team size

11 people (1 PI, 1 admin assistant, 1 technician, 5 PhD students, 3 postdocs)

### Skills developed by the scientific team

Mathematical modeling, advanced data analysis, project and time management, complex thinking, public speaking



## Regional and social impacts

**1**

Food security, Climate change adaptation and mitigation, Sustainable use of soil and water resources

**2**

Understanding climate change impacts on Alpine ecosystems. Adapting agricultural management practices in the face of climate change.

**3**

Aiding the development of decision support systems, informing MRV protocols, analysis of management scenarios

# Perspectives and challenges

## ***Priority 1***

Understanding how ecosystem management affects and is affected by climatic changes

## ***Priority 2***

Developing science-based tools to quantitatively assess ecosystem responses to climatic and anthropogenic pressures

## ***Complex Ecosystems***

Ecosystems are highly complex systems, characterized by complex interactions between multiple biotic and abiotic processes

## ***Balancing Key Variabilities***

High spatial and temporal variability of many key quantities - Need to balance multiple societal needs in devising optimal management strategies

# Laboratory of Cryospheric Sciences (CRYOS)



## **Prof. Michael Lehning**

Laboratory of Cryospheric  
Sciences (CRYOS)

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*Cryospheric Sciences*

Laboratory

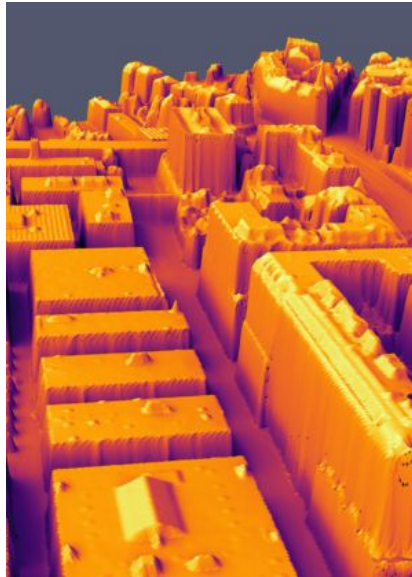
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## **Our mission**

CRYOS investigates the processes that shape snow and atmosphere in mountain and polar regions and their role in a changing climate. CRYOS also works on risk management and optimization of renewable energy production in alpine terrain based on its expertise in wind, water, and radiation processes.

	<b>Research topics</b>
<b>1</b>	<p>We study the processes at the interface of snow and ice with the atmosphere to understand and quantify the energy and mass balance which are changing in a warming climate. Results will help in predicting and adapting to climate change, in the sectors of natural hazards, alpine tourism, agriculture, and renewable energy production.</p>
<b>2</b>	<p>The lab investigates the potential of wind and solar resources for renewable energy production in mountain regions with particular focus on optimization such as better balancing summer and winter production and increasing energy production in winter to reduce the seasonal production deficit.</p>
<b>3</b>	<p>CRYOS develops and applies physics-based numerical models for snow, permafrost and the lower atmosphere, which are used in theoretical and applied research. Such models allow for predictions and for simulating scenarios of events and possible changes in alpine and polar regions.</p>

# Our key projects



## SWEET EDGE

As part of the “SWiss Energy research for the Energy Transition” program, EDGE seeks to provide scientific evidence to fast-track the growth of locally sourced decentralized renewable energy in Switzerland, to help achieving renewable energy targets in 2035 and 2050.

## SmallScaleSnow @Large

In the SNF-funded project "SmallScaleSnow@Large", we investigate snow - atmosphere exchange in extreme environments in particular the large-scale effects of drifting and blowing snow. First results point to the influence not only on the local mass balance but also on cloud formation and precipitation.

- Swiss Federal Office of Energy (SFOE)
- Universities of Geneva, Bern,
- TH Zürich
- HSLU Lucern
- ZHAW (project leaders)

[View the project](#)

## UrbanTwin


In the UrbanTwin ETH domain joint initiative project we are investigating the urban microclimate and its effect on renewable energy production. Urban heat island characteristics and potential mitigation measures are modeled and scenarios developed for the future.

- Swiss Polar Institute
- SLF
- International Polar Foundation
- Centre d'Etudes Spatiales de la Biosphère (CESBIO)
- Finnish Meteorological Institute

[View the project](#)

Multiple groups at EPFL and ETHZ across schools and disciplines

[View the project](#)

	<h2 style="text-align: center;">Our results and highlights</h2>
<h1>1</h1>	<p>Finalizing a complete assessment of snow distribution and electricity yield for a planned photovoltaic installation at Prafleuri together with the Spin-Off company SUNWELL</p>
<h1>2</h1>	<p>Outstanding Oral Presentation by Dr. Hendrik Huwald, 30th Intl. Symp. on Polar Sciences (ISPS) – granted by Minister of Ocean and Fisheries, Republic of Korea</p>
<h1>3</h1>	<ul style="list-style-type: none"> <li>• Current and future shifts of snow regimes in extreme environments (SNOWSHIFTS) 2026-2032, funded by European Research Council (ERC)</li> <li>• Dynamic changes in air-snow-ice-ocean interactions with global warming: An observational programme in Antarctica and the Southern Ocean supported by multi-scale modelling (DOMINO) 2026-2030, funded by Swiss Polar Institute (SPI)</li> </ul>
<h1>4</h1>	<p>The « Antarctic Wind Atlas » is a high-resolution dataset that maps wind conditions across Antarctica, developed using a combination of atmospheric models, observations, and machine learning. It provides detailed information on wind speed and energy potential, even in remote and previously unmeasured regions. This product helps scientists and stakeholders better understand the Antarctic climate and supports planning for sustainable energy and research infrastructure.</p>

# Team & talents

## **Lab team size**

Current team : 16 (1 professor, 7 senior scientists (post-doc & scientific collaborators), 7 PhD students, 1 administrative collaborator)

## **Specific team member**

Rainette Engbers is a PhD student in her first year. Her work aligns well with the cryospheric research in the Group studying blowing snow with both modelling and data analysis. In this framework, she has set-up sensors during her field expedition to Antarctica. Just after return from Antarctica, she had a very good candidacy exam.

## **Skills developed by the scientific team**

CRYOS members work very autonomously under targeted scientific guidance. They develop expertise in environmental science and engineering, fieldwork and instrument deployment, numerical modeling and machine learning, as well as science communication and outreach.



## Regional and social impacts

**1**

Facts and information on local consequences of climate change. Propositions for mitigating and solutions for better adapting to consequences of climate change.

**2**

Contribution to the management of local water resources and natural hazards. Assessment and potential of renewable energy sources in alpine regions.

**3**

Data and scenario simulations for ski resorts and mountain tourism in general. Knowledge, data, and simulations for hydropower sector. Support for development of high-Alpine Photovoltaic and wind resources.

**4**

Better urban climate in Sion.

# Perspectives and challenges

## *Main priorities*

Successful and coordinated start of SnowShifts and DOMINO projects

Development of a new SNF proposal on snow

## *Main challenges*

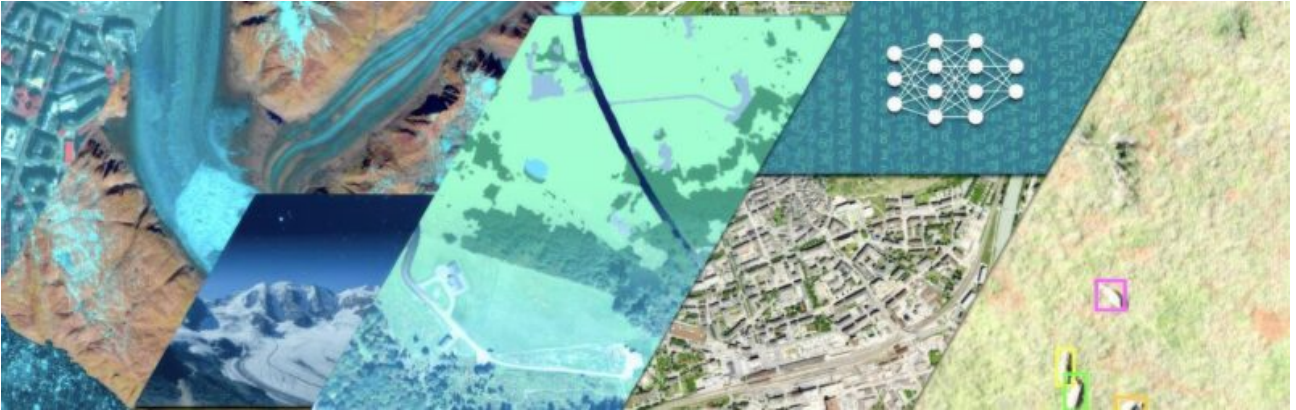
Continuation of renewable energy research after end of the EDGE project

## *Future Partnerships*

- CESBIO Toulouse
- GFZ Potsdam



# Environmental Computational Science and Earth Observation Laboratory (ECEO)



## **Prof. Devis Tuia**

Environmental Computational  
Science and Earth  
Observation (ECEO)

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*Remote Sensing, Machine  
learning*

Laboratory

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## **Our mission**

At ECEO we develop technology to monitor Earth with digital data. We use data from multiple sources (from the smartphone to the satellite) and develop algorithms enabling spatio temporal monitoring of our changing Earth. We study land processes, underwater ecosystems and ecosystems dynamics, for instance related to animal conservation and forest monitoring.

	<b>Research topics</b>
<b>1</b>	Develop AI algorithms to make sense of digital data about Earth
<b>2</b>	Monitor endangered ecosystems like coral reefs or tropical forests
<b>3</b>	Map distribution of species (animals and vegetal) and how they distribute in space and time, especially under climate change

# Our key projects



## WildAI

We study behavior of alpine wildlife by analysing automatically a set of videos acquired by camera traps installed in the Swiss National Park.

Swiss National Park

[View the project](#)

## Coral reef monitoring in the Red Sea

We develop machine learning technology to map coral reefs with close sensing, support local monitoring programs and build capacity in the Red Sea Nations with dedicated workshops


- Transnational Red Sea Center (EPFL)
- Univeristé de Djibouti
- Red Sea University

## DVPS

With an international consortium, we explore new avenues to develop large scale multisource AI models capable of solving multiple problems at once, the so-called multimodal foundation models.

- PI School
- University of Oxford
- Cambridge
- ETH

[View the project](#)

	<b>Our results and highlights</b>
<b>1</b>	Completion of coral monitoring mission in Makassar, Indonesia (2025). Release of Swiss scale treeline map.
<b>2</b>	D. Tuia, Clarivate highly cited researcher 2025
<b>3</b>	DVPS, Horizon Europe

# Team & talents

## **Lab team size**

17 people

## **Skills developed by the scientific team**

Machine learning algorithms for understanding environmental processes  
Low cost monitoring systems based on camera traps (Mammalps project with Swiss National Park), GoPro cameras (coral reefs monitoring) and fixed wings drones (WildDrone project, tested in Kenya and Namibia in 2025)



## Regional and social impacts

**1**

We provide reproducible algorithms and scientific evidence at large scale of the evolution of several critical ecosystems of Earth

**2**

We collaborate with several services of the Canton (Géoinformation, Forêts, Agriculture) to support them in their monitoring efforts, in particular to scale them up and automatize

**3**

Through collaborations with industry (Swisstopo, AXA), we develop technology critical to make their data analysis routines more efficient and accurate

**4**

We train the next generation of environmental engineers in data proficiency, and prepare them to the future challenges of process monitoring, which are strongly influenced by big data problems and complex, multi-modal streams

# Perspectives and challenges

## *Main opportunities*

Democratization of AI is a great opportunity to spread wider our technology

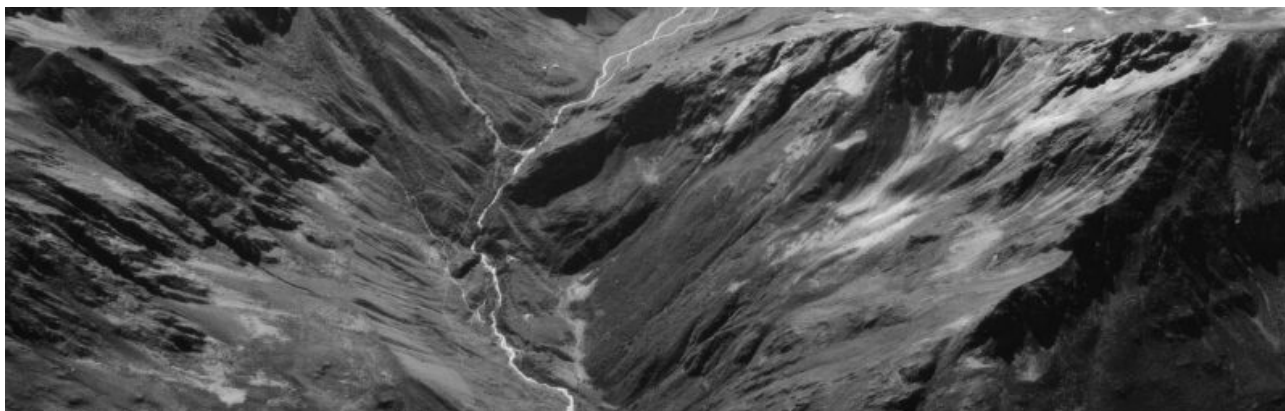
Great interest in Valais for AI technology helps us connecting with several key regional players

## *Future Partnerships*

- Expanding our coral technology in other reefs of the world, towards a citizen-led monitoring system
- Extending our blue ice mapping technology to other problematics related to polar dynamics



# River Ecosystems Laboratory (RIVER)



**Prof. Tom Ian Battin**

River Ecosystems Laboratory  
(RIVER)

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*River science*

Laboratory

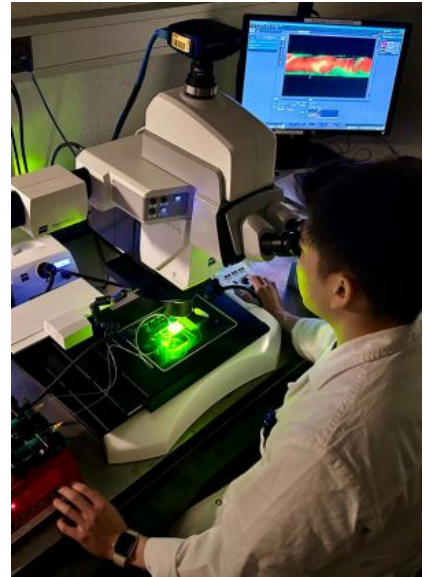
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## **Our mission**

To understand the coupled physical, chemical and biological processes in high-mountain streams and rivers in the context of climate change.

	<b>Research topics</b>
<b>1</b>	Understand climate change impacts on high-mountain river ecosystems.
<b>2</b>	Map the biological complexity in glacier-fed streams.
<b>3</b>	Understand the role of rivers for the global carbon cycle.

# Our key projects



## BREATHE

In collaboration with leading research European research institutes, we design and test novel indicators for water quality based on sensor technologies and modeling.

Service de  
l'Environnement


## SENTINELS

We combine fieldwork with sensor technology and modeling to predict hydrological regimes and carbon biogeochemistry in high-mountain river networks under the influence of various glacier types.

## VIRUS

Blending fieldwork, bench-scale experiments and advanced bioinformatics, we investigate effects of environmental viruses on bacterial biodiversity in glacier-fed streams.

- EPFL,
- Pasteur Institute Paris

	<b>Our results and highlights</b>
<b>1</b>	Vanishing Glaciers Project from the NOMIS Foundation and PAMIR project from SPI successfully terminated.
<b>2</b>	BREATHE Project
<b>3</b>	Publications in leading journals (eg., Nature, Nature Geoscience)

# Team & talents

## **Lab team size**

Around 20 members across 13 nationalities.

## **Specific team member**

Wai Hoe Chin is an outstanding scientist with a tireless dedication to the development of novel methods to detect and characterize novel virus from rivers.

## **Skills developed by the scientific team**

conducting scientific research; plan demanding expedition; interact with stakeholders;



## **Regional and social impacts**

**1**

Early warning systems for river ecosystem health deterioration.

**2**

Implementing novel strategies for water quality monitoring.

**3**

Implementation of a first-of-its-kind collection of viruses from streams in Valais.

# Perspectives and challenges

## ***Priority 1***

Establish MIC - Microbial Initiative for the Cryosphere at ALPOLE

## ***Main challenges***

Acquiring funds for discovery-driven research.

## ***Future Partnerships***

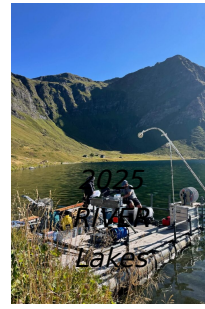
With the European Molecular Biology Laboratory and Pasteur Institut Paris.

## ***Priority 2***

Secure funding to conduct research in Valais and Greenland



2025 RIVER  
PAMIRhighlight3



2025  
Lakes



2025  
PAMIR  
Highlight1



2025 RIVER PAMIR  
Highlight2

# Microbiome Adaptation to the Changing Environment (MACE)



## **Prof. Ianina Altshuler**

Microbiome Adaptation to the  
Changing Environment  
(MACE)

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*Environmental Microbiology*

Laboratory

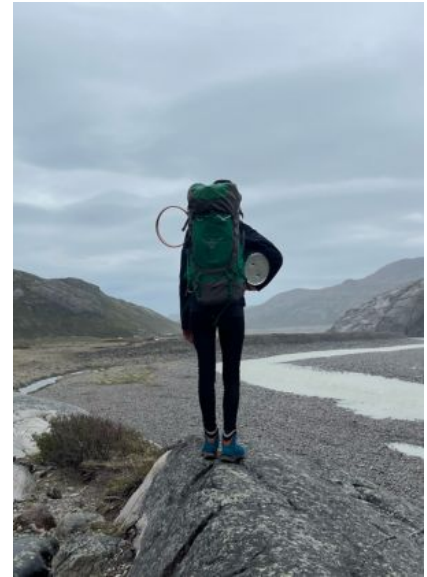
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## **Our mission**

At the MACE lab, we study how microbes survive and adapt in snow, ice, and frozen soils. Through fieldwork, lab experiments, and molecular analyses, we uncover how these resilient life forms respond to a warming climate and help shape fragile alpine and polar ecosystems.

	<b>Research topics</b>
<b>1</b>	<p>Permafrost thaw and greenhouse gas release: When frozen ground thaws, trapped carbon becomes available to microbes, leading to the release of greenhouse gases like CO<sub>2</sub> and methane. We study how microbial communities shift with warming and how these changes influence ecosystem stability and climate feedbacks.</p>
<b>2</b>	<p>Microbial adaptation in the cold: We study how microorganisms survive and stay active in snow, ice, and frozen soils. They use special biochemical strategies, to function at subzero temperatures. These adaptations reveal how life responds to environmental change.</p>
<b>3</b>	<p>Microbial interactions and symbioses: Microbes interact constantly, sometimes cooperating, sometimes competing. We explore how these relationships shape microbial communities in cold environments and how partnerships between microbes and plants or animals help both adapt to harsh and changing conditions.</p>

# Our key projects



## Alpine Microbiome Under Pressure

Across multiple Swiss-Alpine summits, we use passive warming plots to study how rising temperatures affect soil microbes and greenhouse gas emissions. These experiments reveal how mountain ecosystems respond to warming.

Swiss Federal Research Institute WSL

## Snow Decline in the Alps

We study how reduced snow cover affects alpine soils and their microbes using field plots with snow removal and addition. Tracking changes across seasons helps us understand how shrinking snowpacks alter soil health, nutrient cycles, and greenhouse gas emissions.

## Greenland Microbes on Newly Exposed Land

As Greenland's glaciers retreat under climate warming, new soil ecosystems emerge where microbes quickly take hold. We study how these early communities transform lifeless sediments into richer soils and influence greenhouse gas fluxes.

- ECEO
- EERL



## **Our results and highlights**

**1**

Our alpine field studies reveal rich and unique microbial diversity across different mountain sites, showing that even nearby ecosystems can host distinct microbial communities. We also find that while alpine soils release CO<sub>2</sub>, many simultaneously take up methane (CH<sub>4</sub>), helping to potentially offset greenhouse gas emissions.

# Team & talents

## **Lab team size**

8 people in the lab (not counting Master students)



## Regional and social impacts

**1**

Our research helps predict how climate change affects alpine mountain and polar ecosystems. This will guide conservation and public awareness of cold regions.

**2**

Studying alpine soils and snow systems in Valais allows us to support sustainable land use, biodiversity conservation, and climate adaptation strategies in this sensitive alpine region.

**3**

Preserving and studying cold-adapted microbial organisms opens new possibilities for sustainable biotechnology, from green chemistry and environmental solutions to novel enzymes for industrial applications.

# Perspectives and challenges

## *Main opportunities*

A main priority is to understand how warming will reshape Alpine ecosystems, microbial activity, and greenhouse gas balance. \* Cold-adapted microbes offer untapped potential for sustainable biotechnological and industrial innovation.

## *Main challenges*

Linking microbial data with climate models is challenging but can potentially greatly improve predictions of greenhouse gas feedbacks.

# Soil Biogeochemistry Laboratory (SOIL)



**Prof. Meret Aeppli**

Soil Biogeochemistry  
Laboratory (SOIL)

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*Soil Biogeochemistry*

Laboratory

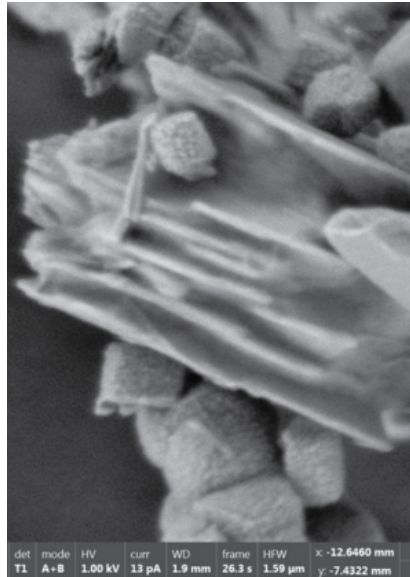
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## **Our mission**

At the Soil Biogeochemistry Lab, we reveal how redox-driven processes govern carbon, nutrient, and contaminant cycling. Combining field observations with laboratory experiments, we build tools and models to predict ecosystem function and guide sustainable soil stewardship in a changing climate.

	<b>Research topics</b>
<b>1</b>	<p>Mineral Redox Chemistry: Some tiny soil minerals (with iron and manganese) act like little batteries. We measure when they “give” or “take” electrons to predict how nutrients and pollutants change.</p>
<b>2</b>	<p>Soil Organic Matter Dynamics: Microbes eat dead leaves and roots for energy. We measure that energy to learn when carbon stays in the ground or turns into gases that affect our climate.</p>
<b>3</b>	<p>Sustainable Soil Management: Soils have tiny airless pockets where extra greenhouse gases can form. We map where and how strong these pockets are to help people grow healthy crops while keeping water clean and emissions low.</p>

# Our key projects



## Mountain Soils

We map soil organic carbon across topographies in Vallon de Réchy and Binntal and pinpoint the chemical, physical, microbial, and geological drivers of where carbon accumulates. This helps predict how these stocks may change under future climate. More information: <https://www.epfl.ch/labs/soil/soil-organic-carbon-in-mountain-soils/> and data: <https://alpinesoc.epfl.ch/>

[View the project](#)

## Manganese minerals

We measure how manganese minerals with different structures exchange electrons. Our findings help improve predictions of mineral-mediated reactions, including pollutant transformations. More information: <https://www.epfl.ch/labs/soil/electrochemical-analysis-of-the-redox-properties-and-reactivity-of-manganese-oxides-strong/>

UC Davis

## Wetland restoration

We develop a process-based modeling framework to estimate carbon fluxes in restored wetlands by linking ecohydrological and biogeochemical processes and validating the results with monitoring data from Swiss wetlands. This helps quantify restoration impacts and optimize projects to maximize carbon sequestration under changing climate.

- CHANGE EPFL
- Pro Natura

[View the project](#)

[View the project](#)

## Team & talents

### Lab team size

1 PhD student, 4 Postdocs, 1 admin assistant, 1 prof (status December 2025)

### Introducing a specific team member

Vineeth Pothanamkandathil: Podstoc in the group since March 2025.  
Develops novel experimental and modeling approaches to characterize the redox reactivity of soil minerals.

### Skills developed by the scientific team

Project management and supervision, experimental and laboratory skills, experimental design, field skills, data management, communication skills.

### Other

Interdisciplinary team with backgrounds in environmental chemistry, pedology, environmental microbiology, agronomy



## Regional and social impacts

**1**

By revealing how soils store carbon, purify water, cycle nutrients, and transform pollutants, our research turns molecular insight into tools for climate action, clean water, and resilient food systems—guiding policies and practices that protect people and nature.

**2**

Our research maps soil organic carbon stocks in valleys like Réchy and Binntal and identifies the drivers of their stability. These insights help anticipate how Alpine soils—and their organic carbon—will change as the climate warms.

**3**

We train students and interns in field methods, laboratory experiments, GIS/modeling, and project management & supervision, producing job-ready talent for environmental consulting, hydropower, agro-tech, and remediation companies.

# Perspectives and challenges

## *Main opportunities*

Assess how snow-cover thickness/duration shifts Alpine soil carbon cycling.

Help agriculture adapt to hotter, drier summers (water retention, cover crops, tillage).

Improve soil modules in models to forecast local climate impacts.

Optimize wetland restoration for net carbon gains while managing methane.

Build open datasets & sensor networks for long-term Alpine monitoring.

## *Main challenges*

- Separating climate vs. topography/land-use effects on soil processes.

- Harsh Alpine conditions: access, safety, and instrument reliability.

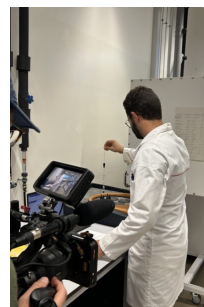
- Scaling from micro-sites to catchments while tracking uncertainty.

- Limited long-term data; harmonizing measurements and standards.

- Integrating field, lab, and model results into actionable guidance.

## *Future Partnerships*

Cantonal agencies and land managers



# Smart Environmental Sensing in Extreme Environments Laboratory (SENSE)



## **Prof. Jérôme Chappellaz**

Smart Environmental Sensing  
in Extreme Environments  
Laboratory (SENSE)

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*Biogeochemistry, climate  
change*

Laboratory

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## **Our mission**

SENSE missions are to explore climate change and greenhouse gas biogeochemistry through engineering / new technologies, with a focus on extreme and marine environments. The corresponding motto summarizing our mission could be expressed as “Tech for Climate”.

	<b>Research topics</b>
<b>1</b>	Greenhouse gas biogeochemistry in aquatic environments, i.e. what are the production and consumption mechanisms of these gases, possibly affecting the fluxes between the aquatic environment and the atmosphere
<b>2</b>	Smart sensors : additional data are required, at better spatial and temporal scales. We develop sensors, including affordable ones, allowing to increase the data coverage
<b>3</b>	Low tech and citizen science : engage sailors to equip their sailing boats with low cost sensors allowing to get scientific profit of their expedition

# Our key projects



## BASAL-CH4

A project funded by the Swiss polar institute, during which we evaluated methane (CH<sub>4</sub>) fluxes from west Greenland fjords in summer, making use of our in-situ sensor called SubOcean and of an expedition by the Swiss scientific sailing boat FOREL.

- Swiss polar institute
- Forel Heritage association

[View the project](#)

## Swiss lakes and LéXPLORE

We continue to acquire detailed measurements of dissolved nitrous oxide (N<sub>2</sub>O) and dissolved CH<sub>4</sub> in Lake Geneva and other Swiss lakes at different seasons, with the final goal to evaluate their production and consumption mechanisms, as well as fluxes towards the atmosphere.


LéXPLORE platform Eawag  
UNIL

## Sailowtech

We design, construct and improve low-cost sensors to measure temperature, salinity, dissolved oxygen and dissolved CO<sub>2</sub> in aquatic environments. This will help to develop citizen science for a better spatial and temporal recording of these important variables. Since 2025, our team ensures the overall academic coordination of Sailowtech.

Sailowtech association  
MAKE projects of EPFL

[View the project](#)

	<b>Our results and highlights</b>
<b>1</b>	<p>Our detailed in-situ analyses of dissolved CH<sub>4</sub> in Lake Geneva have demonstrated that high concentrations far from the Rhone river delta are mostly generated by lateral transport from the delta itself.</p>
<b>2</b>	<p>Prof. Dr. Jérôme Chappellaz, who leads the SENSE unit, received the Belgica Medal from the royal academy of sciences in Belgium.</p>
<b>3</b>	<p>Projects supported by the Swiss polar institute : BASAL-CH<sub>4</sub> and NITRO-BAFFIN</p>

# Team & talents

## Lab team size

7

## Specific team member

This year Isabel Wild as administrative assistant. She conducts an incredible job following the whole aspects of administration of the team, but also in accompanying ALPOLE Professors with the organization of the bimonthly meeting of all ALPOLE Professors. Her dedication and professionalism are truly astonishing and a great asset for our team and for ALPOLE.

## Skills developed by the scientific team

Multi-disciplinary approach at the interface between environmental geosciences and engineering. Field work and associated logistics. Demanding field environments (lakes, polar regions).

## Other

Communication. Such a research topic is of interest for a broad public. Therefore it is important to be able to handle media interviews for instance.



## Regional and social impacts

**1**

Our research provides essential information regarding potential biogeochemical feedbacks activating under a warmer world, which is particularly important in Switzerland where the current warming is stronger than global average.

**2**

Our research shows that the canton of Valais takes its share of responsibility in better understanding how the climate system works. Our know-how could find ramifications with activities in Valais related with water quality, the carbon and nitrogen cycle.

**3**

Our research on new sensors may lead to discoveries finding ramifications into industrial applications.

# Perspectives and challenges

## ***Priority 1***

Improve our current sensors

## ***Priority 2***

Deploy the sensors in collaboration with international programs, through new scientific expeditions in different parts of the world

## ***Priority 3***

Expand the capacity of citizen science around aquatic environments but possibly other ones as well

## ***Main challenges***

There are engineering challenges, requiring to develop connections with different disciplines at EPFL. There are also deployment challenges, as we rely in part on the complex logistics of foreign operators in polar regions. Last but not least, citizen science requires to minimize the budgets of the instruments, which is not always easy.

## ***Future Partnerships***

Other Professors within EPFL. Collaboration with Eawag around new types of CTD instruments able to document the physical state of water systems. Collaboration with other nations (in particular Norway) for deployment in polar oceans, with perspectives in Svalbard and in the Southern ocean around Antarctica. Prospect to take part to the BeauPair expedition in 2027 together with Germany and Canada.



# School of Basic Sciences (SB)

## Laboratory for Functional Inorganic Materials (LFIM)



### **Prof. Wendy Queen**

Laboratory for Functional  
Inorganic Materials (LFIM)

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*Chemistry*

Laboratory

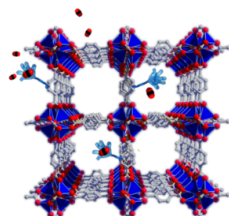
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## **Our mission**

LFIM pioneers advanced porous materials for gas and liquid separations—specializing in CO<sub>2</sub> capture, water purification, and recovery of valuable metals from waste—to reduce global energy consumption and advance environmental stewardship.

	<b>Research topics</b>
<b>1</b>	<p>Carbon Capture: We will develop better ways to remove CO2 directly from the atmosphere and from large point sources, with the aim of making the process cheaper and more effective to help reach carbon neutrality goals.</p>
<b>2</b>	<p>We create cost-effective and sustainable ways to extract valuable and critical metals like platinum, palladium, and gold from waste for its reuse, with the aim of helping ensuring secure material supply chains necessary for the energy transition while promoting environmental stewardship.</p>
<b>3</b>	<p>LFIM designs selective porous materials capable of removing targeted contaminants from water sources, with the aim of helping secure clean water access for all and aid environmental remediation.</p>

# Our key projects



## Gold Recovery Exhibit

In collaboration with our industry partner, we started a project to capture fluorinated molecules from gas mixtures. These persistent gases have very high global warming potential, and we aim to reduce their emissions using efficient, cost-effective porous adsorbents.

## **NCCR Separations**

This year we received funding to launch the NCCR Separations, a Swiss National Centre of Competence in Research dedicated to developing the next generation of separation technologies. By harnessing advanced materials and/or novel processes, we aim to tackle some of the world's most pressing challenges — from capturing CO<sub>2</sub> directly from the air to separating ammonia and recovering critical metals from waste streams.

## **Direct Air Capture**

We are developing porous materials able to capture CO<sub>2</sub> directly from the air. The project will feature the design and implementation of a CO<sub>2</sub> capture unit that will be installed at a local incineration facility in conjunction with ton scale carbon capture from the plant itself.

## **Porous Adsorbents for Water & Metal Recovery**

The group received an SNSF grant this year to develop piperazine- and dihydrophenazine-based building blocks for the design of highly efficient, cost-effective porous adsorbents targeting water treatment and heavy element recovery from complex waste streams.

[View the project](#)

## **Scaling Adsorbents for Gold Recovery & Clean Water**

Supported by a BRIDGE Proof of Concept Fellowship, our team member Dr. Nazanin Taheri aims to scale up efficient adsorbents for recovering gold and removing heavy metals from industrial wastewater and e-waste, advancing clean water and circular resource recovery.

[View the project](#)

• Climeworks Enevi

• Rio Tinto

View the  
project

View the  
project



## Our results and highlights

**1**

Our postdoctoral researcher Dr. Nazanin Taheri was selected as a BRIDGE Proof of Concept Fellow, receiving CHF 130k to advance her innovative work. Her project was later selected among the Top 5 startups out of 50 at the Energy & Environment Innovation Day organized by STARTUP CAMPUS Switzerland. In 2026, she also received 2nd place at the Sustainability Week Zurich Startup Award for her work on gold recovery from e-waste and industrial streams, combined with heavy metal removal to support cleaner water and circular resource recovery.

**2**

Our former PhD student Dr. Till Schertenleib received the EDCH Doctoral Program Thesis Distinction, placing his thesis among the top 8% of 2025 submissions. He was also selected as one of the 2025 MatChem PhD Student Award winners, recognizing the outstanding contribution of his PhD thesis and highlighting his scientific excellence. Dr. Timo Felder was awarded the Outstanding Poster Award at EuroMOF 2025, highlighting the strong impact of his research within the porous materials community. In addition, one of his recent publications was selected for the 2025 Most Popular Porous Materials Articles Collection, highlighting the relevance and visibility of his research. Our PhD student Sanjay Venkatachalam received the Outstanding Poster Award at the Gordon Research Conference in the USA, recognizing the quality and impact of his research presentation.

**3**

The NCCR “Separations” brings together 20 research groups to accelerate technology transfer, support Swiss sustainability goals, and strengthen innovation. It aims to position Switzerland as a leader in sustainable separation science by strengthening national expertise and building lasting interdisciplinary collaborations.

**4**

A BRIDGE Proof of Concept Fellowship was secured to support Dr. Nazanin Taheri's innovative adsorbent technology, paving the way toward a potential EPFL spin-off in the near future. In addition, one patent has been filed based on her innovative adsorbent materials and their application in resource recovery.

# Team & talents

## Lab team size

15

## Introducing a specific team member

Dr. Nazanin Taheri joined LFIM in September 2022 as an organic chemist, applying her expertise to the design of efficient adsorbents for addressing environmental challenges. Over the past three years, under the supervision of Prof. Wendy Lee Queen and through strong teamwork with PhD students, she has developed efficient adsorbents for gold recovery from e-waste and industrial streams, and heavy metal removal from wastewater. Her work has led to outstanding scientific outputs, including a publication in Journal of the American Chemical Society, and has attracted CHF 130k in BRIDGE Proof of Concept funding to support the scale-up and translation of her technology toward real-world applications.

## Skills developed by the scientific team

Our team members are developing the ability to translate fundamental scientific knowledge into practical solutions for pressing environmental challenges. Rather than pursuing research in isolation, they focus on technologies that combine scientific rigor with tangible environmental and economic impact.

A key skill is learning to bridge the gap between fundamental research and industry needs, from material design and characterization to application-driven testing, scale-up thinking, technology transfer, and collaboration with industrial partners. This prepares researchers to contribute to a more sustainable planet while advancing innovations with real-world relevance. In fact, while we actively explore scalable solutions for industry, we also maintain a strong focus on fundamental research. For example, our former PhD student Dr. Till Schertenleib carried out outstanding fundamental work that was recognized with the EDCH Doctoral Program Thesis Distinction and the 2025 MatChem PhD Student Award.



## Regional and social impacts

**1**

We develop advanced porous materials to combat climate change through efficient CO<sub>2</sub> capture, purify water by removing toxic metals, and recover valuable metals from e-waste—enabling a circular economy while training future leaders and engaging society through research translation.

**2**

LFIM helps boost visibility of Valais as a world-class science hub, helps drive economic growth through the creation of startups and bringing in investments, trains future scientists globally, engages the public via GoldRush exhibitions and local media (Canal 9, Nouveliste, RTS, Migros displays), and strengthens regional partnerships for the energy transition through presentations to decision makers and working with local industry, and engaging with local schools

**3**

Our research tackles the industrial energy challenge head-on: separation processes consume 10-15% of global energy. We deliver economic impact through startup creation, patent development protecting novel materials and methods and tech transfer, and through direct industry collaborations in an effort to help bring cutting-edge separation technologies to market.

# Perspectives and challenges

## ***Priority 1***

Provide new scientific knowledge that may help address existing global challenges related to climate change and water scarcity.

## ***Priority 2***

Scale our breakthrough materials from lab to industry—transforming CO<sub>2</sub> capture, e-waste recycling, and water purification from research innovations into deployed technologies.

## ***Priority 3***

Train the next generation of sustainability leaders while expanding public engagement to inspire action on climate and circular economy.

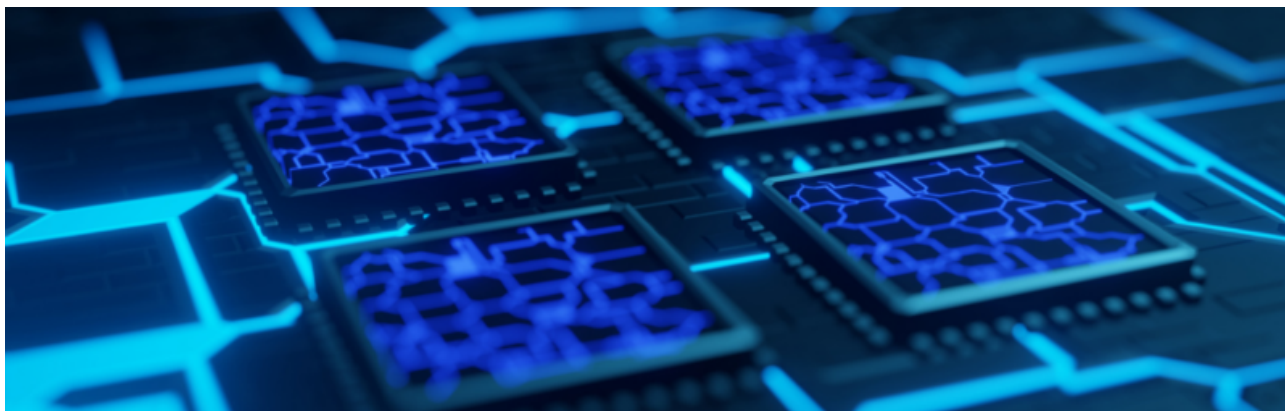
## ***Main challenges***

Bridging the gap between laboratory success and industrial-scale deployment. Making our energy-efficient technologies cost-competitive with existing methods. Securing pilot-scale funding to demonstrate real-world performance. Moving from promising prototypes to commercially viable products that industries will adopt. Developing necessary industrial partnerships

## ***Future Partnerships***

Our NCCR is aimed at addressing the above challenges and accelerate separation technology development to more rapidly meet industrial needs related to cost, energy consumption, and environmental sustainability. Within the context of this project we already have 8 academic partners and at least 15 supporting industrial partnerships which could be leveraged.

# Laboratory for Energy Materials (LEM)



## **Prof. Dr. Sascha Feldmann**

Laboratory for Energy  
Materials (LEM)

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*Chemistry, physics, materials  
science*

Laboratory

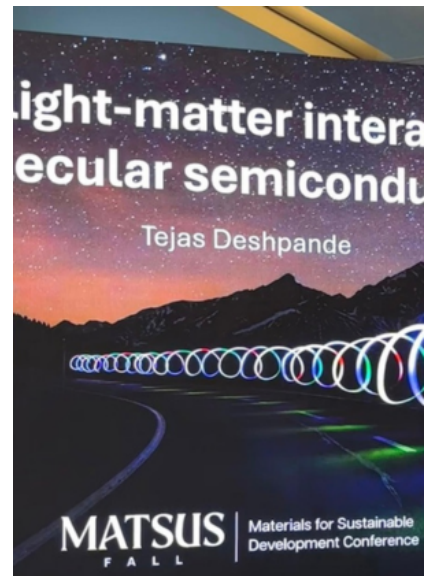
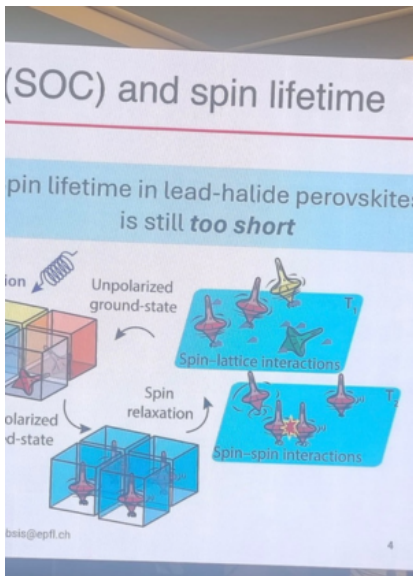
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## **Our mission**

The Laboratory for Energy Materials employs advanced optical characterization techniques and materials chemistry to transform the way we produce and consume energy as a society. We work on uncovering the design rules to enable the next generation of cheap, efficient and flexible solar cells & ultra-bright displays, and unlock entirely new applications in quantum information technology.

	<b>Research topics</b>
<b>1</b>	Cheap, flexible and highly energy-efficient solar cells
<b>2</b>	Efficient, flexible, ultra-bright displays and holography
<b>3</b>	Emerging quantum information technologies for ultra-efficient computing

# Our key projects



## Lead-Free Perovskites

Developing lead-free halide perovskites as sustainable, highly energy-efficient emerging semiconductors. These materials are printable from solution, cheap to manufacture and show enhanced electron spin lifetimes compared to their lead-counterparts.

EPFL Institute of Chemical Sciences and Engineering

## Ultrasensitive Polarization Microscopy

Development of an ultrasensitive polarization microscope with unprecedented spatiotemporal and energy resolution at record polarization sensitivity, in collaboration with the leading microscopy and optics manufacturer Zeiss.

Carl Zeiss AG

## Chiral Light-Matter Control

Understanding and controlling chiral light-matter interactions in molecular semiconductors for polarization-resolved organic optoelectronics.

EPFL Institute of Chemical Sciences and Engineering



## Our results and highlights

**1**

- A Swiss Excellence postdoctoral scholar has joined the group and will work to understand how chirality affects spin in singlet fission.
- A SNSF Postdoctoral Fellow has joined the group and will be working on chiral plasmonic materials.
- A perspective article on the impact of chirality on singlet fission and triplet fusion was published in ACS Energy Letters, one of the leading energy journals.
- Our labs hosted three high school students who learned how to make nanocrystals and experienced a working lab during the Swiss Study Week in Materials Science & Chemistry, organized in collaboration with Schweizer Jugend Forscht.

**2**

Sascha has won the Wiley Young Innovator Award and was named a C&EN Talented 12, two of the most competitive early-career research awards worldwide.

**3**

Sascha was awarded an ERC Starting Grant by the European Research Council – the most prestigious award in Europe. He also was awarded an international MAPS grant, an SNSF project funding grant, and a Swiss-Korean Quantum grant.

**4**

Two patents were filed regarding a) a new formulation for ultrabright QLED displays and b) an ultrasensitive polarization detection scheme.

# Team & talents

## **Lab team size**

10 people, set to grow to about 15 next year

## **Introducing a specific team member**

All are equally important

## **Skills developed by the scientific team**

Project management, critical problem solving skills, advanced synthetic chemistry, coding, semiconductor fabrication, semiconductor characterization, advanced optical spectroscopy, device fabrication.



## Regional and social impacts

**1**

We enable energy production & consumption applications with unprecedented energy conversion efficiencies. All devices based on semiconductors in modern society would operate based on cheaper to manufacture materials, yet at higher efficiency.

**2**

Valais in particular is affected very strongly by the consequences of climate change. The outlook of sustainable renewable energy sources based on cheap yet efficient photovoltaics is of key interest for the future development of this canton.

**3**

Industry partners at large benefit from the IP we create regarding more energy efficient solar cells and ultra-bright display materials.

# Perspectives and challenges

## **Priority 1**

Lead-free halide perovskite semiconductor development with enhanced efficiency and stability.

## **Priority 2**

Commercialization of an ultrasensitive polarization microscope.

## **Priority 3**

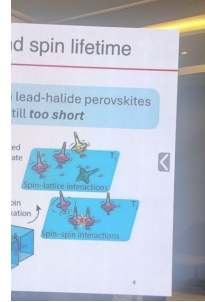
Enabling achiral molecular materials to be imbued with chiral properties.

## **Main challenges**

Stability issues in lead-free halide perovskite materials (high trap density) - polarization artifacts in optical components - absence of a mechanistic understanding of chirality induction mechanisms.

## **Future Partnerships**

- Quantum information technology companies interested in novel material platforms for qubits
- Solar cell companies interested in novel material platforms which are cheaper, flexible and more efficient than silicon
- microscopy manufacturers interested in the highest possible polarization contrast



# Laboratory of Nanochemistry for Energy (LNCE)



## **Prof. Raffaella Buonsanti**

Laboratory of Nanochemistry  
for Energy (LNCE)

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*Chemistry*

Laboratory

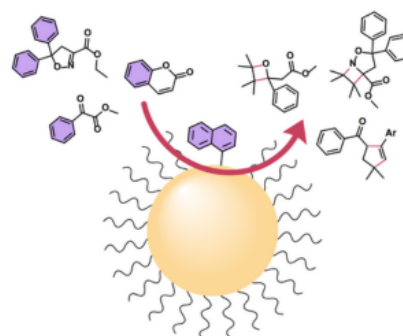
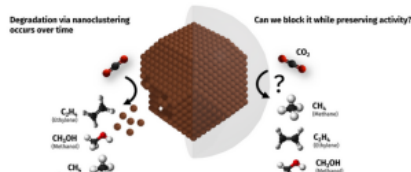
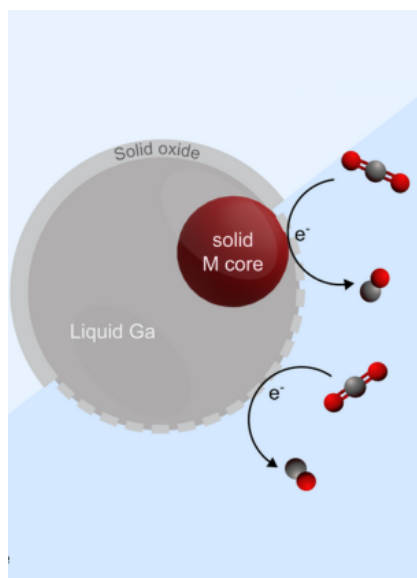
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## **Our mission**

LNCE addresses energy and sustainability challenges by addressing the fundamental key questions behind them. We use the tunability of well-defined nanocrystals to establish design principle of efficient and stable materials which store electricity and light into chemicals via conversion of low value molecules. We are particularly interested in the conversion of small molecules, especially CO<sub>2</sub> and CO, expanding to fine chemicals. The goal is to create a more sustainable chemical production.

	<b>Research topics</b>
<b>1</b>	Colloidal chemistry
<b>2</b>	Electrocatalysis
<b>3</b>	Photocatalysis

# Our key projects



## Tulip

We develop a new class of nanoparticles for the conversion of small molecules based on liquid metals. The idea of using liquid metals instead of conventional solid metals is that they will not deactivate and offer industry stable catalysts for chemical conversion. This grant is an ERC Consolidator.


## Design strategies for stable catalysts in CO<sub>2</sub> electroreduction

We develop strategies to create efficient and stable catalysts for converting CO<sub>2</sub> into chemicals. These catalysts are based on copper instead of conventional precious metals.

## Quantum dots for light-driven fine chemicals production

We develop light absorbing quantum dot materials to facilitate the production of fine chemicals using light.

This project is part of the big Swiss consortium NCCR Catalysis

	<b>Our results and highlights</b>
<b>1</b>	<p>Publication highlights include:</p> <ul style="list-style-type: none"> <li>&gt; <a href="https://www.nature.com/articles/s41929-023-01070-8">https://www.nature.com/articles/s41929-023-01070-8</a></li> <li>&gt; <a href="https://www.nature.com/articles/s41563-024-01819-x">https://www.nature.com/articles/s41563-024-01819-x</a></li> <li>&gt; <a href="https://www.nature.com/articles/s44160-025-00871-y?utm_source=rct_congratemail&amp;utm_medium=email&amp;utm_campaign=nonoa_20250901&amp;utm_content=10.1038/s44160-025-00871-y">https://www.nature.com/articles/s44160-025-00871-y?utm_source=rct_congratemail&amp;utm_medium=email&amp;utm_campaign=nonoa_20250901&amp;utm_content=10.1038/s44160-025-00871-y</a></li> </ul>
<b>2</b>	<p>European Chemical Society Lecture Award (2019), Swiss Chemical Society Werner Price (2021), Eastman Lecture in Catalysis at UC Berkeley (2023), Russel Lecture, Queen's University, Canada (2023), American Chemical Society Inorganic Nanoscience Award (2024)</p>
<b>3</b>	<p>Tulip is an ERC Consolidator Grant</p>

# Team & talents

## **Lab team size**

15

## **Skills developed by the scientific team**

Skills learned include project management, decision making, public speaking, research writing, Q&A, how to be innovative and creative, use of data and electronic labnotebooks. These skills will be helpful for any job afterwards.



## **Regional and social impacts**

**1**

Contributing to a sustainable society drives our activities. We are also strongly committed to education of students at all levels, which is crucial for society.

# Perspectives and challenges

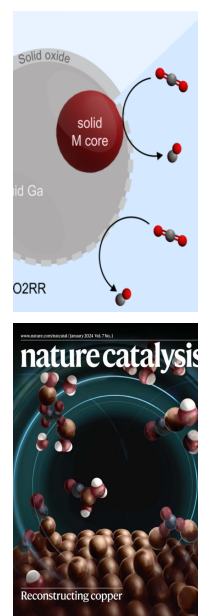
## *Priority 1*

Advancing scientific fundamental knowledge which contributes to more sustainable society



## *Priority 2*

Educate the next generation



# Laboratory of Advanced Separations (LAS)



## **Prof. Kumar Varoon Agrawal**

Laboratory of Advanced  
Separations (LAS)

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*Chemical Engineering*

Laboratory

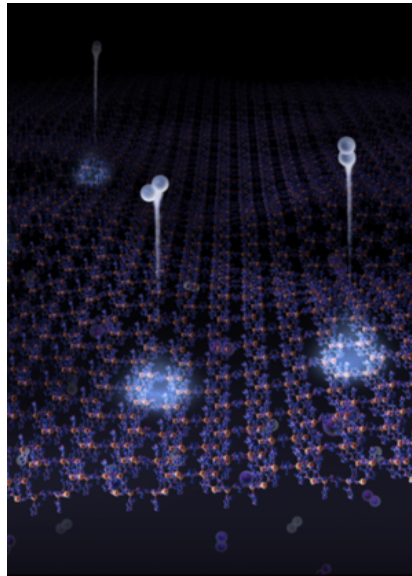
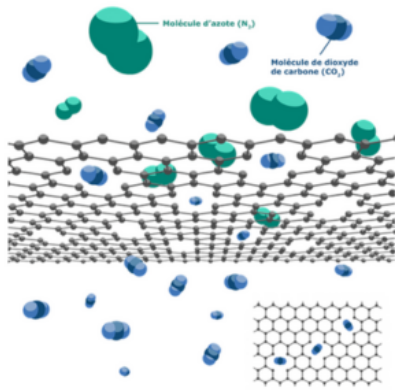
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## **Our mission**

Developing next-generation separation technologies that use less energy and are more sustainable, particularly for gas and liquid purification for application in energy and environment.

	<b>Research topics</b>
<b>1</b>	Energy-efficient CO <sub>2</sub> capture: We develop innovative membranes that can selectively capture carbon dioxide using much less energy than conventional methods.
<b>2</b>	Nanomaterials for clean separations: Our team designs atom-thin nanoporous materials that enable precise separation of gases and liquids at the molecular scale.
<b>3</b>	Scalable and sustainable membrane technologies: We work to translate our discoveries into practical, industrial-scale solutions that support cleaner and more sustainable chemical processes.

# Our key projects



## Graphene CO<sub>2</sub> Capture

CO<sub>2</sub> Capture with Atom-thin graphene Membranes Developing graphene (a Nobel prize winning material) based membranes that can selectively capture carbon dioxide with minimal energy use, supporting efforts to mitigate climate change.

## Ultrathin MOF Membranes


Ultrathin Crystalline Nanoporous Materials (MOFs) for Gas Separation Designing innovative thin films of MOFs (a Nobel prize winning material) that can distinguish between gas molecules at the atomic scale, offering breakthroughs for hydrogen purification and clean energy.

## Scalable Membrane Fabrication

Translating lab discoveries into industrial prototypes. A highlight is capture of CO<sub>2</sub> from Enevi waste incineration plant at the rate of 1 ton CO<sub>2</sub> per day by scaling porous graphene membrane, under a CCUS project funded by EPFL (Solutions4Sustainability, funding of 9 million CHF). Website: <https://s4s-ccus.epfl.ch>

- GAZNAT
- Enevi
- Divea
- Academic collaborators at EPFL and other Universities

- GAZNAT
  - Shell
  - Academic collaborators at EPFL and other Universities
- Academic collaborators at EPFL and other Universities
- [View the project](#)

	<h2 style="text-align: center;">Our results and highlights</h2>
<p style="text-align: center;"><b>1</b></p>	<p>The lab achieved major advances in creating ultrathin membranes — only a few atoms thick — that can efficiently separate gases such as CO<sub>2</sub> and hydrogen.</p>
<p style="text-align: center;"><b>2</b></p>	<p>Prof. Agrawal received several international distinctions, including an ERC Starting Grant, NAMS Young membrane Scientist Award (2018), the AIChE FRI/John G. Kunesh Award (2021), recognizing his pioneering work in separation science.</p>
<p style="text-align: center;"><b>3</b></p>	<p>LAS participates in national and European collaborations focused on sustainable energy and carbon-capture technologies, including partnerships with the Swiss National Science Foundation (SNSF) and ERC projects.</p>
<p style="text-align: center;"><b>4</b></p>	<p>The laboratory spinoff Divea (incorporated in 2024) is active in commercializing the low-cost carbon capture membranes. Laboratory has filed 10 patent application. Several are granted. 7 of these have been licensed by Divea.</p>
<p style="text-align: center;"><b>5</b></p>	<p>LAS's work has led to high-impact publications, global collaborations, and growing recognition for advancing clean-technology solutions that can reduce emissions and energy costs. Divea is carrying field trials of graphene membranes. The research group has developed pilot-plant demonstrators in collaboration with Valais, SFOE, and GAZNAT.</p>

# Team & talents

## **Lab team size**

The LAS currently brings together around 20 researchers, including PhD students, postdocs, and engineers from more than ten countries.

## **Introducing a specific team member**

We would like to highlight Dr. Jian Hao, a senior scientist at LAS, who plays a key role in developing next-generation membranes for CO<sub>2</sub> capture and gas separation. His expertise in nanomaterials and thin-film fabrication is central to transforming laboratory discoveries into scalable technologies.

## **Skills developed by the scientific team**

Team members gain expertise in advanced materials synthesis, nanofabrication, and energy-efficient separation technologies, as well as project management and interdisciplinary collaboration.

## **Other**

The lab strongly promotes diversity, mentoring, and an inclusive working culture that encourages creativity and innovation.



## Regional and social impacts

**1**

Our research supports the global transition to low-carbon technologies by making CO<sub>2</sub> capture and purification processes more energy-efficient and affordable.

**2**

Based in Sion, the LAS strengthens the local innovation ecosystem, attracts international talent, and contributes to positioning Valais as a hub for clean-technology research.

**3**

By developing scalable and cost-effective separation technologies, the lab helps industries reduce energy use and emissions while improving their competitiveness and sustainability.

# Perspectives and challenges

## ***Main opportunities***

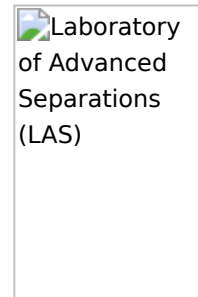
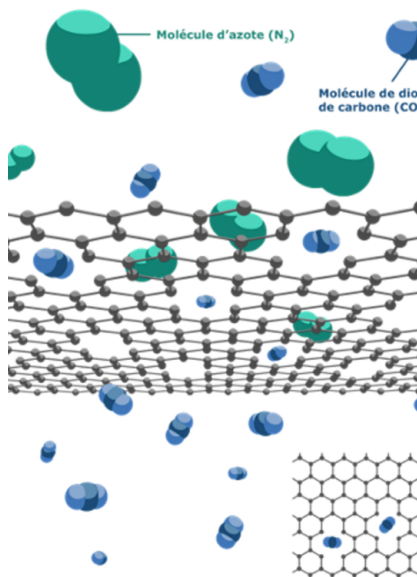
LAS aims to expand the application of its advanced membrane technologies to large-scale CO<sub>2</sub> capture and clean hydrogen production. There are strong opportunities to strengthen links with industry and contribute to Switzerland's transition to a low-carbon economy.

## ***Main challenges***

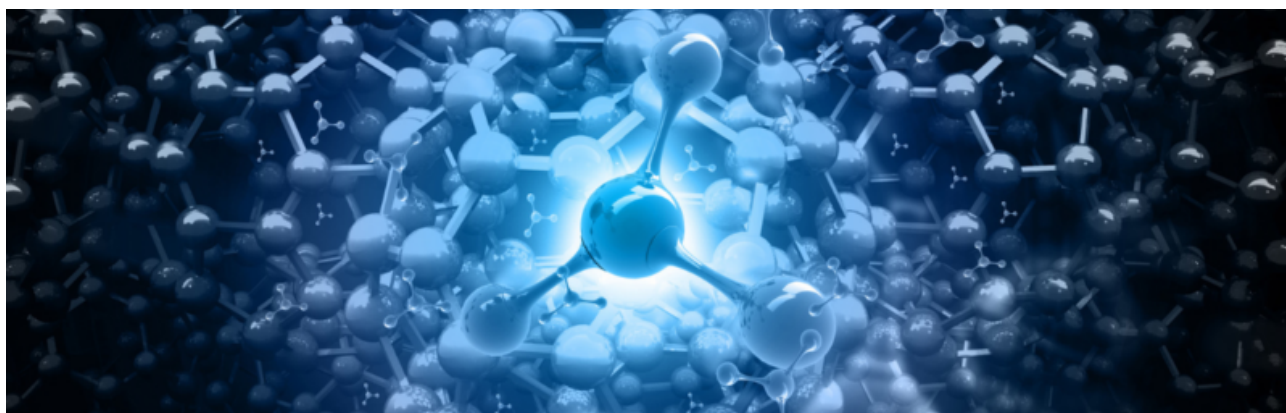
The main challenge is to scale up these materials from lab prototypes to industrial systems while keeping production cost-effective and environmentally friendly. Bridging the gap between research and real-world implementation remains a key focus.

## ***Future Partnerships***

The lab seeks to collaborate with energy and manufacturing companies, as well as public institutions, to accelerate technology transfer and demonstrate the impact of advanced separations in sustainable industrial processes.



# Laboratory of Molecular Simulation (LSMO)



## **Prof. Berend Smit**

Laboratory of Molecular  
Simulation (LSMO)

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*CO<sub>2</sub> capture*

Laboratory

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## **Our mission**

We advance materials discovery by uniting molecular simulation, data science, and AI. Through rigorous modeling, high-quality data, and holistic digital platforms, we accelerate breakthroughs in reticular chemistry and carbon capture, creating tools with real-world impact.

	<b>Research topics</b>
<b>1</b>	We use advanced computer simulations to understand how new materials work at the atomic level. This helps us predict important properties—such as how they hold heat, absorb gases, or move water—before we make them in the lab.
<b>2</b>	We combine large datasets with modern AI methods to identify which materials are most promising for a given job. Instead of testing thousands of materials experimentally, we let AI narrow the search to the most useful ones.
<b>3</b>	We synthesize and characterize new materials—such as bright, tunable luminescent compounds—to explore their properties experimentally and connect them to our simulations and AI models.

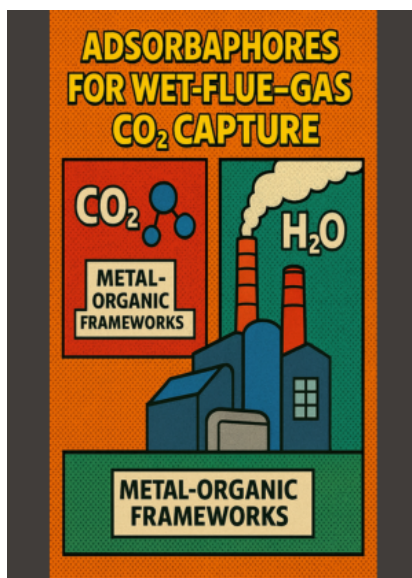
# Our key projects



A unified platform linking material properties, process design, TEA and LCA to identify optimal CO<sub>2</sub>-capture sorbents for real source-sink pairs. Used across >60 global case studies for system-level decisions.

- Heriot-Watt University
- ETHZ
- UC Berkeley
- ENS Paris

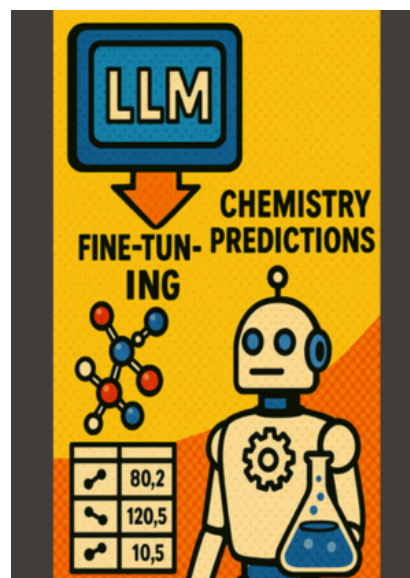
[View the project](#)



Using data-driven MOF screening, we identified robust CO<sub>2</sub>-binding “adsorbaphores” resistant to humidity. Led to synthesis of AI-PMOF and AI-PyrMOF, which outperform commercial sorbents under wet conditions.


- Heriot-Watt University
- UC Berkeley

[View the project](#)



Fine-tuning large language models enables accurate prediction of materials properties and even inverse design with minimal data. Demonstrated across molecules, alloys and MOFs; surprisingly outperforms specialized ML in low-data regimes.

[View the project](#)

	<b>Our results and highlights</b>
<b>1</b>	2 articles in Nature
<b>2</b>	Highly Cited Researcher in the field of Cross-Field - 2025
<b>3</b>	SNFS Advanced grant
<b>4</b>	DePOLY is a spin off from LSMO

# Team & talents

## Lab team size

16-18 people



## **Regional and social impacts**

**1**

Fundamental research

# Perspectives and challenges

## *Main opportunities*

Develop AI-driven materials design

## *Future Partnerships*

Heriot-Watt University

# Laboratory of Materials for Renewable Energy (LMER)



## **Prof. Andreas Züttel**

Laboratory of Materials for  
Renewable Energy (LMER)

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*Energy, Hydrogen, Physical  
chemistry*

Laboratory

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## **Our mission**

The research spans from fundamental science to applied research in the domain of renewable energy storage by means of hydrogen and its derivatives. Investigation of reaction mechanism especially for hydrogen interacting with metals and carbon as well as analysis of energy systems in order to substitute fossil fuels with renewable energy. Search for new creative and innovative solutions and working beyond the obvious.

	<b>Research topics</b>
<b>1</b>	Interaction of hydrogen with metals, hydrogen intercalation and structure of hydrides.
<b>2</b>	Reduction of CO <sub>2</sub> and carbon hydrates with hydrogen, synthetic hydrocarbons as sustainable fuels for the future renewable energy economy.
<b>3</b>	Analysis of the technical requirements and economic impacts of renewable energy systems.

# Our key projects

## Metal hydride storage


In collaboration with Korean groups and GRZ Technologies a energy storage system is developed consisting of an electrolyzer from Korea and a metal hydride storage system from Switzerland. New hydrides based on bcc alloys allow to almost double the hydrogen storage density.

## Biogas to Pure Synthetic Methane

Conversion of biogas to pure methane in collaboration with Gaznat. Hydriding the CO<sub>2</sub> to synthetic methane in the presence of 50% methane after prior removal of the catalyst harming impurities. The methanation reaction leads to >99.6% of Methane in a one stage reactor. The impurities are separated from the biogas by new nanoporous membranes.

## Palm Oil to Sustainable Aviation Fuel

Efficient synthesis of sustainable aviation fuel from palm oil by introducing a selective cracking and hydrogenation. Therefore, more than 75% of the input carbon is conserved in the desired product.

	<b>Our results and highlights</b>
<b>1</b>	Publications on hydrides are the most cited in the field. Significant contributions hydrogen interaction with nanomaterials, metals and carbon.
<b>2</b>	Watt d'Or award, Hydrogen and Energy award
<b>3</b>	Long term international collaborations with leading groups in China, Japan, Korea, USA, and several European countries that led to many publications.
<b>4</b>	A series of patents on hydrides, catalysts, analytical techniques and applications are used in industry.
<b>5</b>	First description of the technical oportunities and economic impact of a complete transition of Switzerland to renewable energy: Andreas ZÜTTEL, Christoph NÜTZENADEL, Louis SCHLAPBACH, Paul W. GILGEN "Power plant units for CO2 Neutral Energy Security in Switzerland", Frontiers in Energy Research: Process and Energy Systems Engineering, 12:1336016 (2024), <a href="https://doi.org/10.3389/fenrg.2024.1336016">https://doi.org/10.3389/fenrg.2024.1336016</a> (open access).

# Team & talents

## **Lab team size**

The team consists of 2 post docs, 7 PhD students and 2 to 5 internship students

## **Introducing a specific team member**

Several former group members are now professors e.g. Wen LUO at Shanghai University or Emanuele MOIOLI at Politecnico in Milano. Several group members have successfully created companies e.g. Noris GALLANDAT GRZ Technologis SA and Cedric KOOLEN SCIDENTIFY SA.

## **Skills developed by the scientific team**

The learn to work not only on scientific interesting research topics but also to work on relevant scientific challenges and to produce valuable results beyond measurements.

## **Other**

Contribution to the knowledge of the global science community by exchange and collaborating with the best scientists world wide.



## Regional and social impacts

**1**

Renewable energy storage is the key technology needed in order to substitute the fossil fuels with renewables. The development of new materials and technologies as well as the science directly serve the society.

**2**

The increasing contribution of renewable energy to the energy mix is a key topic in Valais. New technologies create new activities, work and prosperity.

**3**

The energy transition to renewables is also a transition of the energy market. The economy profits from the knowledge created about the future technologies.

**4**

The contributions to the Swiss hydrogen association Hydropole ([www.hydropole.ch](http://www.hydropole.ch)) and the International Symposium Hydrogen & Energy ([www.hesymposium.ch](http://www.hesymposium.ch)) links us within the Swiss energy network and the international community.

# Perspectives and challenges

## ***Priority 1***

Hydrogen in metals and the properties of hydrides

## ***Priority 2***

Sustainable aviation fuels from biological oil

## ***Priority 3***

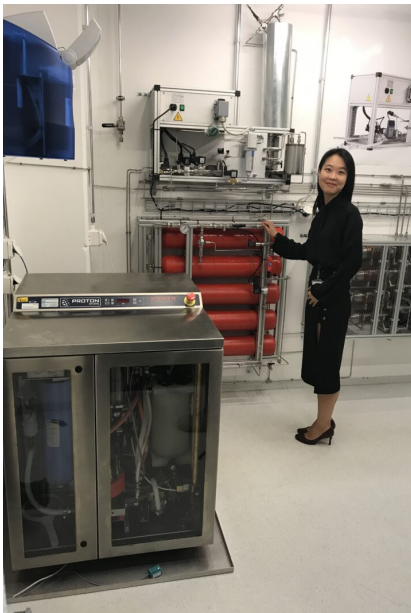
Renewable energy system analysis

## ***Main challenges***

Focus on the promotion of natural intelligence and profit from rather than substitute with artificial intelligence in order to concentrate on the most relevant topics for the benefit of humanity.

## ***Future Partnerships***

Increase the collaboration with China and concentrate on the best Chinese research groups to profit from the synergies to create mutual success.



# School of Engineering (STI)

## Industrial Process and Energy Systems Engineering (IPESE)



### **Prof. François Maréchal**

Industrial Process and Energy  
Systems Engineering (IPESE)

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*Process and energy system  
engineering*

Laboratory

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## **Our mission**

IPESE develops digital twins based optimization for generating net-zero transition, integrating life-cycle metrics. Work spans efficient bio-based processes, CO<sub>2</sub> capture, high-efficiency SOFCs, waste gasification, and urban renewable hubs linking industry, energy, and smart districts.

	<b>Research topics</b>
<b>1</b>	Integration of renewable energy in urban systems, considering local communities, photovoltaics, smart operation, efficiency and advanced energy conversion technologies like heat pumps and district heating.
<b>2</b>	Decarbonising the industrial production, by efficient production, heat recovery, CO2 capture, renewable energy and waste management intergation and industrial symbiosis.
<b>3</b>	Modeling the energy tranistion : how is the energy system adapating to the innovation and the decarbonisation actions.

# Our key projects



## PinchSmall

A computer aided decision support for quick evaluation of decarbonisation options of industrial processes.

- EPFL
- HES-SO
- Swiss Federal Office of Energy

## Net Zero Lab


Decarbonisation strategies for city integrated aluminium production.

- IPESE
- HES-SO
- Oiken
- Novelis

## Urban Energy Twins

Urban Twin and Sweet Swice & Sweet COSI, towards a holistic modle of the integration of renewable energy in cities : from behaviors to energy system adaptation.

Sweet consortium with utility companies

	<b>Our results and highlights</b>
<b>1</b>	Independant and neutral Switzerland : what is the expected cost and consequences
<b>2</b>	Several best papers and poster awards in international conferences
<b>3</b>	Our lab has contributed to the industry decarbonisation roadmap report for the EU commission: AIDRES, “Advancing industrial decarbonization by assessing the future use of renewable energies in industrial processes”: <a href="https://data.europa.eu/doi/10.2833/696697">https://data.europa.eu/doi/10.2833/696697</a>
<b>4</b>	François Marechal has contributed to the creation of six start-up companies : Bluewatt Engineering now part of PSE Siemens : energy efficient waste water treatment, Trea-tech : hydrothermal gasification for water treatment and biomass conversion, Exergo.ch : multi-energy systems design by CO2 based district heating and cooling systems, Urbio : decision support in urban energy system planing. Qaptis : CO2 capture in transportation systems. Emissionium : CO2 tracking and certification.
<b>5</b>	CO2 network demonstrator in EPFL Valais Wallis campus.

# Team & talents

## **Lab team size**

30 reserchers at various levels

## **Specific team member**

<https://www.epfl.ch/labs/ipese/ipese-aboutus/ipese-team/>

## **Skills developed by the scientific team**

Computer aided process and energy system engineering, operation research, machine learning and programming, pinch analysis and process integration methods



## Regional and social impacts

**1**

Showing and quantifying decarbonisation pathways for the decarbonisation and the energy transition by integrating technological innovations. In the context of the International Energy Agency, coordination of a task to develop a digital twin strategy for the industrial processes decarbonisation: <https://iea-industry.org/tasks/process-integration-for-industry-decarbonization/>

**2**

The sustainability (economic, environmental and societal) impact of Net Zero Valais : what is the meaning of too expensive ?

**3**

What is the impact of integrating innovation for the energy system decarbonisation ?

**4**

Demonstrating the role of local energy communities in the energy transition: giving power to the people by implementing decentralised solutions

# Perspectives and challenges

## Main opportunities ?

Industry decarbonisation in a transitioning world  
 Adapting the infrastructure to integrate decentralised productions, industrial symbiosis at the regional scale.

## Main challenges

Integrating innovation for the energy transition

## Future Partnerships

Our lab has a long tradition of collaboration with the industry, we support collaboration for knowledge and technology transfer.

### Switzerland Independent (in Energy)

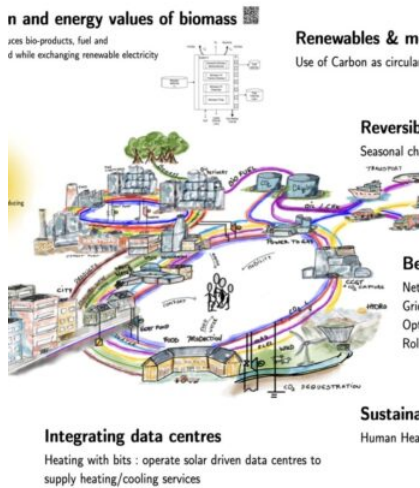


Image1

# Group of Energy Materials (GEM)



## **MER Jan Van herle**

GEM Group of Energy  
Materials (STI-SCI-JVH)

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*Electrochemical Engineering*

Laboratory

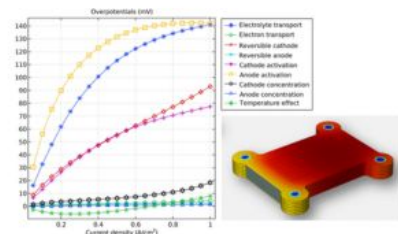
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## **Our mission**

Conception, design, fabrication, assembly, testing, diagnostics, analysis and modeling of fuel cells and electrolysers from Watts to 100 kW, in both high temperature ceramic (750°C) and ambient temperature polymer (20-70°C) technologies, for both natural and renewable fuels.

	<b>Research topics</b>
<b>1</b>	Understanding of the long-term durability of fuel cells and electrolysers, separating and quantifying the various performance degradation processes with time.
<b>2</b>	Designing, fabrication and buiding of fuel cell/electrolyser components and of dedicated test equipment, in particular for in situ measurements.
<b>3</b>	Multi-physics multi-scale modeling, from micrometric interfaces to complete systems, to support the design (axis 2) and performance understanding (axis 1).

# Our key projects



## Reversible-CH4

We develop a complete pilot installation to demonstrate real seasonal storage of renewable electricity to methane injected into the gas grid, using a reversible fuel cell/electrolyser system (10/30 kW), with negligible emissions. Full operation expected in 2027.

- SolydEra (VD)
- HES-SO-Sion Despraz (VD)
- SP Groups (VS VD GE)
- Oiken (VS)
- Gaznat (VD)

## ANEMEL

Alcaline membrane water electrolysis, using only Earth-abundant materials, is designed and characterised in our lab, which promises game-changing performance for H<sub>2</sub>/O<sub>2</sub> production. We validated a 1 kWe unit in our lab for >1000h with our home built test bench.

Canton VS - GEM start-up  
DeltaSpark EU partners  
Gaznat (VD)

## HYSPIRE

Steam electrolysis in oxygen ion or proton conducting ceramics is performed at 500-700°C at small scale. In parallel, a powerful 3D CFD coupled multi-physics steam electrolyzer stack dynamic model was set up.

- SolydEra (VD; IT)
- EU partners NCEPU (China)



## Our results and highlights

**1**

Three connected papers were published on alkaline membrane water electrolysis, reporting some electrochemical analysis for the 1st time (on a stack); one paper reached the Journal cover.

**2**

Xinyi Wei (PhD thesis May 2025) received the Best Researcher of the Year Award from the EU Clean Hydrogen Partnership (Nov 2025), among 42 top candidates, a high international distinction for a young researcher (<35 yrs).

Suhas Nuggehalli received a PhD Excellence distinction (Aug 2025) for his keen Entrepreneurship in parallel to the PhD thesis.

**3**

2 new very competitive EU calls were won (1.6 M€), with scores of 14/15 and 15/15. This maintains GEM as the No.1 lab of EPFL in EU grants.

**4**

1 patent filed, 1 start-up created (December 2025, DeltaSpark)

**5**

17 Journal articles published in 2025, 1 book.

# Team & talents

## Lab team size

- 21 members + 10 master students + 3 guest PhD students
- The GEM lab is composed of 1/3rd PhD students, 1/3rd scientists, 1/3rd engineers

## Specific Team Member

- Samaneh Daviran develops novel protective coatings against steel corrosion, using cheap wet deposition techniques, and obtained a competitive Ignition Grant to pursue this work.
- Hangyu Yu ran a fuel cell system on natural gas for 2 yrs, applying optimized control, successfully defended his PhD thesis in Sep 2025, publishing several papers. His work is highly fertile for follow-up proposals.

## Skills developed by the scientific team

- Getting hands dirty in building and testing devices and specific characterisation equipment.
- Training the brain into learning softwares, underlying maths, and programming code. Hangyu Yu released an electrochemical analysis tool to the scientific community.

## Other

- GEM Team members learn self-responsibility, how to work in a team, to raise funding, to network, to collaborate with other academic and industrial entities, and the necessity of legal frameworks.
- Suhas Nuggehalli and Luc Bondaz raised 1.4 MCHF funding from multiple sources for their startup DeltaSpark.



## Regional and social impacts

**1**

Storing excess electricity into fuels for later reuse helps in making us less dependent on winter electricity import, which will become even more crucial if nuclear power is phased out. Already today we export 2x in summer what we import in winter.

**2**

Our seasonal storage pilot installation, CH<sub>4</sub> to power (winter) and power to CH<sub>4</sub> (summer), will be a first-of-a-kind hardware demonstration without simulating any component.

**3**

Our lab trains engineers for tomorrow's technologies that define and shape the energy transition. Affordable available energy (clean and efficient) is a backbone of a productive industry and of a stable supportive society.

**4**

We initiate 15-20 new master students per year into our activities via direct project work.

# Perspectives and challenges

## *Main opportunities*

SOFCs on NG (elec. efficiency >60%, no pollution) are in high demand, owing to the exponential rise of AI and its power demand (1 data center = 28 MWe)

Demonstrating full seasonal storage feasibility with reversible power-to-gas-to-power and the gas grid

10/30 kW installation in Energypolis and 50 / 150 kW installation in Aigle with Gaznat and SolydEra

Produce clean liquid fuels from electricity and carbon-sources

Developing compact footprint alkaline membrane water electrolysis

## *Main challenges*

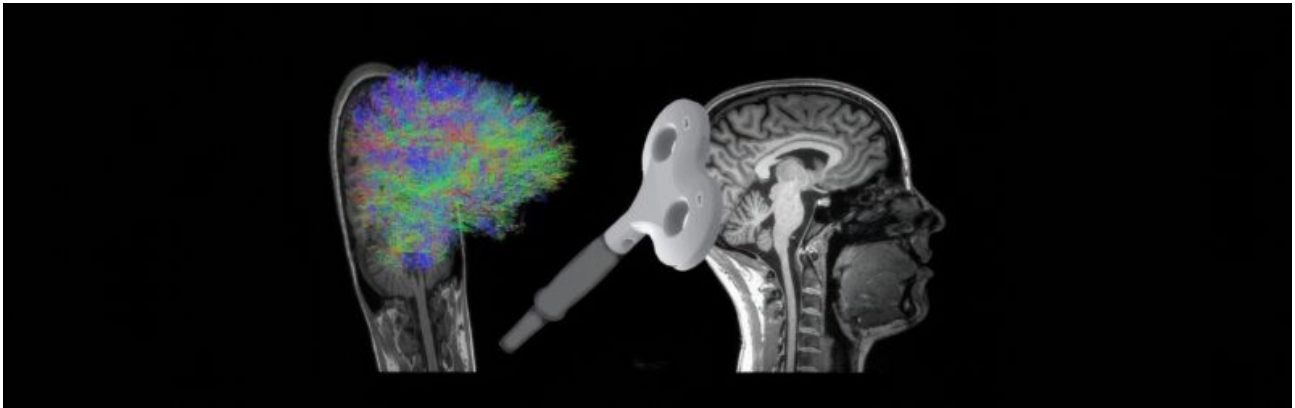
- Funding cuts and ferocious funding competition
- Lack of test and fabrication infrastructure space
- Europe's harmful self-isolation in its energy transition choices.

## *Future Partnerships*

- Reinforce the Gaznat-SolydEra partnership; SolydEra is SOFC technology leading
- Partnerships with other fuel cell / electrolyser companies
- Alignment with the gas industry for CH<sub>4</sub> as vector

# School of Life Sciences (SV)

## Chair of Clinical Neuroengineering (UPHummel Lab)



### **Prof. Friedhelm C. Hummel**

Defitech Chair for Clinical  
Neuroengineering - Hummel  
Lab

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*Clinical Neuroengineering*

Laboratory

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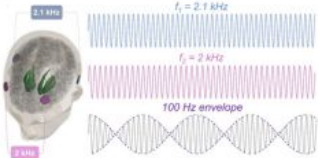
## **Our mission**

The Hummel Lab aims to advance personalized neurotechnological interventions that enhance recovery of sensorimotor and cognitive functions in individuals affected by neurological disorders such as stroke, traumatic brain injury, and neurodegenerative diseases. By combining mechanistic insight into brain function and recovery with the development of predictive biomarkers, our goal is to translate personalized innovative neurotechnologies from the laboratory bench to the clinical bedside.

	<b>Research topics</b>
<b>1</b>	Better understanding of motor and cognitive functions and how they are implemented in the brain and their changes with healthy aging leveraging cutting-edge multimodal brain imaging, electrophysiology and behavioral tasks.
<b>2</b>	Better understanding neurological disorders using advanced brain investigation methods such as neuroimaging, electrophysiology, and brain stimulation to reveal how brain networks change in health and disease.
<b>3</b>	Developing neurotechnology-based therapies to improve the quality of life of patients with neurological disorders, translating cutting-edge brain research into effective, personalized clinical interventions.

# Our key projects

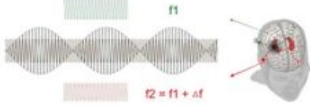
## Transcranial Temporal Interference Stimulation



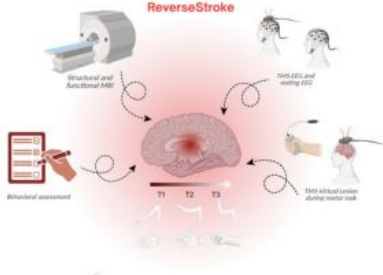
### Motor learning task



## Transcranial Temporal Interference Stimulation



### Spatial Navigation in virtual environment



## Modulation of Learning

Having demonstrated striatal non-invasive deep brain stimulation for motor learning enhancement in healthy adults, we now extended findings to Traumatic Brain Injury and Mild Cognitive Impairment patients. Ongoing work targets more intensive protocols and stroke patients.

Academic Partners: Wyss Center, M. Wessel (Uni Oldenburg), E. Neufeld (ETHZ), IT IS foundation (Zürich), TI Solution (Zürich) and Clinical Partners: CRR, HVS, Berner Klinik.

## Modulation of memory


Using tTIS with concurrent neuroimaging and immersive virtual reality, we investigate how non-invasive deep brain stimulation of the hippocampus modulates memory processes underlying spatial navigation and face-name associations. We demonstrate that targeted hippocampal stimulation can enhance navigation performance, strengthen associative memory, and increase hippocampal activity, advancing mechanistic understanding of memory modulation and opening new avenues for clinical applications in traumatic brain injury and dementia.

Academic Partners: J. Moon (KIST), I.Rektorová (CEIT Brno), M. Wessel (Uni Oldenburg), M. Bassolino (HES), K.Schaller (HUG) and Clinical Partners: CRR, HES, HUG.

## ReverseStroke

A longitudinal multimodal study within the Sion clinical-research ecosystem, characterizing changes in neural mapping of arm and hand movements after subcortical stroke using neuroimaging, electrophysiology, noninvasive brain stimulation and behavioral measures.

Academic Partners: G. Courtine (EPFL), Karolinska Institute and Clinical Partners: CRR, HVS, Berner Klinik, CHUV.

	<h2 style="text-align: center;">Our results and highlights</h2>
<p style="text-align: center;"><b>1</b></p>	<p>Publication in Brain of « Boosting hemianopia recovery: the power of interareal cross-frequency brain stimulation ». Brain 17 November 2025. DOI: 10.1093/brain/awaf252</p>
<p style="text-align: center;"><b>2</b></p>	<ul style="list-style-type: none"> <li>• Pierre Vassiliadis receives the 2025 NCM young scientist award.</li> <li>• Maximilian Wessel becomes Professor (Associate) at Carl von Ossietzky University of Oldenburg.</li> <li>• Estelle Raffin becomes Permanent Research Scientist at CNRS, Grenoble.</li> </ul>
<p style="text-align: center;"><b>3</b></p>	<ul style="list-style-type: none"> <li>• SNSF Lead Agency Brazil-CH FoG Project</li> <li>• HORIZON-EIC-2024-PATHFINDEROPEN-01 ReverseStroke Project</li> <li>• Akiva Foundation nDBS-TBI Project</li> <li>• Wyss Lighthouse Partnership Project ApatTIS Project</li> <li>• HORIZON-RIA Social and hUman ceNtered XR (SUN) Project</li> <li>• SNSF Lead Agency CH-Cz NiBS-iCog Project</li> </ul>
<p style="text-align: center;"><b>4</b></p>	<p>Pioneering non-invasive deep brain stimulation</p>

# Team & talents

## Lab team size

24 (2025)

## Skills developed by the scientific team

- Developing advanced skills in: Non-invasive brain stimulation, Systems neuroscience, Neuroimaging, Electrophysiology methods
- Learning to think critically

## Other

Our lab is actively involved in outreach and dissemination activities to engage with the broader community.

- We host annual visits for young pupils (Collège de la Planta, Sion), offering them the opportunity to discover our research and explore the lab environment.
- We participated at the Scientastic festival on EPFL Valais Wallis campus on May 17-18 2025, and to the TecDays in October 2025 at Lycée de la Planta.

Additionally, we are committed to professional development, taking part in training days such as the Journée de Rééducation at Clinique Romande de Réadaptation and Hopital du Valais where we contribute to advancing knowledge inneurorehabilitation.

In Spring 2025, we have organized a lab retreat in Commeire, a beautiful alpine setting in Valais, which offered a valuable opportunity to step away from our daily routines and reconnect as a team. Surrounded by the mountains, we took time to reflect on what we have achieved together, and discussed the challenges and opportunities ahead. The retreat fostered open exchanges, fresh perspectives, and a renewed sense of collaboration, ending with a shared fondue enjoyed with a view.



## Regional and social impacts

**1**

Advancing our understanding of neurological disorders, such as Alzheimer, stroke or traumatic brain injury, to develop innovative neuro-technologies based rehabilitation methods to improve patients' life and provide first proof-of-concept for clinical translation.

**2**

Strengthening the eco-systems of clinical translational research with clinical partners (HVS, CRR,...) and universities (HES-SO Valais-Wallis). Addressing core disorders impacting on health economics in Valais and develop novel treatment strategies. Strengthening the clinical-translational eco-systems with clinical partners (HVS, CRR, Berner Klinik) and research institutions (HES-SO Valais, Sense, Spark).

**3**

Paving the way to new treatments, if successful strong impact on health economy and health costs.

**4**

Making Valais more attractive for translational neuroscientists, putting Valais on competitive map for translational neuroscience.

# Perspectives and challenges

## ***Main opportunities***

Pioneer next-generation neurotechnologies, particularly non-invasive brain stimulation, and translate them from bench to bedside.

Strengthen collaborations with clinical partners to optimize patient recruitment and access.

Contribute to further building the vibrant clinical-scientific-innovation ecosystem in Sion.

Foster excellent working conditions and growth opportunities for all team members.

## ***Main challenges***

The distance between the main campus and Campus Biotech limits events, teaching, and collaboration; insufficient critical mass of neuroscientists and neuroengineers; challenges in patient recruitment.

## ***Future Partnerships***

Further collaborations within the Sion health, clinical, translational, and innovation ecosystem; the Pôle Santé will serve as an excellent incubator.



Our Alumni, Pierre Vassiliadis received the 2025 NCM young scientist award  
Credit: Weiss center



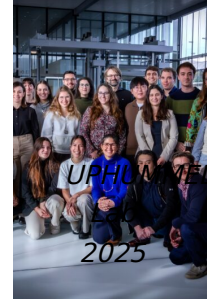
Lab retreat in Commeire



Estelle Raffin becomes Permanent Research Scientist at CNRS Grenoble



ReverseStr study experiment in action



2025



Lab retreat in Commeire



Scientastic 2024



Professor at Carl von Ossietzky University of Oldenburg

# Projects

## Greenfjord project

**Study of the Greenland fjord ecosystem in a changing climate: socio-cultural and environmental interactions**

**EERL, Prof. Julia Schmale**



The acceleration of climate change in the Arctic is having a profound effect on Greenland's fjord systems. These systems are fragile because of the delicate link between the cryosphere, ocean, land, atmosphere and biosphere. Moreover, these iconic Greenlandic landscapes are at the heart of the socio-economic and cultural systems that govern local livelihoods. Warming induces the melting of glaciers and the detachment of ice blocks (calving), leading to a sharp increase in surrounding freshwater flows. Changes in these flows have an impact on the dynamics of marine ecosystems and the circulation of nutrients, which in turn affect the marine food web (food webs describe the food interactions between species in an ecosystem) with cascading effects: at lower trophic levels, changes in phytoplankton proliferation have an impact on atmospheric chemistry and cloud formation, and therefore on the surface radiation balance. At higher trophic levels, fish are affected, with major implications for local livelihoods and economies, which depend heavily on marine resources.

With GreenFjord, we want to better understand how climate change is affecting fjord ecosystems and how this is impacting biodiversity and livelihoods. The ultimate goal is to translate this new knowledge into models that can simulate and predict the future evolution of fjord systems, including glacial mass loss, trophic evolution and the carbon cycle. Our fieldwork will be carried out on land and at sea and will involve a high degree of participation by local populations. The main activities are as follows:

## **Cryosphere**

Glacier evolution and impact on fjord water and nutrient circulation

## **Ocean**

Physical and microbial characteristics of fjord systems

## **Biosphere**

Determination of biodiversity using environmental DNA

## **Atmosphere**

Influence of local natural emissions on cloud formation

## **Earth**

Export of terrestrial organic matter to the ocean

## **Human**

Understanding the relationship between local livelihoods and fjordic socio-ecosystems

# **AI and corals**

**Based on images taken by cameras, an AI developed at the EPFL can reconstruct coral reefs in 3D in just a few minutes. A minor revolution for seabed study and preservation missions such as those of the Transnational Red Sea Center.**

**ECEO, Prof. Devis Tuia**



Although they may appear in the background in the shots of shimmering fish taken by diving enthusiasts, corals are at the forefront of many scientists' minds, given their fundamental ecological role. These animals with their limestone skeletons are among the most diverse ecosystems on the planet: although they cover less than 0.1% of the total surface area of the oceans, they are home to almost a third of known marine species. They also have a major impact on the lives of people in many reef-bordered countries: according to a study by the US Oceanic and Atmospheric Administration, up to half a billion people worldwide depend on coral reefs for their food security and tourism-related income. Endangered by rising ocean temperatures and local anthropogenic pollution, which cause coral bleaching and death, corals are the subject of in-depth studies, such as those carried out by the Transnational Red Sea Center (TRSC), which aims to unlock the secrets of Red Sea species that are particularly resistant to the stresses of climate change. DeepReefMap, an artificial intelligence developed by the Laboratory of Computational Science for the Environment and Earth Observation (ECEO) at EPFL, was tested as part of this EPFL-led mission\*. It is capable of reconstructing several hundred metres of coral reefs in 3D on the basis of an underwater film taken by a commercial camera in just a few minutes. It can also recognise and quantify certain coral characteristics. « This method democratises the digital reconstruction of reefs and gives a major boost to their monitoring by reducing the work, equipment, logistics and IT costs involved, » points out Samuel Gardaz, TRSC project manager. This research has now been published in *Methods in Ecology and Evolution*.

### **Classify corals according to their state of health and shape**

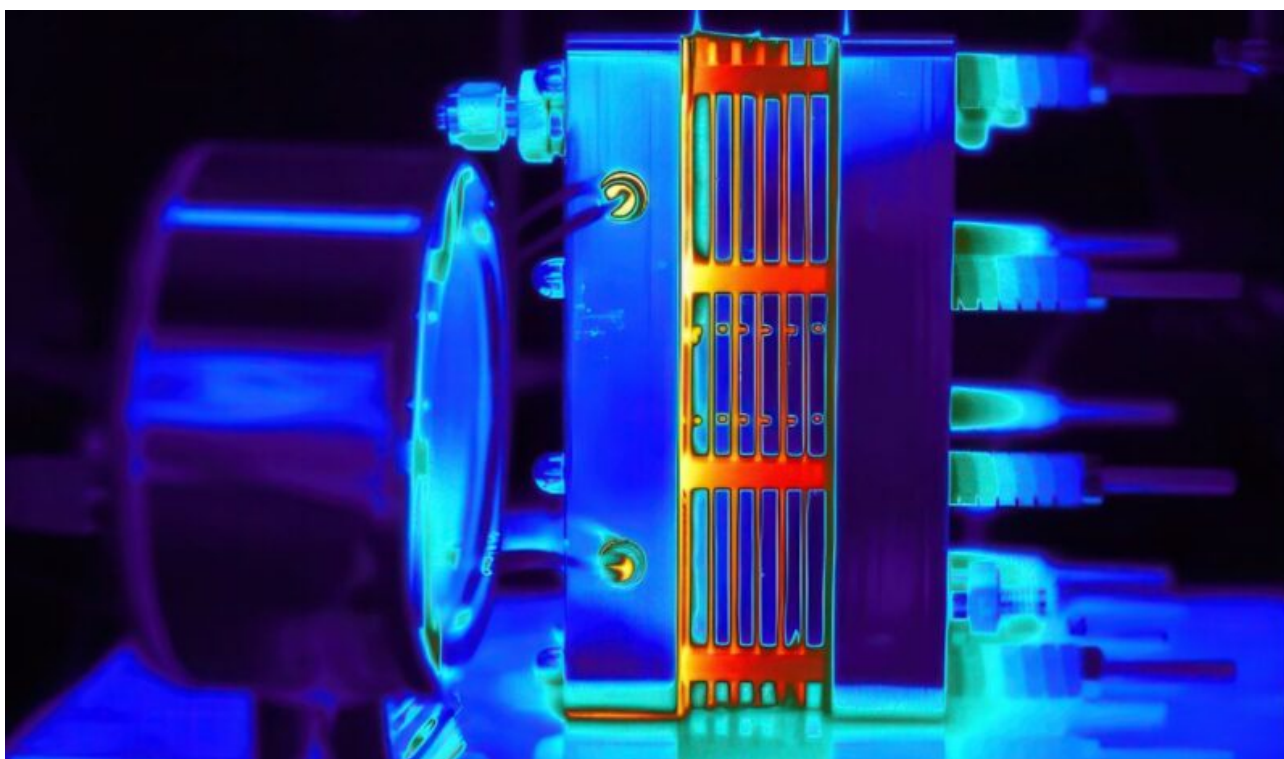
In order to further facilitate the work of their biologist colleagues working in the field, the scientists have included semantic segmentation algorithms to classify and quantify corals according to their state of health – from healthy, i.e. very colourful, to dead and covered in algae, via the white of bleaching – and to identify the forms of coral growth that are most common in the shallow reefs of the Red Sea according to an internationally recognised hierarchy – branching, massive, hard, soft, etc. -. « The aim was really to meet the needs of scientists and conservationists working in the field with a tool that can be deployed widely and very quickly: in Djibouti, for example, there are 400 km of coastline », stresses Jonathan Sauder, who made the development of this AI the subject of his doctoral thesis. « Our method does not require a costly IT infrastructure: on a computer equipped with a simple graphics processing unit, semantic segmentation and 3D reconstruction can be obtained in the same amount of time as the video ».

[Read the full article](#)

## Energy demonstrator

Swiss energy production from renewable sources is still very dependent on the seasons. In summer, there is a huge overproduction, while in winter we have to import several TWh. A demonstrator has been installed in Sion to convert solar energy into gas and store it for reuse in winter.

GEM, MER Jan Van Herle



A « Power-to-Gas » demonstrator has been installed on the Sedun campus. This is a unique experimental platform in Switzerland. This infrastructure enables the most promising technologies in the energy transition to be tested on a real scale, from the capture of CO<sub>2</sub> to the seasonal storage of energy in the form of hydrogen or methane. The result of collaboration between EPFL, HES-SO and several industrial players, this demonstrator places Valais at the heart of innovation in the production of cleaner, circular energy. While MER Van Herle's laboratory is responsible for the reversible fuel cell needed for the process to run smoothly, several other EPFL professors are involved in the demonstrator: Prof. Wendy Queen, Prof. Kumar V. Agrawal and Prof. F. Maréchal.

**The process can be summarised as follows:**

1. Production of photovoltaic energy using panels installed on the roof of the HES-SO Valais Wallis campus
2. Decarbonisation and carbon storage for initial injection into methanisation plants
3. Hydrogen production using a reversible solid oxide fuel cell operating at 750°C
4. Transformation of the hydrogen produced into methane, in particular by adding  $\text{CO}_2$  extracted in phase 2 (for the first cycle, the  $\text{CO}_2$  is then reused in a closed circuit)
5. Methane ( $\text{CH}_4$ ) storage in the Sion gas network, in collaboration with Oïken
6. In winter, gas is extracted from the public grid as required and converted into electricity and heat using a reversible solid oxide fuel cell. The process recovers just under 50% of the initial solar energy.

## Diversity and distribution of bacteria in glacial streams

Climate change is having a significant effect on glacial rivers, particularly on their microbial ecosystems. This study enabled the microbial population of 152 glacial rivers around the world to be surveyed.

**RIVER, Prof. Tom Battin**



The rapid melting of mountain glaciers and the disappearance of the rivers they feed are powerful symbols of climate change. Glacial rivers are cold, nutrient-poor and unstable ecosystems, dominated by microbial biofilms. However, current knowledge of the microbiome of these rivers remains limited, making it difficult to understand how it reacts to the shrinking of glaciers.

In this study, we used metabarcoding (a technique that rapidly identifies the species present in a sample by analysing small pieces of DNA characteristic of each species) and metagenomics (a method that consists of analysing all the DNA present in a given environment, in order to learn not only about the species that live there, but also about their biological functions) to draw up a global inventory of the bacteria present in 152 glacial rivers from the planet's main mountain ranges.

Our results show that the bacterial microbiome of these rivers is taxonomically and functionally distinct from those observed in other icy environments. It is highly diverse, with more than half the species specific to a given mountain region, some to a single site, and only a few cosmopolitan and abundant.

We demonstrate that geographical isolation and environmental selection structure their biogeographical distribution, with microbial compositions clearly differentiated between mountain ranges and between hemispheres. Phylogenetic analyses (methods that make it possible to reconstruct the relationships between different microbial species or strains on the basis of their genes or DNA) also reveal the existence of micro-diverse lineages, shaped by environmental selection, which probably contribute to the functional resilience and overall diversity of the microbiome in these environments.

The shrinking of glaciers due to climate change is therefore threatening this unique microbial ecosystem. Our study provides a global reference for future research into the effects of climate change on disappearing glacier ecosystems.

## **DIVEA: creation of a start-up company**

**EPFL carries out fundamental research into sometimes very complex processes, but always with the idea of adding value to society.**

**Prof. Kumar V. Agrawal**



DIVEA was formally created in 2024 as a spinoff of Prof. Kumar V. Agrawal's Advanced Separations laboratory. Doctors Karl Khalil and Mojtaba Chevalier are also part of the venture. The avowed aim of this start-up is to produce tailor-made membranes in order to decarbonise industry. Certain activities, such as cement, metal and chemical production, are responsible for 34% of CO<sub>2</sub> emissions worldwide. These emissions are recognised as being very difficult to reduce, because they come from the energy used for the chemical processes, but also from the processes themselves.

To counter these effects, DIVEA produces extremely thin graphene membranes (1 layer of atoms) to enable filtration of certain molecules, in particular CO<sub>2</sub>. Once produced, these membranes are robust and easy to install. They drastically reduce greenhouse gas emissions from the industry using them. DIVEA's motto is « Making climate change a thing of the past, one atom at a time ».

## Research support

## Science Promotion Service (SPS)

**The year 2025 confirmed the roots of the Science Promotion Service in the Valais and marked a new stage in the development of the "Science interests me" programme. After a successful first year, the programme continued to expand, offering a growing number of scientific and technical activities aimed at primary and lower secondary school pupils, as well as young people outside the school environment. This new offering has complemented and strengthened our robotics and computing workshops, which have been offered in Valais since 2014, broadening the opportunities available to young people to discover and experiment with science and technology. Thanks to this diversity, many participants were able to discover, manipulate and experiment with science in a fun and participative spirit, with an educational approach adapted to each audience.**

The continuation of these activities is based on a long-term partnership between EPFL and UBS, as well as the provision of premises and financial support from EPFL Valais Wallis and UBS. Some activities take place thanks to partnerships with the NCCR Catalysis, the HES-SO Valais-Wallis, the Office cantonal de l'égalité et de la famille, Novelis, the Ville de Martigny and the Groupe Mutuel.

### Summary of the past year

A total of 14,892 people took part in the activities in 2025, a figure that rises to 15,146 if we include the 254 teachers who accompanied their classes in the various activities. **254 classes (5,049 pupils) took part in school activities, while 3,017 children took part in extracurricular activities and 6,826 adults took part in activities for the general public.**

2025 was marked by the organisation of Scientastic, EPFL's science festival, which welcomed more than 4,800 visitors on 17 and 18 May on the Valais campus, in the ALPOLE building in Sion. Through lectures, workshops, visits and laboratory stands, this event enabled a wide audience – children, teenagers and adults – to discover a variety of scientific activities in a fun and accessible atmosphere. The year was also marked by the creation of new activities to complement and diversify the existing offering.

Among them, « Une journée sciansationnelle » (for 8-10 year-olds) was created in response to the many requests from participants in the « Un jour de sciences pendant les vacances » activity (for 8-10 year-olds) wanting to repeat other activities in the same format. In the same spirit of widening access to our activities, a travelling workshop, « Enquête à Logicity », aimed at schools and more particularly at establishments located in more remote areas with transport difficulties to Sion, was also set up to enable a greater number of pupils to benefit from our activities. The year was also enriched by a collaboration with the Musée de Bagnes, which invited us to run workshops as part of their exhibition devoted to the car in the Alps. Finally, the relationship we have established with several laboratories at the EPFL Valais Wallis continued. These exchanges are an essential part of our mission, enabling researchers to act as role models for the future

## The « Science interests me » programme

The « I'm interested in science » programme, specifically designed by the SPS, is aimed at young people (girls and boys) aged 7 to 16 (primary and lower secondary levels) with the following objectives:

- Stimulate interest in science and technology;
- Cultivate creativity;
- Encourage the acquisition of scientific thinking and approaches and the learning of new knowledge in the MINT fields.

Based on an educational and fun approach, this programme integrates the gender dimension into all its actions and also includes specific actions to encourage more girls and raise awareness among parents and teachers. It focuses on information, encouragement and an introduction to the sciences and technical fields, with the aim of stimulating young people's interest in the MINT fields and encouraging the next generation.



## In figures

**2024**

Année de lancement

**23**

Types d'activités proposées

**8066**

Participant·es âgé·es de 7 à 15  
ans

**6826**

Adultes

**54**

Pourcentage de participantes  
féminines

**3.8**

Collaborateur·rices EPT

## Equality strategies

### Girls' participation in extracurricular activities and equality strategies

In 2025, of the 3,017 children taking part in our extracurricular activities, **1,644** were **girls**, representing a rate of **54%**. This is the result of a proactive strategy to encourage more girls to take up scientific and technical subjects. To encourage their participation, we have put in place a targeted communication campaign aimed at girls' parents. In addition, we reserve 50% of places for girls and 50% for boys at the time of registration: as soon as the 50% rate for boys is reached, the following male registrations are placed on a waiting list, while registrations remain open for girls. This approach not only helps to achieve a balance, but also offers girls an environment where they are not the only few girls among the boys, and feel that they are in the company of other girls who are fully entitled to explore science and technology. These measures are part of a wider drive to promote MINT subjects among girls, in order to encourage a more balanced representation in these fields.

## Communication

Communication about our activities increased, boosting our visibility and impact with our target audiences. Our Valais newsletters saw their audience grow, with an **82%** increase in subscribers to the SPS Valais newsletter (from 369 to 673). This increase can be explained in particular by the visibility offered at the Scientastic festival, which generated a large number of subscriptions.

**Rhone FM: Scientastic festival at EPFL Valais-Wallis this weekend**

**Canal 9: The Scientastic festival in Sion: EPFL opens its doors to the Valais public**

# Shared services: an ecosystem serving science

**There are a number of shared services on the campus, serving the laboratories. These entities, which are less in the limelight on a day-to-day basis, are nevertheless necessary for the smooth running of the campus and play a major role in the results obtained by the laboratories, which are responsible for scientific publications.**

Some services cannot be provided unilaterally by the laboratories, in particular because of the very high cost of certain analytical instruments or the highly specialised skills required to operate them. It is also important to emphasise the important work carried out by the technical, administrative and operational teams linked to the campus. These services are briefly described below, and the people involved can be found [HERE](#):

## How the campus works

The Valais campus is fortunate to be housed in recent, high-quality buildings provided by the State of Valais. However, the extremely complex environment in which most of the laboratories operate requires technical, administrative, security and operational services to be provided on a daily basis in these buildings. The central services of the Valais campus include these various trades, without which the campus would come to a standstill. From managing ventilation and toxic gas evacuation problems to installing new laboratories and managing alarms, the team in place manages an impressive array of different tasks. They often work in the shadows, but their existence is quickly brought to the fore whenever something stops working or needs improving.

## Electron microscopy (CIME)

The CIME is a central electron microscopy platform dedicated to research in solid state physics, materials science and life sciences. It brings together most of EPFL's electron microscopy equipment and an experienced team. This organisation makes it possible to offer a wide range of observation techniques while limiting the investment required.

CIME offers anyone interested in electron microscopy – researchers, EPFL students, staff from other universities or private laboratories – access to the methods best suited to their needs.

CIME also carries out its own research and development activities, in order to maintain a high level of expertise and keep in touch with users.

## **Analysis laboratories (GR-CEL)**

The Central Environmental Laboratory (CEL) carries out research and provides services in the fields of environmental analytical chemistry and molecular biology. Headed by Florian Breider, the CEL brings together laboratory technicians, apprentices and senior researchers. Its work focuses mainly on the fate of micro-pollutants and nano- or micro-plastics in aquatic and terrestrial environments, the development of cutting-edge analytical methods for detecting organic and inorganic pollutants, and the role of micro-organisms in natural and man-made environments.

The CEL provides services, teaching, training and technical support to all the research groups associated with the Institute of Environmental Engineering (IIE), as well as to employees of the ENAC faculty and other EPFL schools.

## **X-ray diffraction and surface analysis platform (ISIC-XRDSAP)**

EPFL's X-ray diffraction and surface analysis platform provides researchers with a wide range of techniques for studying materials. It enables the crystalline structure, chemical composition and surface properties of a wide range of samples to be examined.

Our services cover standard analyses, accessible to all users, as well as more complex experiments defined according to the specific needs of projects. The team also offers support in choosing the most appropriate methods, particularly for people unfamiliar with these techniques.

The main activities include X-ray diffraction (to determine the structure and microstructure of materials, their phases or textures), reflectometry (to measure the thickness of thin layers), as well as surface analyses using electronic spectroscopy (XPS, UPS, Auger) and Raman spectroscopy. These approaches provide detailed information on the composition, chemical state, atomic organisation and evolution of samples over time.

## **Mass spectrometry and elemental analysis platform (ISIC-MSEAP)**

EPFL's mass spectrometry and elemental analysis platform (ISIC-MSEAP) offers a wide range of technologies for analysing small organic molecules, large biomolecules and metallic elements.

Thanks to the diversity of its ionisation and detection techniques, the platform offers very high-precision analyses of the composition, structure and interactions of the substances studied. It also has recognised expertise in 'Top-Down' proteomics (direct analysis of intact proteins) and in 'Native' mass spectrometry, used to study protein complexes in their natural form.

The platform provides services and scientific support to research groups at ISIC and EPFL, as well as to external academic and industrial partners. Users can access the instruments after specific training, or entrust their samples to the team as part of an analysis service or research collaboration.

## **Shops**

Laboratories are in constant need of equipment, from simple lab coats to more complex chemical reagents. Specialists are on hand at the Valais campus to supply them with exactly what they need, on time.

There are two shops. One is attached to the SB faculty, via ISIC, and is located in building I17. The other, more recent, is attached to the ENAC faculty and is located in the ALPOLE building. The warehousemen are also responsible for receiving all incoming goods and parcels, managing the security of the various materials received and dealing with their disposal. They are an essential link in the scientific chain.

## **Mechanical and electronic workshops**

In order to carry out their experiments, laboratories need equipment that is sometimes 'made to measure'. The mechanical and electronics workshops are there to provide it. From the part used to wedge a laser to the chassis supporting a reversible oxide battery, our workshop specialists are there to be creative and deliver quality results. They have a wide range of machines at their disposal, including milling machines, lathes, laser engravers and welding stations. They play an integral part in the design of the parts by discussing them with the researchers, and are responsible for their production. They are the magic hands in the laboratories, enabling experiments of all kinds to be carried out.

They are organised on two sites, one workshop attached to the SB faculty, via ISIC, and is located in building I17. The other, more recent, is attached to the ENAC faculty and is located in the ALPOLE building. These two workshops are complementary and mutually supportive, forming an integral part of the Valais campus ecosystem.

## **IT services**

All the laboratories at Sion make extensive use of IT tools to process the data collected in the field or for purely computational modelling. IT specialists are on campus to support them in all these digital aspects. From the installation of workstations for new arrivals to the very specific coding of platforms used by laboratories, the range of their services is very wide.



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