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# Research Facilities at EPFL

DATE. April 2023

## IMPRESSUM

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Anna Fontcuberta i Morral

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research facilities

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# Discover EPFL Research Facilities

The three main missions of EPFL are **education, research and innovation**. EPFL shared research facilities provide access to **more than 430 cutting-edge technical equipment, instruments and tools**, while sharing knowledge and expertise among users. They support our community and contribute to the fulfillment of EPFL's missions. Each facility has a dedicated staff who maintain and set up **the state-of-the art equipment**, and teach and train new operators and assist researchers in designing experiments and developing new techniques. Our research facilities operate following EPFL's philosophy that sharing knowledge, resources and synergistic collaborations are key for the advancement of science and technology.

Used for over **600,000 hours each year**, facilities support EPFL's leading research and outreach, contributing to major publications in a variety of strategic fields.

This brochure provides an overview for each of the **40 EPFL shared research facilities** being part of the AVP-CP and the different Schools with the goal to expedite connection to interested researchers.

**Welcome to the EPFL research facilities ecosystem.**

**Anna Fontcuberta i Morral**  
*Associate Vice President for Centers and Platforms*

## AVP-CP and ECO in brief

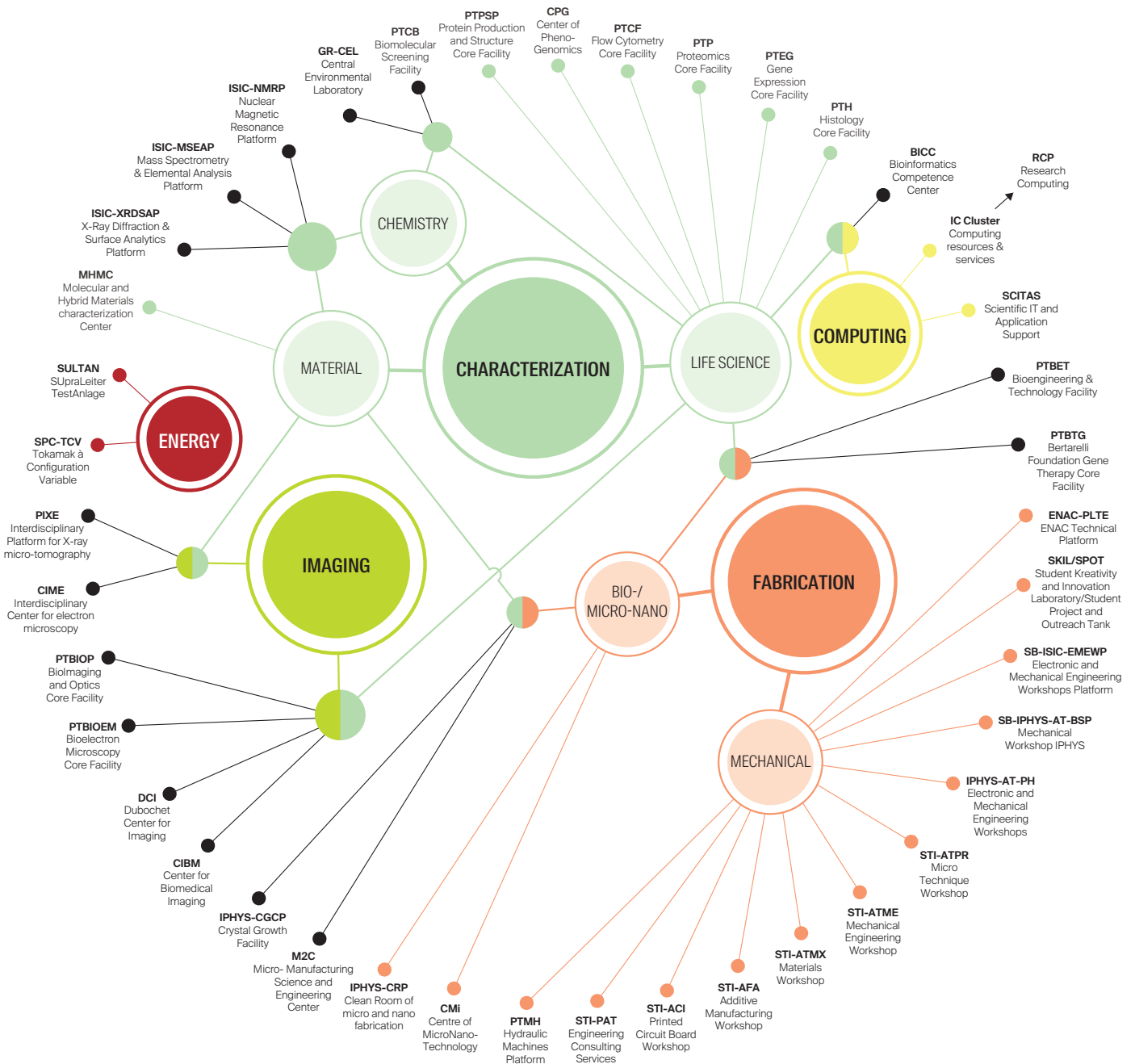
**The Associate Vice Presidency for Centers and Platforms (AVP-CP)**'s mission is to coordinate and enhance the activities of EPFL's technology centers and facilities in order to achieve excellence in the creation of knowledge and the sharing of skills and resources.

**The Equipment and Center Management Office (ECO)**, assists the Associate Vice Presidency for Centers and Platforms in achieving its objectives. ECO provides laboratories and research facilities with the necessary funding for the purchasing of large scientific equipment. In addition, ECO supports the facilities in establishing financial planning and calculating the pricing in coordination with the controlling team of the Vice Presidency for Finances

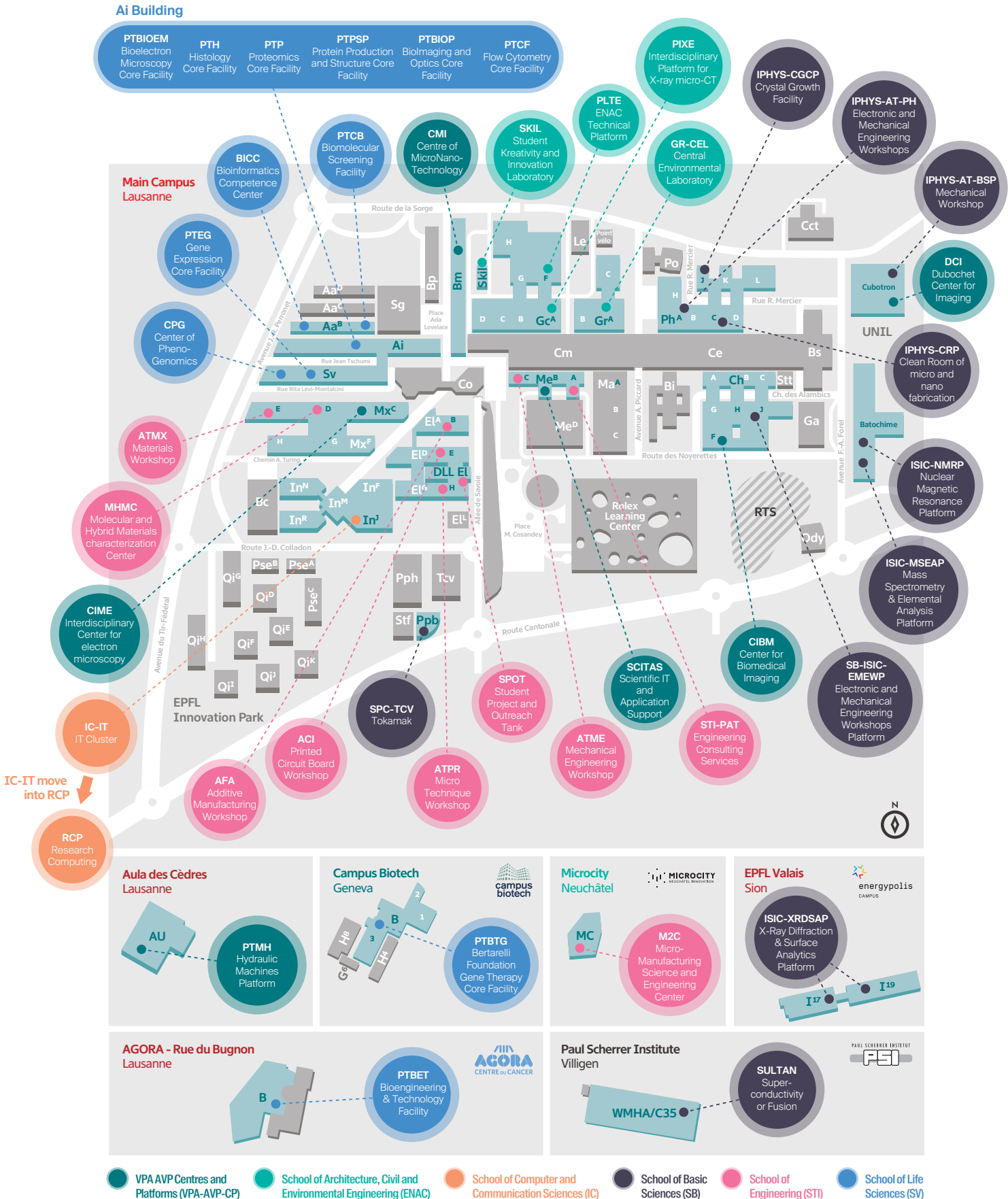
**Pierre-Yves Bolinger**  
*Head of the Equipment and Centers Management Office*



## Applications and services of the different facilities



# Map and affiliation of the facilities





# MHMC

## Molecular and Hybrid Materials Characterization Center

Created in 2013 to provide the EPFL community with state-of-the-art molecular and hybrid materials characterization facilities



## The facility

Facility accessible 24/7  
2 dedicated staff members

> 10 instruments available :

- AFM
- DLS
- DSC
- Ellipsometry
- Fluorescence spectroscopy
- FT-IR spectroscopy
- ITC
- TGA
- UV-Vis spectrophotometry
- Water contact angle

## Services

- User training
- User support
- Technical expertise of the equipment
- Security and safety

3 staff operated services :

- AES
- GPC
- XPS

## Key target groups

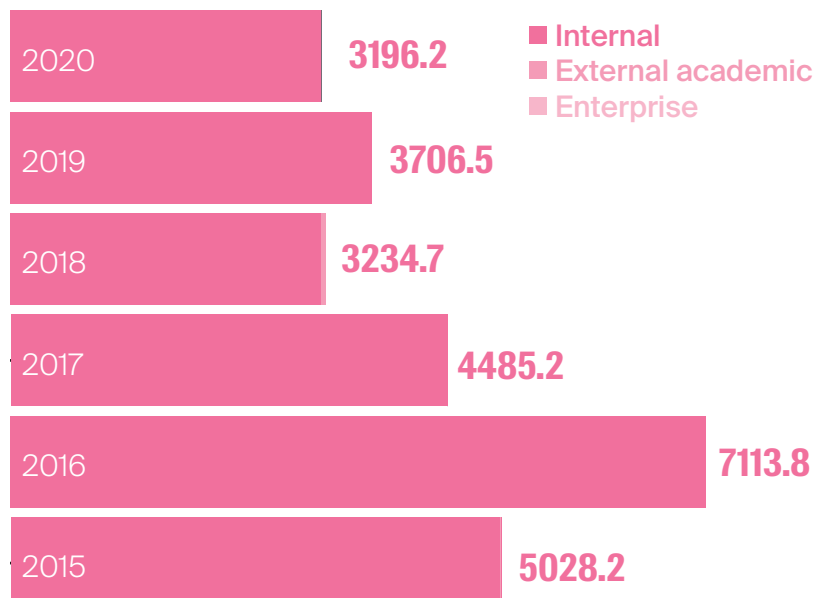
- > 600 Users
- > 100 Laboratories

- 2 Academic
- 4 External users
- 5 Start-ups

## Major publications

1. H. Du, et al. **Reinforcing hydrogels with in situ formed amorphous CaCO<sub>3</sub>**. *Biomater. Sci.* 10, 4949-4958, 2022
2. Anqi Tao, et al. **Polymeric Micelles Loading Proteins through Concurrent Ion Complexation and pH-Cleavable Covalent Bonding for In Vivo Delivery**. *Macromolecular Bioscience* 20 (1), 2019
3. Olivia Bouvard, et al. **Strong coloration of nanoporous tungsten oxides by in-vacuo lithiation for all-solid-state electrochromic devices**. *Thin Solid Films* 730, 138700, 2021

## Instrument use (hours)



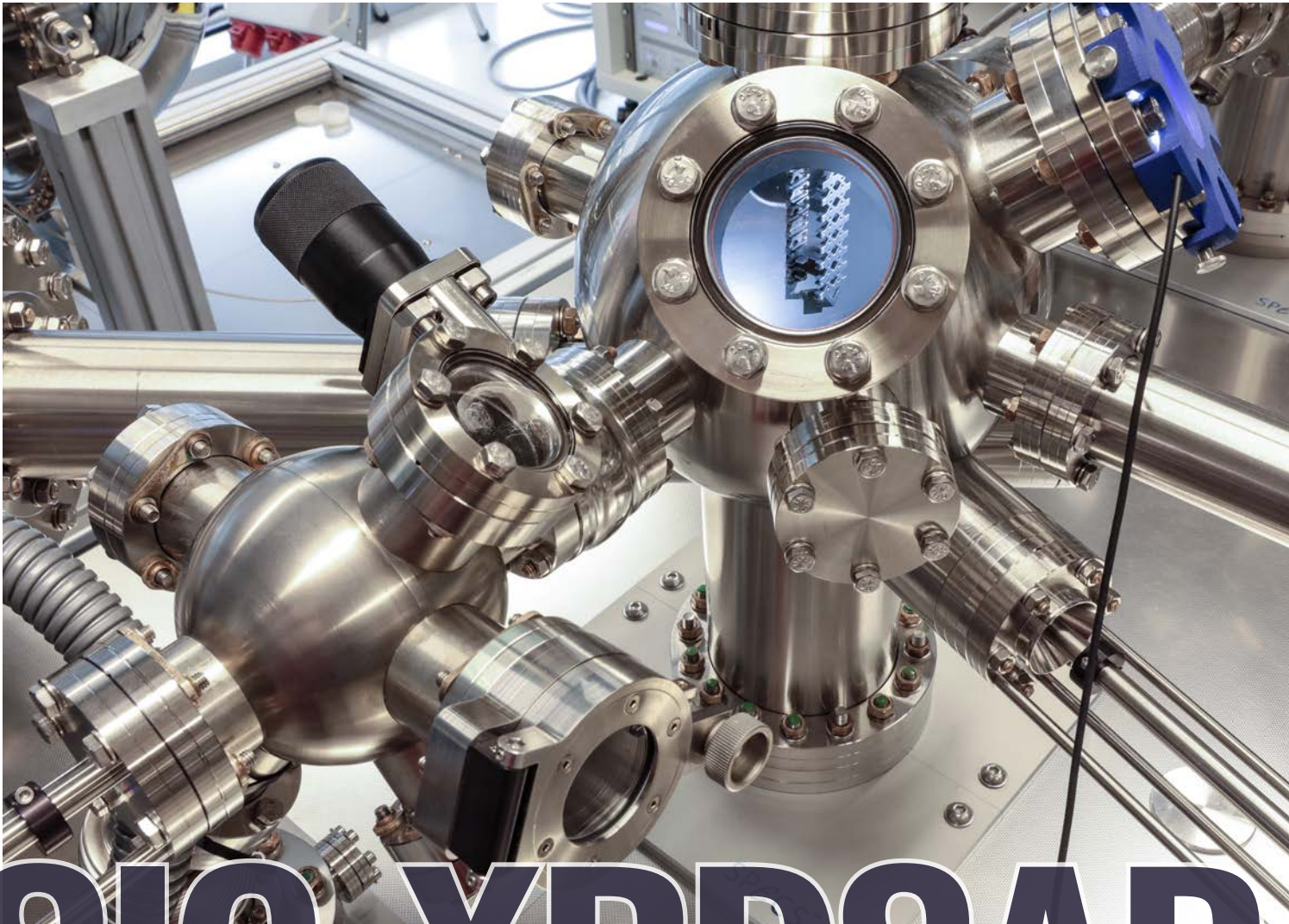
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# ISIC-XRDSAP

## X-ray Diffraction and Surface Analytics Platform

Characterization of nanoscopic, atomic, electronic and vibrational structure using X-ray Scattering and Spectroscopic Methods, on bulk and surfaces.





## The facility

### 4 dedicated staff scientists

### 11 instruments on 2 EPFL sites (Lausanne, Sion):

- 4 Materials diffractometers for XRD, GIWAXS, SAXS, HRXRD and XRR
- 3 Single crystal diffractometers
- 1 XPS/UPS/AES
- 1 Raman (3 lasers) with TERS attachment
- 2 AFM
- Large range of in-situ conditions (temperature, atmosphere, pressure)

## Services

- Full data collection and analysis on all methodologies provided by the facility's infrastructure, article contributions.
- Publication quality CIF files.
- User training (experiment and analysis).
- Scientific user support.
- Experiment design and elaboration of advanced projects, sample cell, method and data analysis development.
- Support in preparing and conducting Synchrotron experiments.
- Point of contact to other Swiss facilities.
- In-depth courses in the doctoral school

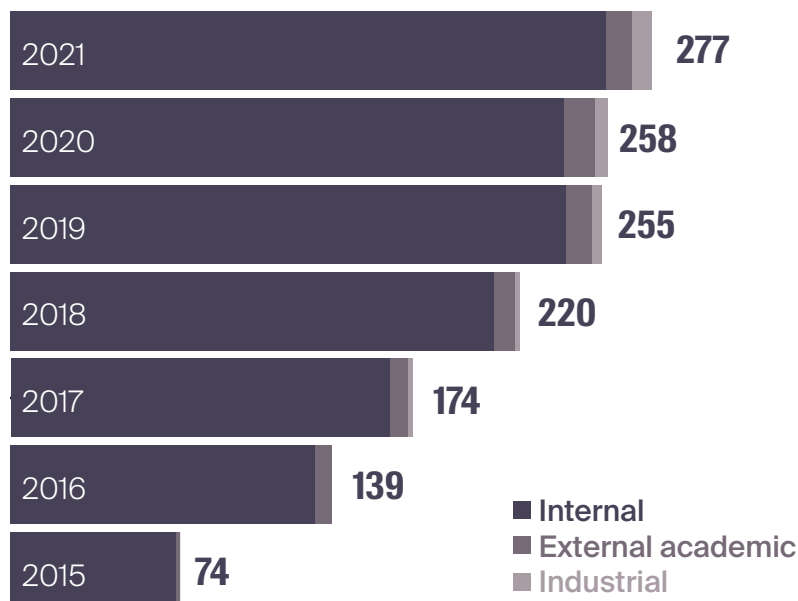
## Key target groups

- **>250 users since 2019**
- Researchers and students at EPFL working on materials synthesis and properties
- **45 EPFL laboratories** from the schools of SB (ISIC, IPHYS), STI (IMX, IEL, IGM, IMT), ENAC (IIE, IIC)
- **External academic:** UNIFR, UNIGE, HES, CHUV, CERN, ESRF & CSEM
- **12 companies (as of 2020)**

## Major publications

1. Varava P., Dong Z., et al. **"Isolation and characterization of diazoolefins"** *Nature Chemistry*, <https://doi.org/10.1038/s41557-021-00790-3>, 2021
2. Ozen B., et al. **"Structure-Property Relationships in Bithiophenes with Hydrogen-Bonded Substituents"** *Chemistry - A European Journal*, 27, 3348 - 3360, 2021
3. Krishna A., et al. **"Nanoscale interfacial engineering enables highly stable and efficient perovskite photovoltaics"** *Energy & Environmental Science*, DOI: 10.1039/D1EE02454J, 2021
4. Boyd P. G., et al. **"Data-driven design of metal-organic frameworks for wet flue gas CO2 capture"** *Nature*, 576, pages 253-256, 2019
5. Gratia P., **"The Many Faces of Mixed Ion Perovskites: Unraveling and Understanding the Crystallization Process"** *ACS Energy Lett.*, 2, 12, 2686-2693, 2017

## Number of users



## Contact



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# PHYS-CGCP

## Crystal Growth Facility

Growth and Characterization of Materials from Bulk Single Crystals to Nanostructures



## The facility

The Crystal Growth Facility is a complex of chemistry labs, furnace rooms, sample preparation labs for polishing and cutting samples, and material characterization labs.

**4.9 dedicated staff members + 2 apprentices**  
«Laborant Physique»

### Instruments :

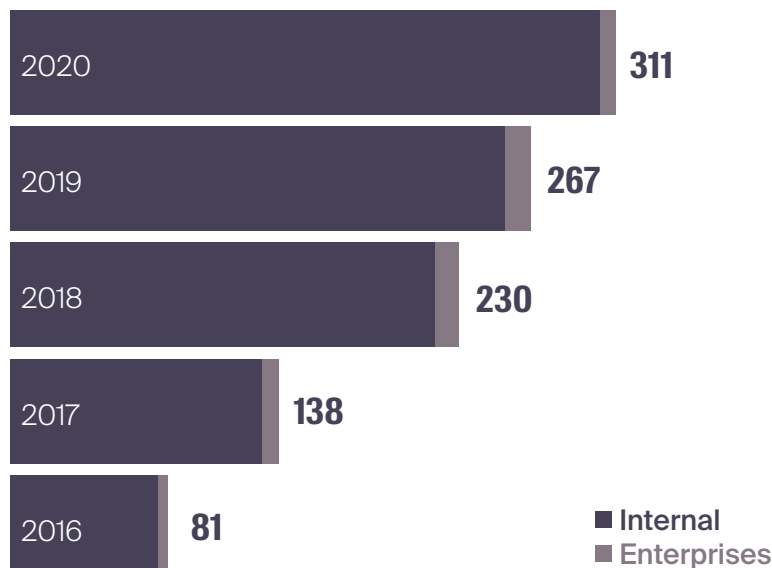
- 50 furnaces for crystal growth
- 4 powder and thin-film X-ray diffractometers
- 2 single crystal X-ray diffractometers
- 1 Laue camera
- 2 PPMS
- 1 Raman spectroscope
- 1 UV-Vis spectrometer

## Services

Inorganic as well as organic crystals can be grown by Chemical Vapor Transport, Bridgman process, Flux method, Floating zone as well as by wet chemical processes (hydrothermal, reflux...).

Characterization of samples by Raman spectroscopy (between 80K and 850K), by X-Ray diffraction (single crystals, powders, thin films), by low temperature XRD (down to 3K) as well as high temperature XRD (up to 1200°C). Magnetometry (VSM and ACMS), Resistivity Heat Capacity, Thermal Conductivity measurements can be performed in our PPMS from 1.7K to 400K under magnetic field (up to 14T).

## Number of users



## Key target groups

- 60 EPFL labs and 5 startups
- Fundamental Science and Engineering
- Life and Environmental Science

## Major publications

1. Arakcheeva, A; Bi, WH; Baral, PR; Magrez, A. **Self-flux-grown Ba<sub>4</sub>Fe<sub>4</sub>ClO<sub>9.5-x</sub> crystals exhibiting structures with tunable modulation.** *CrystEngComm*, 2022,24, 3529-3536.
2. Zhang, J; Bialek, M; Magrez, A; Yu, H; Ansermet, JP. **Antiferromagnetic resonance in TmFeO<sub>3</sub> at high temperatures.** *Journal of Magnetism and Magnetic Materials*, 2021, 523, 167562.
3. Majidian, M; Magrez, A; Forro, L; Leterrier, Y. **Viscoelastic behavior of suspensions of reduced graphene oxide nanoparticles in epoxy.** *Applied Physics Letters*, 2021, 119, 041901.
4. Huang, P; Schönenberger, T; Cantoni, M; Heinen, L; Magrez, A; Rosch, A; Carbone, F; Ronnow, HM. **Melting of a skyrmion lattice to a skyrmion liquid via a hexatic phase.** *Nature Nanotechnology*, 2020, 15, 761-767.
5. Hegde, NG; Levatic, I; Magrez, A; Ronnow, HM; Zivkovic, I. **Magnetic dynamics across the in-field transition in Ca<sub>3</sub>Co<sub>2</sub>O<sub>6</sub>.** *Physical Review B*, 2020, 102, 104418.

## Contact



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# ISIC-NMRP

## Nuclear Magnetic Resonance Platform

Characterization of material and molecules by solid and liquid state Nuclear Magnetic Resonance



## The facility

### 3 staff members

### 24 NMR systems on 3 sites (BCH, CH, Sion)

- 7 spectrometers 400 MHz with autosampler
- 6 spectrometers 400MHz manual
- 3 high resolution / high sensitivity NMR spectrometers 500, 600 800 MHz equipped with cryoprobes
- 4 solid state NMR systems at 400 (2x), 500 and 900 MHz operating at low temperature (100 K) very fast spinning speed (110 kHz)
- 2 gyrotrons, 1 klystron, 1 d-DNP prototype

### Yearly :

50'000h acquisition (110'000 NMR spectra)

## Services

- Open access to the NMR spectrometers
- Training and support on the instruments for the NMR users
- Help, advises and development for specific research projects
- Solid-state NMR advises, samples preparation, measurements and analysis
- Maintenance and troubleshooting of the EPFL NMR spectrometer park
- In-depth courses in the doctoral school

## Key target groups

More than 400 users, mainly from academic research groups (392) but as well from start-ups and industry (24)

### More than 60 EPFL laboratories actives in :

- Chemistry (ISIC) : 33 labs
- Life sciences (SV) : 6 labs
- Material science (IMX, IMT, IGM) : 20 labs
- Physics (IPHYS) : 2 labs

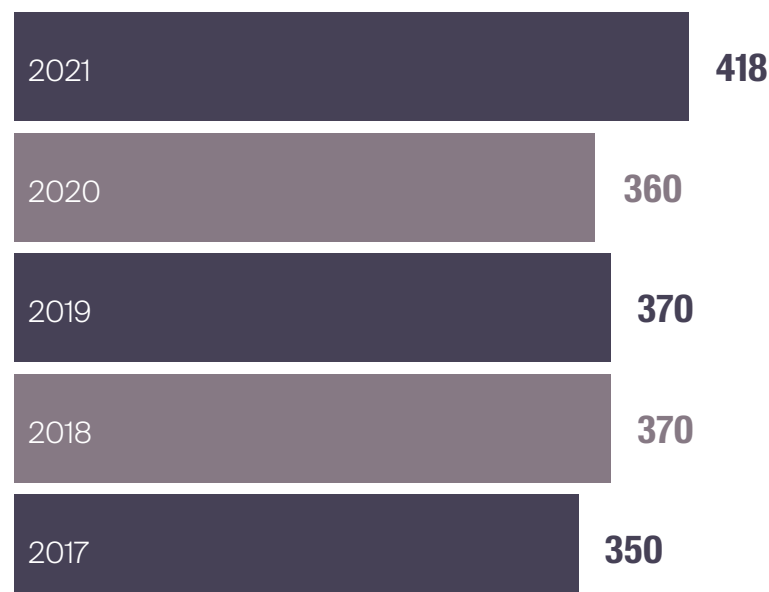
External academics research groups (CERN, ETHZ UNIL, UniNE, UniBe, UNIGE, ...)

### 6 start-ups and companies

## Major publications

1. De Matos, R. et al. **"Gd<sup>3+</sup>-Functionalized Lithium Niobate Nanoparticles for Dual Multiphoton and Magnetic Resonance Bioimaging"**, *ACS Applied Nano Materials* 5, no 2 (25 février 2022): 2912-22.
2. Kooij, B. et al. **"Vanadium complexes with N-heterocyclic vinylidene ligands"**, *Chem. Commun.* 58, no 26 (2022): 4204-7.
3. Loiudice, A. et al. **"Ligand Locking on Quantum Dot Surfaces via a Mild Reactive Surface Treatment"**, *Journal of the American Chemical Society* 143, no 33 (2021): 13418-27.
4. Murgia, F. et al. **"Enhanced Room-Temperature Ionic Conductivity of NaCB1H12 via High-Energy Mechanical Milling"**, *ACS App. Mat. & Interfaces* 13, no 51 (2021)
5. Villalobos, L. et al. **"Bottom-up synthesis of graphene films hosting atom-thick molecular-sieving apertures"**, *Proceedings of the Nat. Aca. of Sci.* 118, no 37 (2021)

## Number of users



## Contact



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# MSIC-MSEAP

## Mass Spectrometry and Elemental Analysis Platform

Structural analysis of samples by Mass Spectrometry and Elemental Analysis



## The facility

**5 staff members (4,2 FTE)**

**12 instruments on 2 sites (Lausanne, Sion)**

- 1 GC-MS (liquid and headspace)
- 1 Ion Trap LC-MS
- 2 LC-MS QTOF
- 3 High resolution Orbitrap FT-MS
- 2 MALDI-TOF
- 1 ICP-MS
- 1 ICP-OES
- 1 CHNS/O analyzer

**Yearly :**

More than 10000 samples submitted

## Services

- Mass spectrometry analyses in many fields of application from small molecules to large biomolecules
- CHNSO analyses
- Scientific support to research groups
- Submission and results through [eln.epfl.ch](http://eln.epfl.ch)
- In-house tools for advanced data analysis ([ms.epfl.ch](http://ms.epfl.ch))
- Open access to MS instruments (training and support)
- In-depth courses in the doctoral school

## Key target groups

More than 350 users, from academic to private external users

**84 EPFL laboratories :**

- FSB: ISIC, IPHYS
- FSV: IBI, GHI, ISREC
- STI: IMX, IMT
- ENAC: IIE

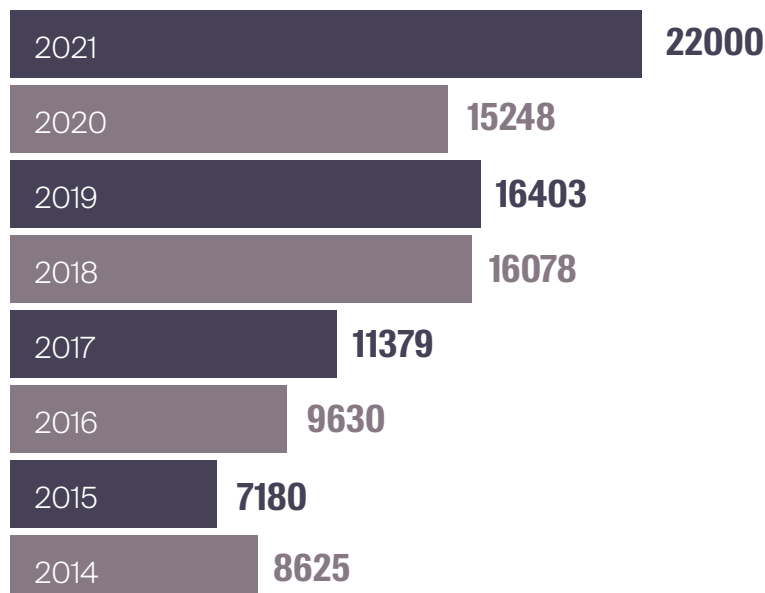
**External academic:** UNIL, UNIFR, UNIGE, UNIBE, UNINE, UNIBAS, ETHZ, CHUV, HEFR, HEVS...

**20 start-ups and companies**

## Major publications

1. *Giaveri et al. Adv mater* 2021, Sept 23.
2. *Nagornov et al. Anal Chem* 2021, 93(38) 12930-37.
3. *Ortiz et al. Rapid Commun Mass Spectrom* 2020, 15-34 (23).
4. *Nagornov et al. J Am Soc Mass Spectrom* 2020, 31(9) 1927-42.
5. *Jansze et al. Chem Commun* 2018, 54(68), 9529-9532

## Number of samples



## Contact



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# GR-CEL

## Central Environmental Laboratory

Provides scientific support and services in the fields of environmental analytical chemistry and molecular biology





## The facility

5 FTE dedicated staff members  
Senior scientists and laboratory technicians

### Cutting-edge equipment:

- LC-MS/MS and HR-MS
- Ion chromatography
- GC-MS/MS and Py-GC/MS
- ICP-OES and ICP-QQQ
- SP-ICP/MS
- Carbon and nitrogen analysis
- IR spectroscopy and chemical imaging
- Fluorescence spectrophotometry
- Automated nucleic acid extraction
- PCR and qPCR
- Cell counter
- Sample preparation
- DNA/RNA extraction robots
- Genes detection by PCR, cloning or sequencing
- Community analysis using NGS methods
- Cell cultures and physiology

## Services

- Advises and development for specific research projects
- Advises on samples preparation, measurements and analysis
- Training and support of the platform users
- Open access instruments
- Maintenance and troubleshooting of the analytical park

## Key target groups

- Researchers in the fields of environmental science and engineering, material science, chemistry, biology.
- PhD students, postdocs, senior scientists and Master students

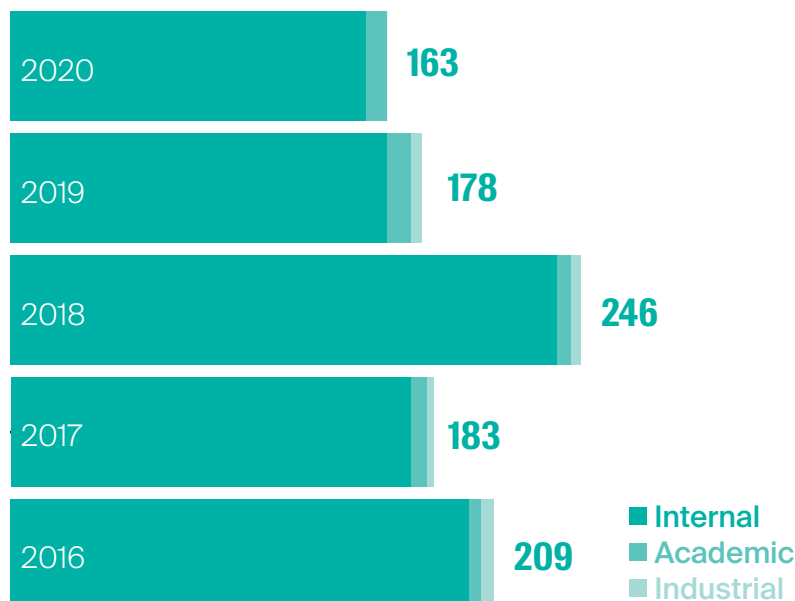
### Additional groups:

- Scientists at Swiss or other Universities
- Companies and start-up

## Major publications

1. Horváth, E. et al. **Solar water purification with photocatalytic nanocomposite filter based on TiO<sub>2</sub> nanowires and carbon nanotubes.** *npj Clean Water* 5, 10 (2022).
2. Thibault Masset, et al. **In Vitro Digestion of Tire Particles in a Fish Model (*Oncorhynchus mykiss*): Solubilization Kinetics of Heavy Metals and Effects of Food Coingestion,** *Environmental Science & Technology* 2021 55 (23).
3. M. Voumard, F. Breider, U. von Gunten, **Effect of cetyltrimethylammonium chloride on various *Escherichia coli* strains and their inactivation kinetics by ozone and monochloramine,** *Water Research, Volume 216, 2022.*
4. Thomas Coral, et al. **Biostimulation as a sustainable solution for acid neutralization and uranium immobilization post acidic in-situ recovery,** *Science of The Total Environment, Volume 822, 2022.*
5. Angélique Moraz and Florian Breider, **Detection and Quantification of Nonlabeled Polystyrene Nanoparticles Using a Fluorescent Molecular Rotor,** *Analytical Chemistry* 2021 93 (45), 14976-14984.

## Number of analytical requests



## Contact



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# PTCB

## Biomolecular Screening Facility

The PTCB is the first and largest academic screening facility in Switzerland for chemical biology and drug discovery.



## The facility

9 (7.8 FTEs) specialized staff members

Over 15 years of multidisciplinary expertise.

Screening instrumentation and infrastructure

- 3 Integrated robotic workstations
- 9 Fluidic/washer dispensers
- 3 Automated microscopes
- 4 Multimode plate readers
- 2 Cell culture labs
- Proprietary LIMS and IT infrastructure

>100'000 chemical compounds available

- Clinical drugs
- Chemical diverse and focused collections

## Services

Operational axes:

- Screening campaigns, from assay design to hits validation (6 - 18 months). Over 20 screening projects managed per year.
- Custom chemical synthesis and medicinal chemistry (Hits to Leads)
- Open access to specific instrumentation

Innovative research in chemical biology:

- Probes and novel screening approaches

Education:

- Teaching and hands-on workshops
- Master students supervision

## Key target groups

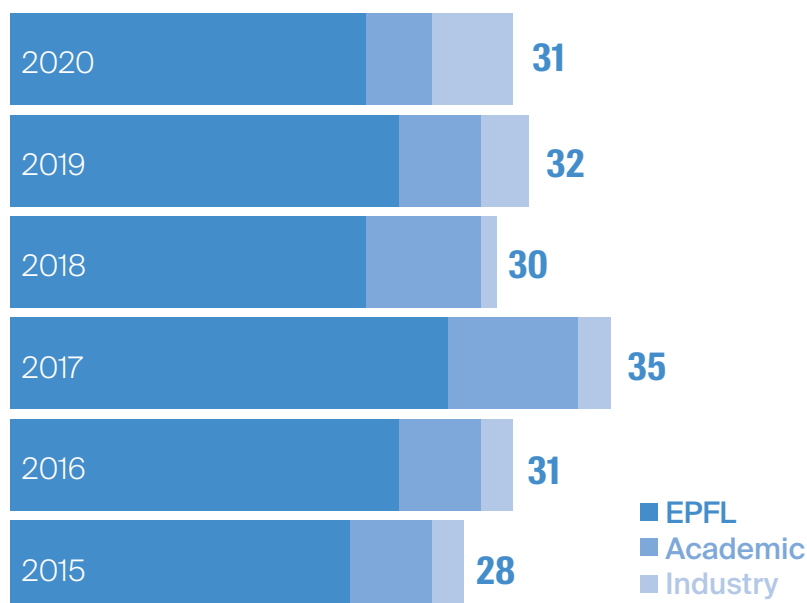
>80 users from 32 different research groups:

- EPFL labs: SV, STI and SB
- Non-profit Swiss institutions:
- UNIGE, UNIL, CMU, CHUV, UNIBAS, ETHZ, UNIBE, UNIZH, IRO-Bellinzona, HES-SO VS, Hôpital Jules Gonin, Transfusion interrégionale CRS
- Industrial partners: SME's and start-ups

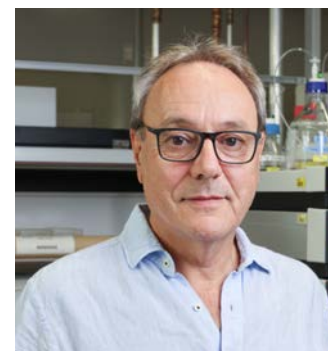
## Major publications

1. Sangouard G., et al. **Picomole-Scale Synthesis and Screening of Macrocyclic Compound Libraries by Acoustic Liquid Transfer.** *Angew Chem Int*, 60: 21702-21707, 2021
2. Brandenburg N., et al. **High-throughput automated organoid culture via stem-cell aggregation in microcavity arrays.** *Nat Biomed Eng*, 4: 863-874, 2020
3. Jaferzadeh K., et al. **Marker-Free Automatic Quantification of Drug-Treated Cardiomyocytes with Digital Holographic Imaging.** *ACS Photonics*, 7: 105-113, 2020
4. Kale S.S., et al. **Thiol-to-amine cyclization reaction enables screening of large libraries of macrocyclic compounds and the generation of sub-kilodalton ligands.** *Sci Adv*, 5: eaaw2851, 2019
5. Haag S.M., et al. **Targeting STING with covalent small-molecule inhibitors.** *Nature*, 559: 269-273, 2018

## Number of research groups



## Contact



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# PTPSP

## Protein Production and Structure Core Facility

The PTPSP offers expertise, training and instrumentation for production, purification and biophysical/structural characterization of proteins and protein complexes.



## The facility

The mission of PTPSP is to advise, train and connect researchers in protein sciences and integrative structural biology.

A team of 8 (6.4 FTE) structural biologists and biochemical experts are of service to the users from the production and purification of proteins to their atomic structural characterizations.

The PTPSP provides access to **state of the art biophysical instruments** ; such as DLS, SPR, BLI, CD, MP.

Collaboration with top-notch Swiss facilities such as the Swiss Light Source (SLS-PSI) for X-ray crystallography and the Dubochet center for Imaging (DCI) for single-particle cryoEM.

## Services

PTPSP is a hub for production and structural studies of macromolecules

- Design of vectors for protein expression
- Production of proteins in various hosts: mammalian, insect or bacterial cells
- Purification of proteins via different techniques
- 3D atomic structures determination of macromolecules by X-ray crystallography, BioNMR and single-particle cryoEM
- Biophysical characterization of proteins and protein-protein interactions

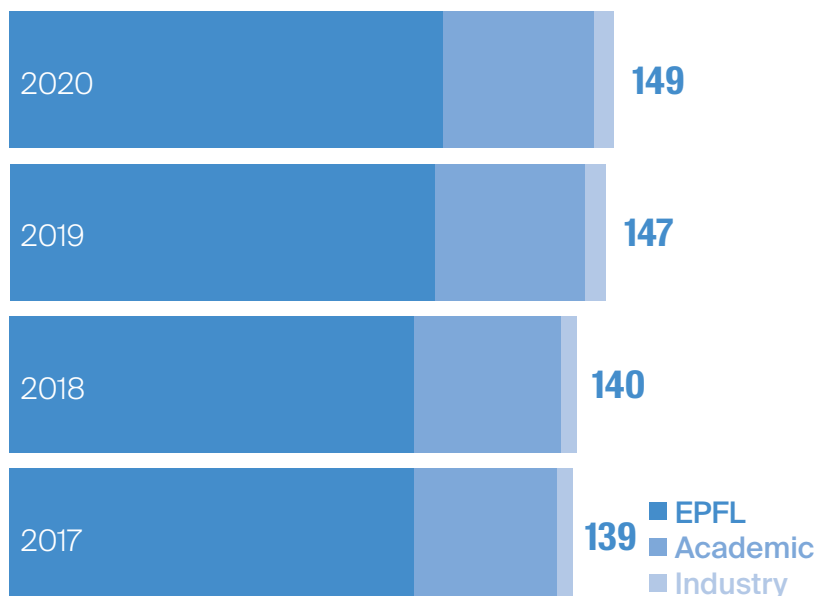
## Key target groups

- All scientists are welcome, with or without expertise in protein sciences or structural biology.
- Follow-up of projects on a regular basis to achieve user goals.
- Promote training of students and scientists
- **41 EPFL labs** (from SV, STI, SB, ENAC schools) and **37 non-EPFL labs or start-ups** benefit from our know-how, services and instrumentation.
- Teach at Master and PhD courses and participate in outreach to general public.

## Major publications

1. Fenwick et al (2021) **A highly potent antibody effective against SARS-CoV-2 variants of concern.** *Cell Reports, In press*
2. Röhrig et al (2021) **Azole-Based Indoleamine 2,3-Dioxygenase 1 Inhibitors.** *J. Med. Chem.* 2021, 64, 4, 2205-2227.
3. Mesquita et al (2021) **S-acylation controls SARS-CoV-2 membrane lipid organization and enhances infectivity.** *Dev Cell.* 2021 Oct 25;56(20):2790-2807.e8.
4. Kong XD, et al (2020) **De novo development of proteolytically resistant therapeutic peptides for oral administration.** *Nat Biomed Eng.* 2020 May;4(5):560-57.
5. Piton et al.. (2020) **High resolution CryoEM structure of the ring-shaped virulence factor EspB from Mycobacterium tuberculosis.** *J Struct Biol X* 2020 Jul 2;4:100029.

## Number of users



## Contact



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# PTEG

## Gene Expression Core Facility

The PTEG provides access to a powerful set of workflows for the functional and quantitative analysis of genomes and transcriptomes, both at the tissue and single-cell levels



## The facility

The facility's team is composed of 6 (5.2 FTEs) specialized staff members.

- 5 next-generation sequencers
- 3 single-cell genomics instruments
- 4 quantitative PCR instruments, both classical or microfluidics-based
- 2 automated pipetting platforms
- 4 instruments for DNA/RNA quality control
- 1 spatial transcriptomics service

## Services

We provide a diverse set of protocols and instruments for the functional and quantitative analysis of genomes (DNA) and transcriptomes (RNA), both at single-cell level or on bulk cell populations. This comprises next-generation sequencing, classical or high-throughput microfluidics-based qPCR technologies and spatial transcriptomics analyses. In addition, we enable manipulation of the cellular gene expression program by providing different genome-wide collections of genes.

## Key target groups

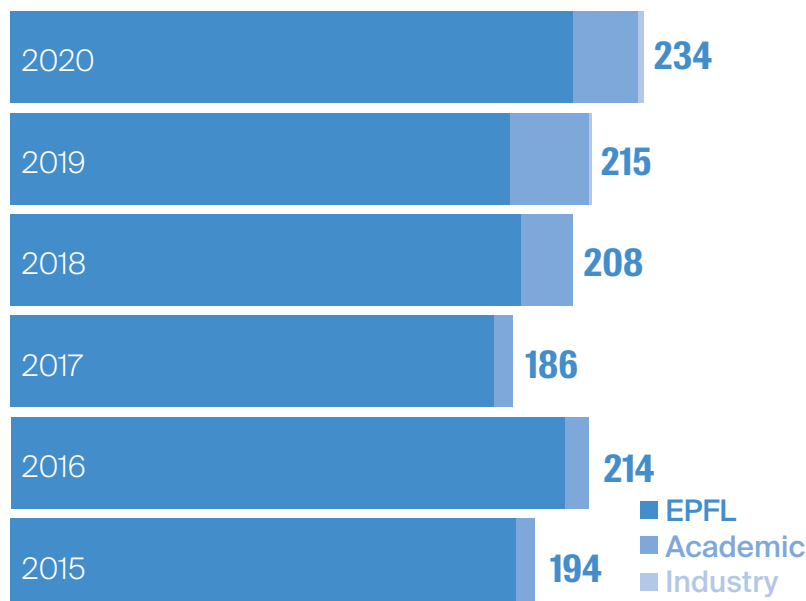
Our users are provided with genomics/sequencing tools to study a very wide range of topics.

- 54 labs used our services in 2020
- 36 from the EPFL School of Life Sciences
- 7 from other EPFL labs
- 11 from other academic institutes

## Major contributions

1. Sungalee S., et al. **Histone acetylation dynamics modulates chromatin conformation and allele-specific interactions at oncogenic loci.** *Nat Genet*, 53: 650-662, 2021
2. V'kovski P., et al. **Disparate temperature-dependent virus-host dynamics for SARS-CoV-2 and SARS-CoV in the human respiratory epithelium.** *PLoS Biol*, 19: e3001158, 2021
3. Sesterhenn F., et al. **De novo protein design enables the precise induction of RSV-neutralizing antibodies.** *Science*, 368: eaay5051, 2020
4. Nikolaev M., et al. **Homeostatic mini-intestines through scaffold-guided organoid morphogenesis.** *Nature*, 585: 574-578, 2020
5. Alpern D., et al. **BRB-seq: ultra-affordable high-throughput transcriptomics enabled by bulk RNA barcoding and sequencing.** *Genome Biol*, 20: 71, 2019

## Number of users



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# PTP

## Proteomics Core Facility

The PTP provides top-notch mass spectrometry-based proteomic technologies and relevant training to the EPFL Life Sciences community and collaborators.





## The facility

The facility is equipped with four state-of-the-art mass spectrometers designed to provide fast and sensitive proteome characterization along with accurate quantitation. The machines are operated by a highly experienced scientific team composed of four mass spectrometry specialists (4.8 FTEs) each of whom has more than ten years of experience.

Additionally, the team includes a dedicated bioinformatician (0.8 FTE) with extensive experience in establishing sophisticated data-analysis workflows.

## Services

We offer strong scientific support for proteomics-related projects, across the whole journey of a project: **from experimental design to data interpretation**. We can successfully address a number of biological questions related but not limited to:

- protein identification and characterization of post-translational modifications (PTMs)
- absolute and relative quantitation of proteins and PTMs across multiple samples
- investigation of protein complexes and protein-protein interactions

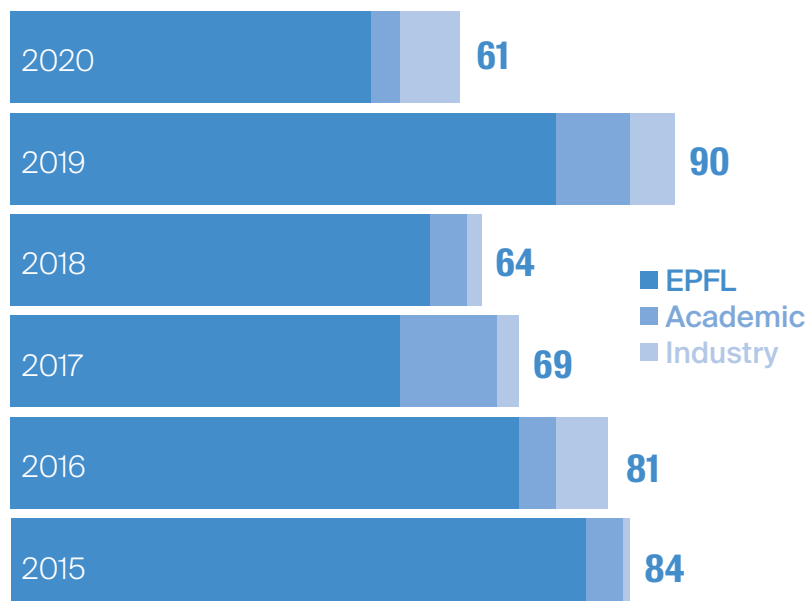
## Key target groups

Our users include students and researchers interested in addressing their biological questions by using mass spectrometry-based proteomics. The team offers its expertise to the EPFL Life Sciences community and collaborators throughout Switzerland and beyond. In addition, the team is actively participating in consulting, teaching and training of students and researchers who are interested in the field of mass spectrometry-based proteomics.

## Major publications

1. Bergamo A., et al. **Lysozyme-Induced Transcriptional Regulation of TNF- $\alpha$  Pathway Genes in Cells of the Monocyte Lineage.** *Int J Mol Sci*, 20: 5502, 2019
2. Cianciaruso C., et al. **Molecular Profiling and Functional Analysis of Macrophage-Derived Tumor Extracellular Vesicles.** *Cell Rep*, 27: 3062-3080.e11, 2019
3. Dorin-Semlat D., et al. **Phosphorylation of the VAR2CSA extracellular region is associated with enhanced adhesive properties to the placental receptor CSA.** *PLoS Biol*, 17: e3000308, 2019
4. Krapp A., et al. **Analysis of the *S. pombe* Meiotic Proteome Reveals a Switch from Anabolic to Catabolic Processes and Extensive Post-transcriptional Regulation.** *Cell Rep*, 26: 1044-1058.e5, 2019
5. Hamel V., et al. **Identification of Chlamydomonas Central Core Centriolar Proteins Reveals a Role for Human WDR90 in Ciliogenesis.** *Curr Biol*, 27: 2486-2498.e6, 2017

## Number of users



## Contact



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# PTBTG

## Bertarelli Foundation Gene Therapy Facility

The PTBTG provides expertise in genetic engineering and gene delivery using viral vector technologies.



## The facility

### 5 (4.6 FTEs) specialized staff members

- Non-GMP viral vector production
- Genetic engineering
- Cell culture in shaker flasks
- Downstream chromatography process
- Ultracentrifugation
- Vector analytics (digital PCR, nanoparticle analysis)
- Expertise in the in vivo application of viral vector technologies
- Technology transfer

## Services

- Solutions for the scalable production of both AAV and lentiviral vectors
- Production of viral vectors for genetic manipulations, including gene transfer, gene silencing and gene editing
- Design and engineering of novel viral vectors
- Analytical characterization of viral vectors
- Assay development
- Support in the early development of innovative gene therapies, in particular for the central nervous system and sensory organs

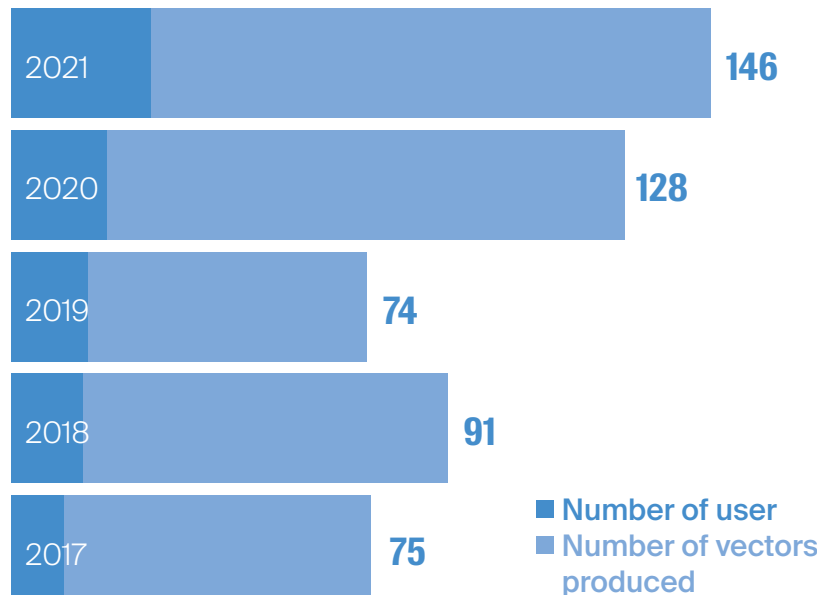
## Key target groups

- Research labs using vector-based gene delivery
- Companies active in gene therapy
- Research consortia and interest groups aiming at the development of gene therapies for unmet clinical needs

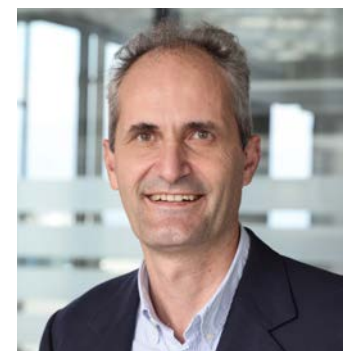
## Major publications

1. Wu J. et al. **Single and dual vector gene therapy with AAV9-PHP.B rescues hearing in Tmc1 mutant mice.** *Molecular Therapy*, 29(3):973-988, 2020.
2. Bernard-Marissal N., van Hameren G., Juneja M., Pellegrino C., **Altered interplay between endoplasmic reticulum and mitochondria in Charcot-Marie-Tooth type 2A neuropathy.** *PNAS*, 116(6): 2328-2337, 2019.
3. Blessing D., et al. **Scalable Production of AAV Vectors in Orbitally Shaken HEK293 Cells,** *Molecular Therapy - Methods & Clinical Development*, 13:14-26, 2019.
4. Bobela et al. **Modulating the catalytic activity of AMPK has neuroprotective effects against  $\alpha$ -synuclein toxicity.** *Molecular Neurodegeneration*, 12(1):80, 2017.
5. PTBTG has contributed to the development of gene therapy programs with Arctos Medical AG (acquired in 2021 by Novartis) and AvrionTx (a spin-off of EPFL).

## Number of users & vectors produced



## Contact



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# PTCF

## Flow Cytometry Core Facility

The aim of the PTCF is to provide advanced instrumentation as well as high-level technical and scientific expertise in flow and mass cytometry and cell sorting.



## The facility

The facility's team is composed of 4 (3.8 FTEs) specialized staff members.

The PTCF is equipped with state-of-the-art equipment:

- 1x BC Cytotflex
- 2x Beckman Coulter Gallios
- 1x Full Spectrum Aurora
- 3x BD LSRII Fortessa
- 1x Attune NxT
- 1x BC Astrios EQ
- 2x Aria Fusion
- 1x CyTOF Helios

## Services

- Training and access to the self-served analyzers
- Facility operated cell sorting services
- Advice regarding cell preparation and choice of fluorochromes
- Help with data acquisition, analysis and interpretation
- Technical support and troubleshooting

## Key target groups

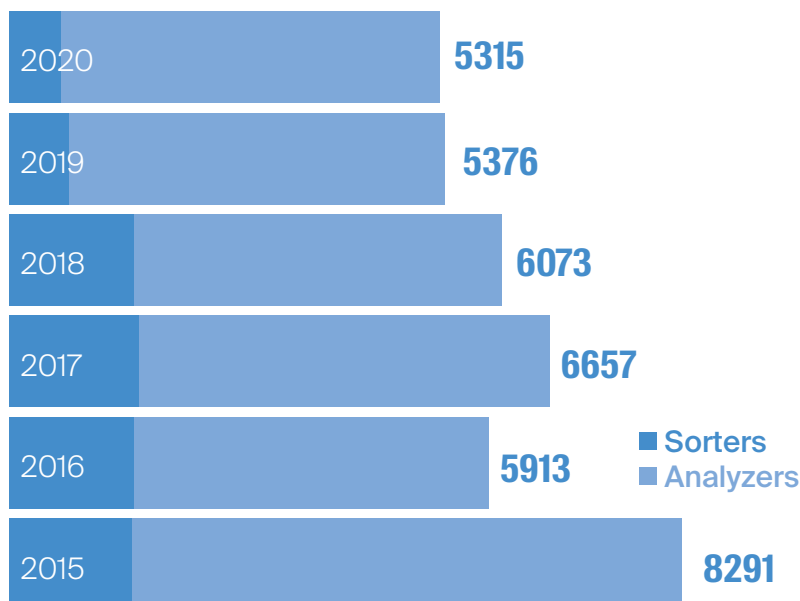
The PTCF provides access to **flow cytometry, mass cytometry and cell sorting** to a wide range of users from the EPFL and UNIL, and other academic research institutions and companies in Switzerland and abroad.

We offer the possibility to generate high-quality reproducible research data by providing access to the state-of-the-art regularly maintained equipment in combination with implementation of quality management procedures.

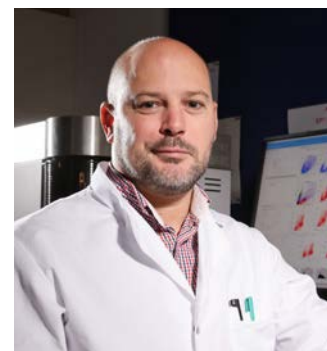
## Major publications

1. Samie L., et al. **The efficiency of DNA extraction kit and the efficiency of recovery techniques to release DNA using flow cytometry.** *Sci Justice*, 59: 405-410, 2019
2. Vannini N., et al. **The NAD-Booster Nicotinamide Riboside Potently Stimulates Hematopoiesis through Increased Mitochondrial Clearance.** *Cell Stem Cell*, 24: 405-418.e7, 2019
3. Tauzin L., et al. **Cellular endogenous NAD(P)H fluorescence as a label-free method for the identification of erythrocytes and reticulocytes.** *Cytometry A*, 93: 472-479, 2018
4. Faget J., et al. **Neutrophils and Snail Orchestrate the Establishment of a Pro-tumor Microenvironment in Lung Cancer.** *Cell Rep*, 21: 3190-3204, 2017

## Activity hours



## Contact



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# PTH

## Histology Core Facility

The PTH prepares samples for light microscopic study of organs, organoids and other special biological specimens.



## The facility

The facility is located at the SV Faculty in the AI building. It houses the following equipment:

- VIP6 tissue processor, paraffin dispenser
- 4 cryostats for frozen sectioning
- 4 microtomes for paraffin sectioning
- 4 sliding microtomes
- 1 vibratome
- Prisma Autostainer and coverslipper
- Ventana Discovery ULTRA Immunostainer
- Lunpahore custom microfluidic setup
- X- clarity clearing system

The facility's team is composed of 6 (3.1 FTEs) specialized staff members.

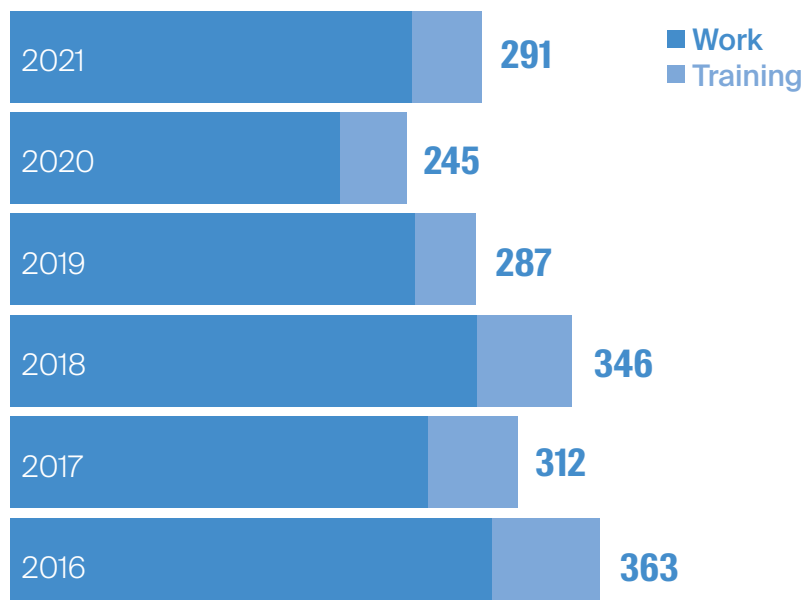
## Services

On one hand, the facility assists researchers in the optimization of histological approaches specific for each scientific project. EPFL members can get training on the instruments.

On the other hand technicians of the facility perform work for researchers: tissue processing, sectioning, histological stains, immunodetection of proteins, detection of mRNA and miRNA, and implementation of newly available techniques (multiplexing and spatial transcriptomics).

As a part of a collaboration with the University of Bern, a trained veterinary pathologist helps the facility to diagnose and interpret morphologic lesions within organs.

## N° of work and training requests



## Key target groups

The majority of the PTH users are members of the EPFL community and particularly the SV Faculty.

Researchers of academic laboratories from the Lausanne area and broader area of Romandie can as well process samples at the facility.

## Major publications

1. Rossi G., et al. **Capturing Cardiogenesis in Gastruloids.** *Cell Stem Cell*, 28: 230-240.e6, 2021
2. Sflomos G., et al. **Intraductal xenografts show lobular carcinoma cells rely on their own extracellular matrix and LOXL1.** *EMBO Mol Med*, 13: e13180, 2021
3. Taverni D., et al. **Nongenetic Evolution Drives Lung Adenocarcinoma Spatial Heterogeneity and Progression.** *Cancer Discov*, 11: 1490-1507, 2021
4. Thacker W., et al. **Rapid endotheliitis and vascular damage characterize SARS-CoV-2 infection in a human lung-on-chip model.** *EMBO Rep*, 22: e52744, 2021
5. Dheilly E., et al. **Cathepsin S Regulates Antigen Processing and T Cell Activity in Non-Hodgkin Lymphoma.** *Cancer Cell*. 37: 674-689.e12, 2020

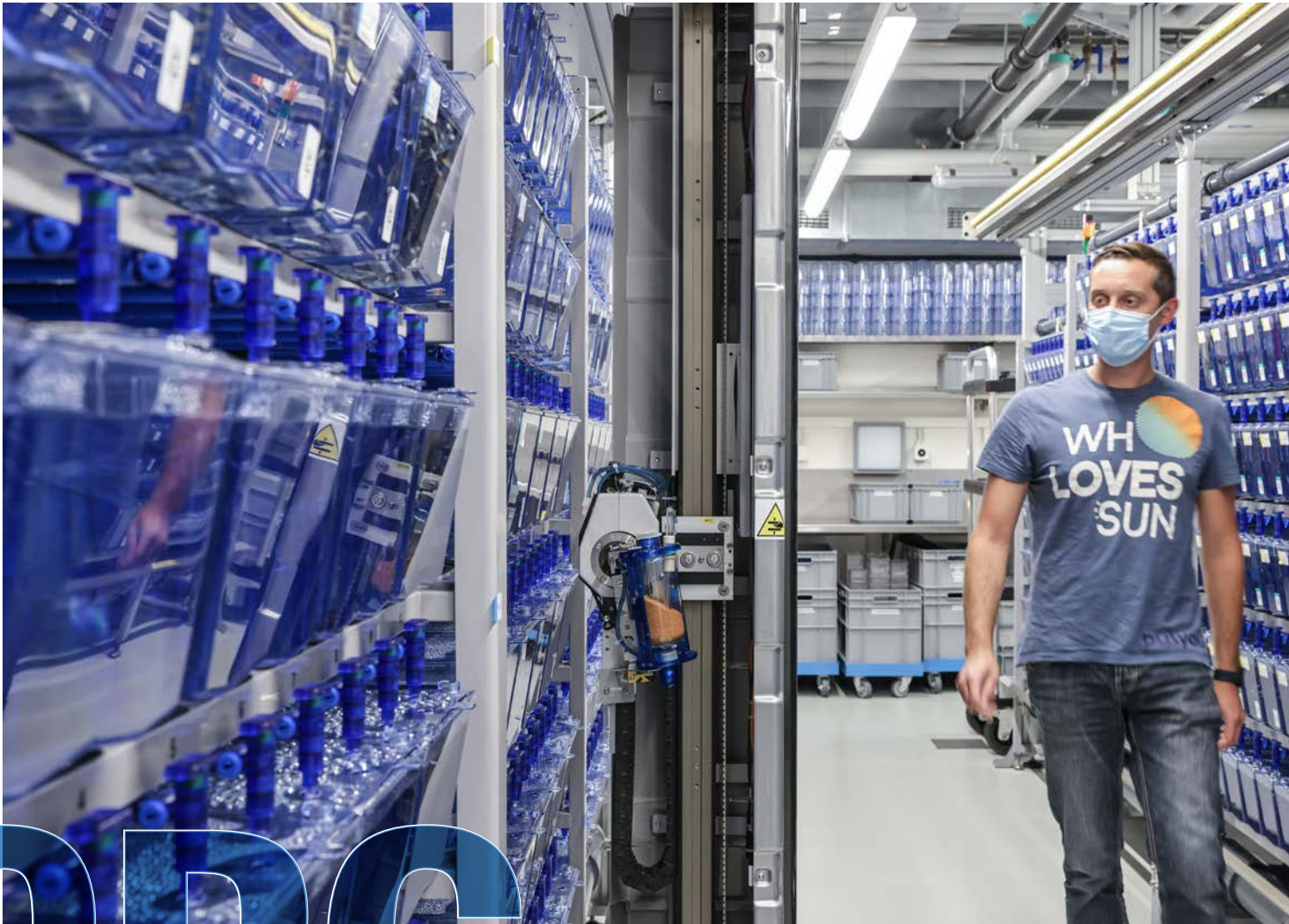
## Contact



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# CPG

## Center of PhenoGenomics

The CPG is a Center of expertise in animal experimentation, which provides services and support in *in vivo* research and allows high quality scientific research by best practices in animal care, welfare and well-being.





## The facility

### Team of 65 people (60.10 FTE)

- Infrastructures for importing, housing and experimentation on laboratory rodents (mice and rats) and laboratory aquatic animals (zebrafish)
- Biosafety Level 1, 2 and 3 housing and experimental units
- Scientific equipment for neurobiology and cardio-metabolic tests, blood analysis, in vivo (eg. Fluorescence, X-ray) and optical imaging
- 450 mouse transgenic lines housed in the facility
- 55 mouse lines cryopreserved per year, 20 mouse embryo transfers per year
- 40 new transgenic zebrafish lines established per year

## Services

- Expertise to design and generate genetically modified models
- Housing, husbandry, breeding and colony management of rodents and zebrafish
- Standardized and custom phenotyping assays across all major physiological and pathological systems
- Advanced imaging techniques and optical methods for in vivo imaging
- Cryopreservation and recovery including import, archiving, and distribution
- Research support from project managers, animal care and veterinary professionals
- Communication about animal experimentation

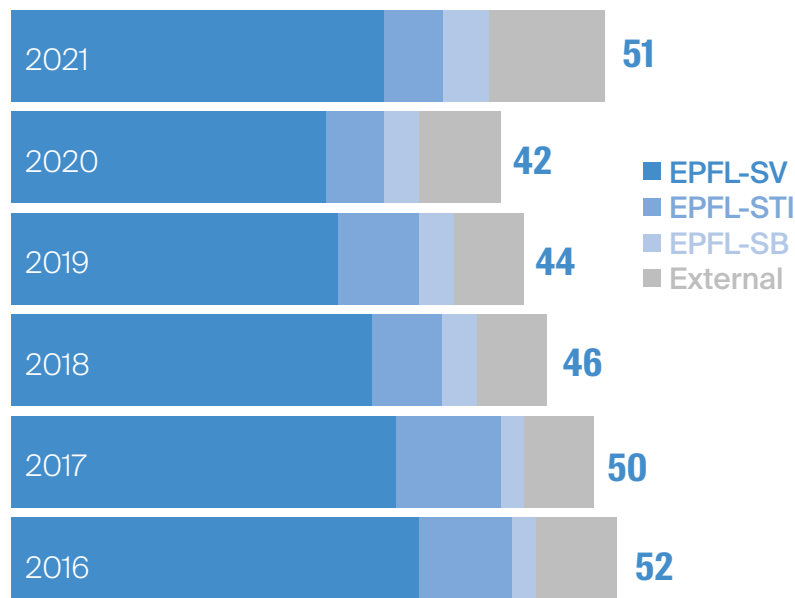
## Key target groups

- All EPFL research groups that need to perform animal experiments with vertebrates for a given project
- Research groups can perform the experimental work themselves if duly accredited or can benefit from the service activities of the Center
- Fee-for-services for external academic collaborators and industrial partners

## Major publications

1. Guo Y, et al. **Metabolic reprogramming of terminally exhausted CD8+ T cells by IL-10 enhances anti-tumor immunity.** *Nat Immunol*, 22: 746–756, 2021
2. Perino A, et al. **Central anorexigenic actions of bile acids are mediated by TGR5.** *Nat Metab*, 3: 595–603, 2021
3. Sflomos G, et al. **Intraductal xenografts show lobular carcinoma cells rely on their own extracellular matrix and LOXL1.** *EMBO Mol Med*, 13: e13180, 2021
4. Squair JW, et al. **Neuroprosthetic baroreflex controls haemodynamics after spinal cord injury.** *Nature*, 590: 308–314, 2021

## Number of groups



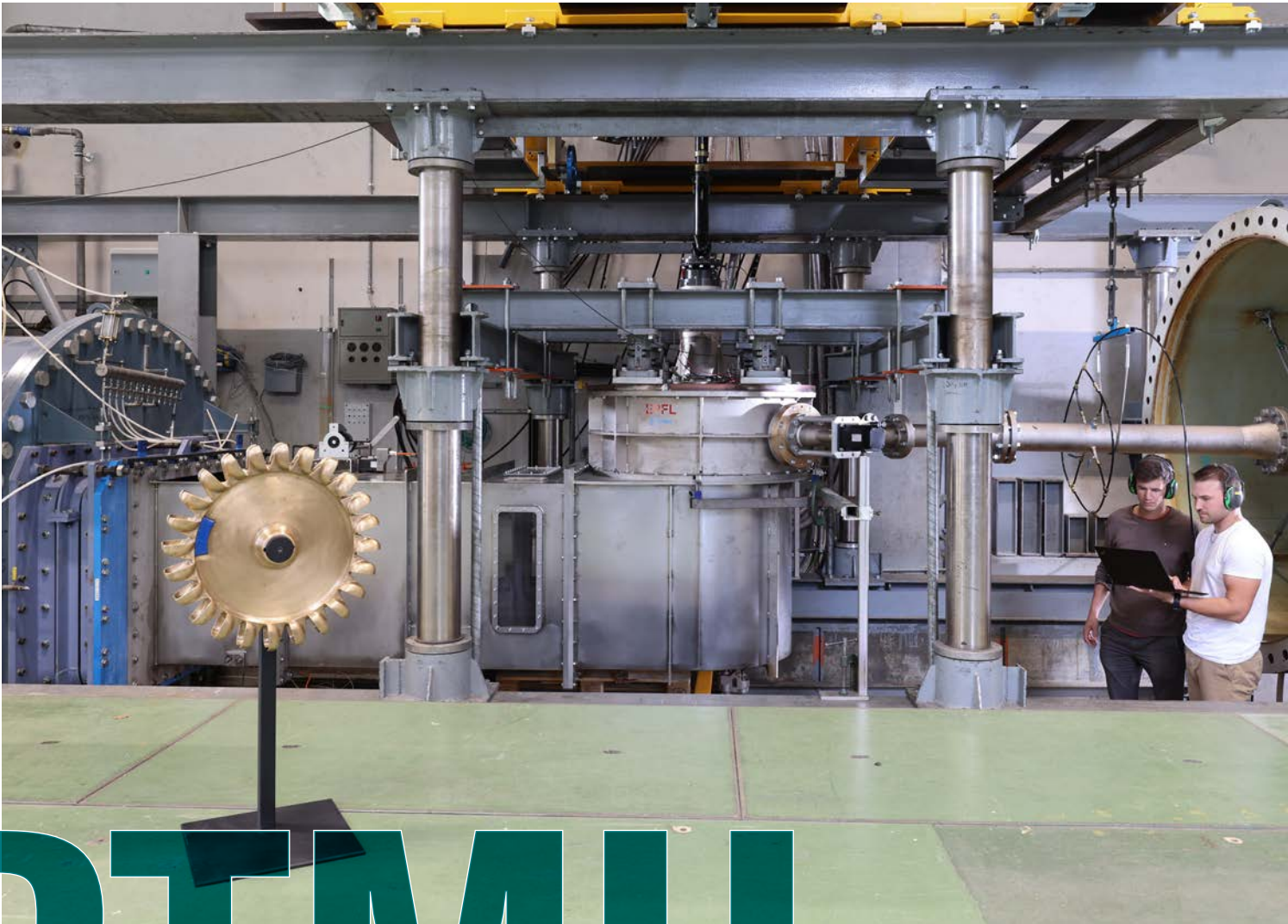
## Contact



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# PTMH

## Technology Platform for Hydraulic Machines

Leader and independent on hydraulic reduced scale model tests, Innovative in hydroelectric R&D as renewable energy



## The facility

### Highly qualified staff of 16 FTE.

- Over 40 years of expertise.
- Independence from hydraulic manufacturers.
- Tests of reduced scale model for hydroelectric projects according to the IEC 60193 standards R&D in hydraulic machines (experimental and numerical), in advanced measurement techniques
- Research competences to propose new solutions to the hydropower sector to challenging into the renewable energy policies.

## Services

- Model tests, on site measurements and/or expertise
- Development of new measurements techniques and/or functionalities of the test rigs
- Expertise of the design office and/or the workshop
- 6-10 model tests per year

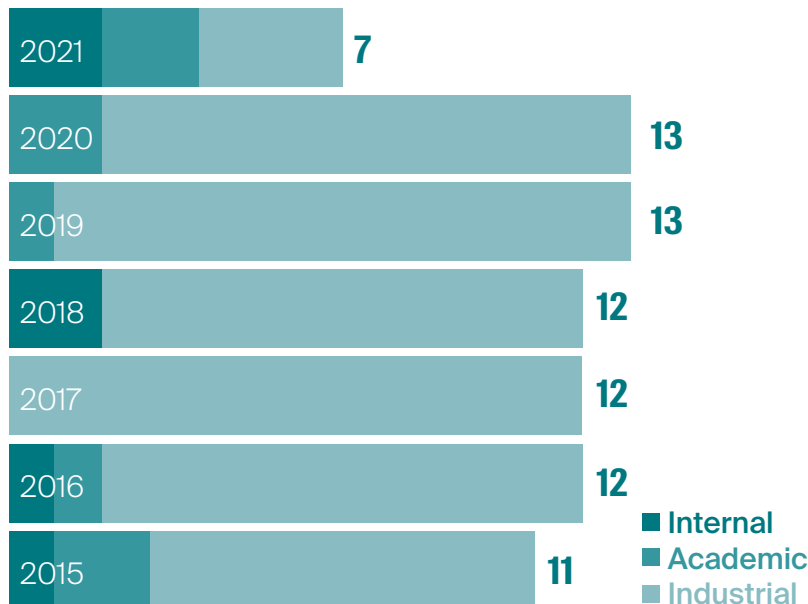
## Key target groups

- Manufacturers of hydraulic machines and companies operating a park of hydroelectric power plants
- Research and development organizations
- Internal users

## Major publications

1. E. Vagnoni, **“Reaction turbines used in PHES units and related problems”**, *Encyclopedia of Energy Storage*, Elsevier, 2022
2. Gerini F., et al., **“Improving frequency containment reserve provision in run-of-river hydropower plants”**, *Sustainable Energy Grids and Networks* 28:100538, 2021
3. Gomes Pereira Jr. J., et al., **“Prediction of unstable full load conditions in a Francis turbine prototype”**, *Mechanical Systems and Signal Processing*, 169:108666, 2021
4. E. Vagnoni, et al., **“Dynamic behaviour of a Francis turbine during voltage regulation in the electrical power system”**, *International Journal of Electrical Power and Energy Systems*, 125, 2020
5. Leguizamón S., et al. **“On the Efficiency Alteration Mechanisms Due to Cavitation in Kaplan Turbines”**, *Journal Of Fluids Engineering-Transactions Of The Asme*, 139:061301, 2017

## Number of tests (1 test = 3 months on average)



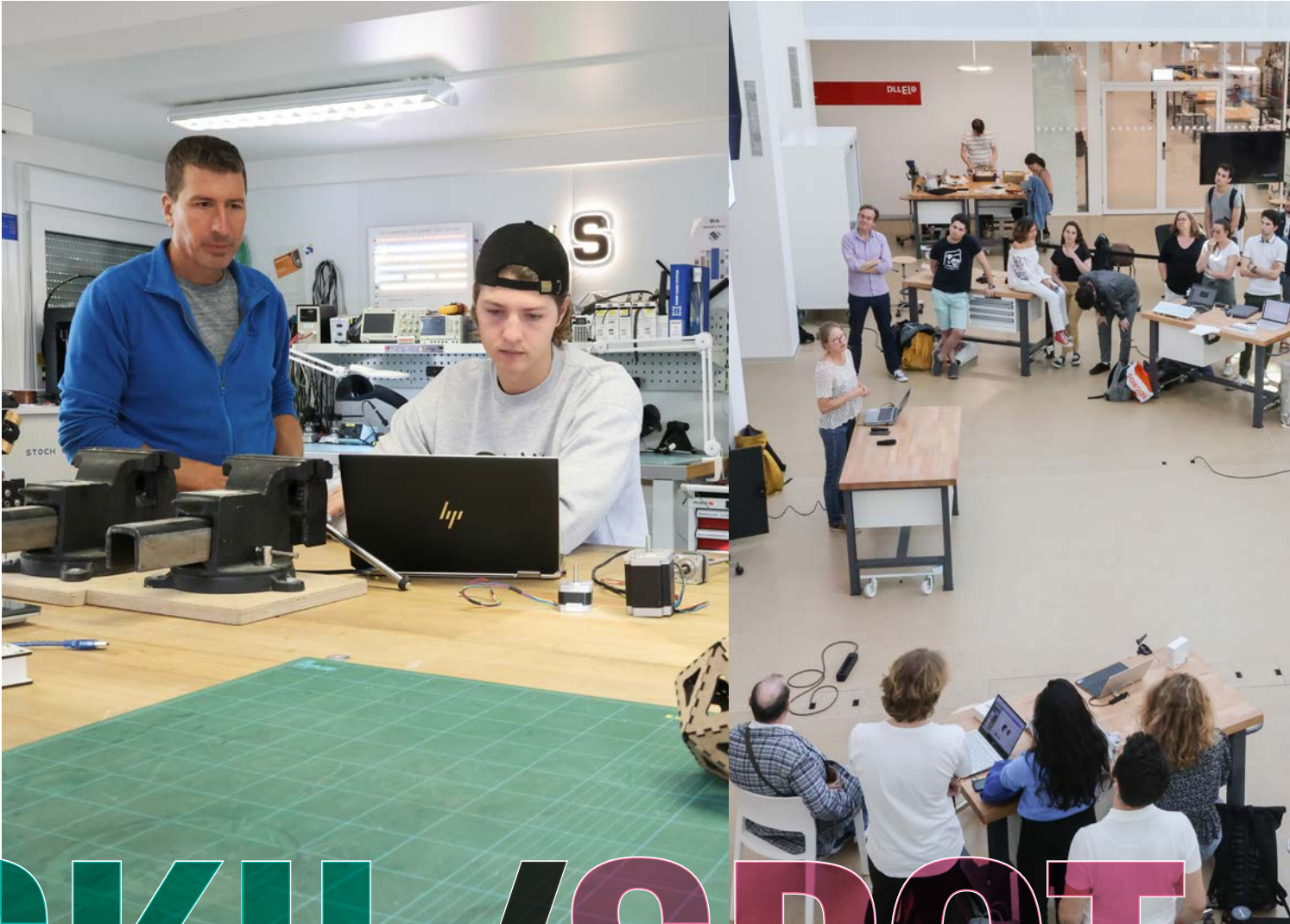
## Contact



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# SKIL/SPOT

## Student Kreativity and Innovation Laboratory (SKIL) Student Project and Outreach Tank (SPOT)

SKIL and SPOT are two complementary spaces aiming at encouraging student initiative, creativity, and interdisciplinarity in a workshop environment and allowing the realization of hands-on projects.



## The facilities

The SKIL is dedicated to prototyping with specific expertise on wood and the SPOT support advanced prototyping in mechanics and electronics including one immersive room. Covered fields and available equipments are:

- Meeting and gathering spaces with coffee machine
- Ideation: ideation material, projection screen, material library and computers
- Immersion: VR headsets, motion capture and immersive room
- Mechanical workshop: laser cutter, lathe, milling machine, welding machines, power tools
- Maker: 3D printers, laser cutter, vinyl cutting machines, sewing/embroidery machines
- Electronics workshop: soldering station, electronic benches, pick and place station, welding oven
- Wood workshop: wood saws, CNC milling machine and power tools

## Services

The SKIL and SPOT are mainly an infrastructure (building and equipment) where the students can realize their project. The staff is present for advice and to guide the students during the realization phases, but the main goal is that the students do themselves. The SKIL and SPOT are also helping the students to be well prepared before going to other EPFL platform such as professional workshops, and other DLL spaces, ...

## Key target groups

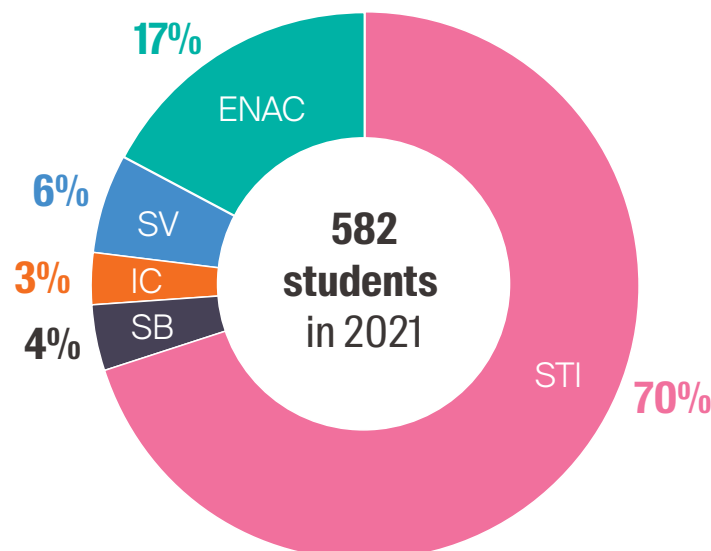
The target group is mainly the Bachelor and Master students at EPFL who work in a hands-on project or are willing to experiment a project-based learning.

## Major output

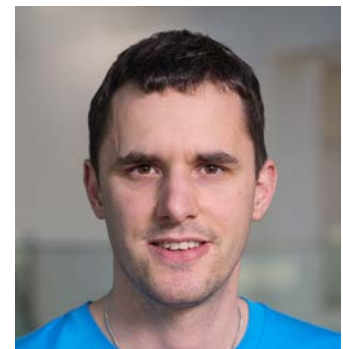
Support of:

- Courses and semester projects
- >20 MAKE projects
- >7 Act for change Lab projects
- changemakers
- Outreach with the SPS
- EPFL associations and more...

## School representation at SKIL



## Contact



Coordinator SKIL and SPOT  
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# PLTE

## ENAC Technical Platform

Mechanical and electro-technical technical platform



## The facility

Platform set up at the initiative of the Dean's Office in 2017 and bringing together the former GC, GR and LESO-PB workshops. Our services are invoiced and eligible with the NSF since 2019. Our team consists of 10 technicians (mechanics, engineers and, apparatus builder) as well as 2 polymechanics apprentices

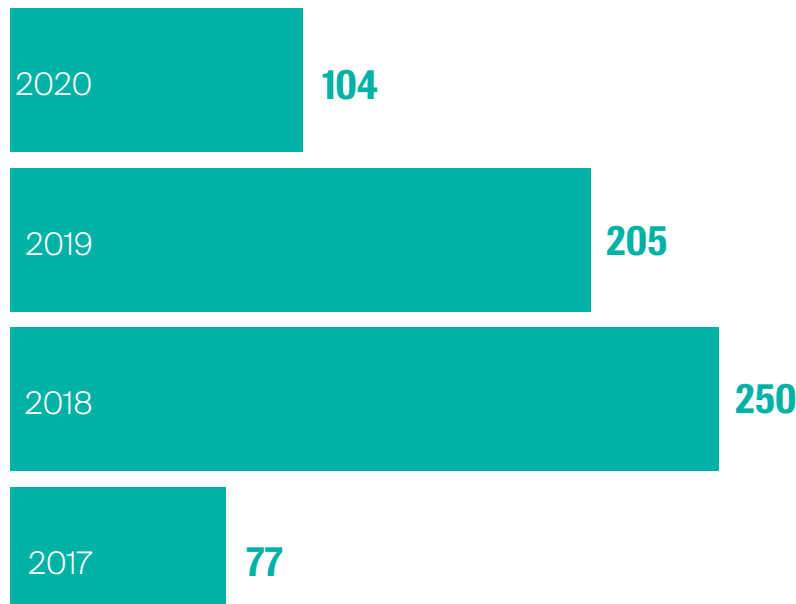
## Key target groups

We work in priority for all the laboratories of ENAC and in the second place for the other units of the School. As far as our availability allows, we also carry out some external mandates (universities).

## Services

Realization of complex projects in mechanics and electro-technology. Use of CAD for design. Modern machinery (CNC-standard). Laser cutting machine for steel, aluminum, etc.), welding workshop and 3D printer.

## Number of projects



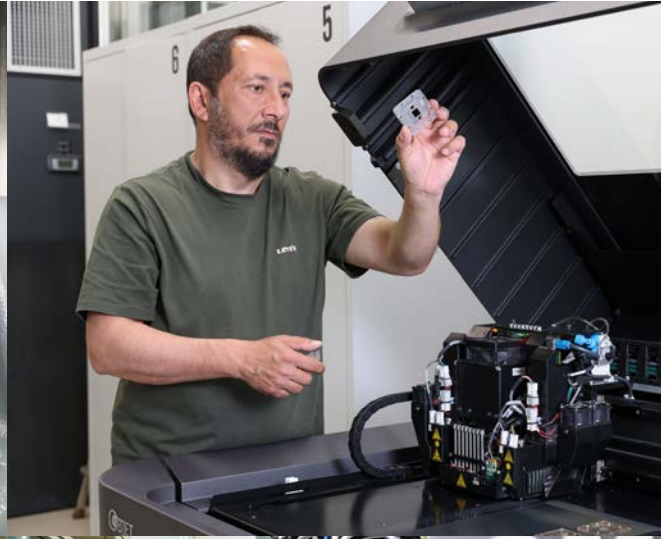
## Contact



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# PAT-GE

## School of Engineering Technical Platform

Engineering and Manufacturing Services -  
Partners, Resource and Experts on Prototype  
Design, Development and Manufacturing





## The facility

2 Mechanical Engineers  
1 IC Engineer  
1 polymechanic

**CAD Softwares:**

- CATIA
- SolidWorks
- Cadence
- EDA Tools and Design Kits

In addition to consulting services, the unit PAT-GE is supervising all workshops of STI

## Key target groups

**Provide Engineering services to:**

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects

## Services

**Consult on phases from concept to manufacturing prototype:**

- Requirements and specifications
- Brainstorming for ideas
- Feasibility
- Advices
- Support design of devices:
- Participate to design phases
- Provide feedback on design of devices for manufacturing, maintenance, reliability, safety
- Propose Detailed Design
- Decision on manufacturing in house or outsourcing
- Improving on existing devices
- Bespoke lab testing equipment and hardware

## Contact



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# AFA

## Additive Manufacturing Workshop

Professional 3D Printing of Mechanical Parts



## The facility

### 2 Employees

#### 6 Different 3D Printing Machines:

- FDM STRATASYS Fortus 450mc
- MJM Connex 500
- SLA-DLP Envisiontec Perfactory P4 Mini XL
- SLS-Fusion EOSINT P 395
- FDM STRATASYS F370
- Stratasys Polyjet J55 Prime

## Services

#### 3D printing using different techniques:

- FDM (Fused Deposition Modelling) 406 x 355 x 406mm
- MJM (Multi Jet Modelling) 490 x 390 x 200mm
- SLA-DLP (Stereolithography-Digital Light Processing) 115 x 72 x 220mm
- SLS-Fusion (Selective Laser Sintering) 340 x 340 x 600mm
- Multi-materials Jet Modelling 1'174cm2 Round x 190mm

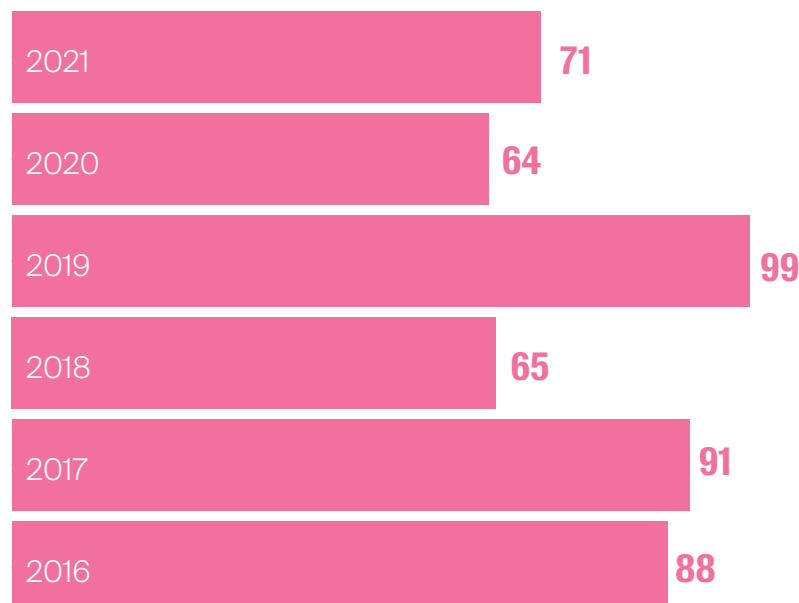
#### Consulting on design and manufacturing for 3D Printing

## Key target groups

#### Provide Manufacturing and Engineering services to:

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects
- External customers and startups

## Number of customers



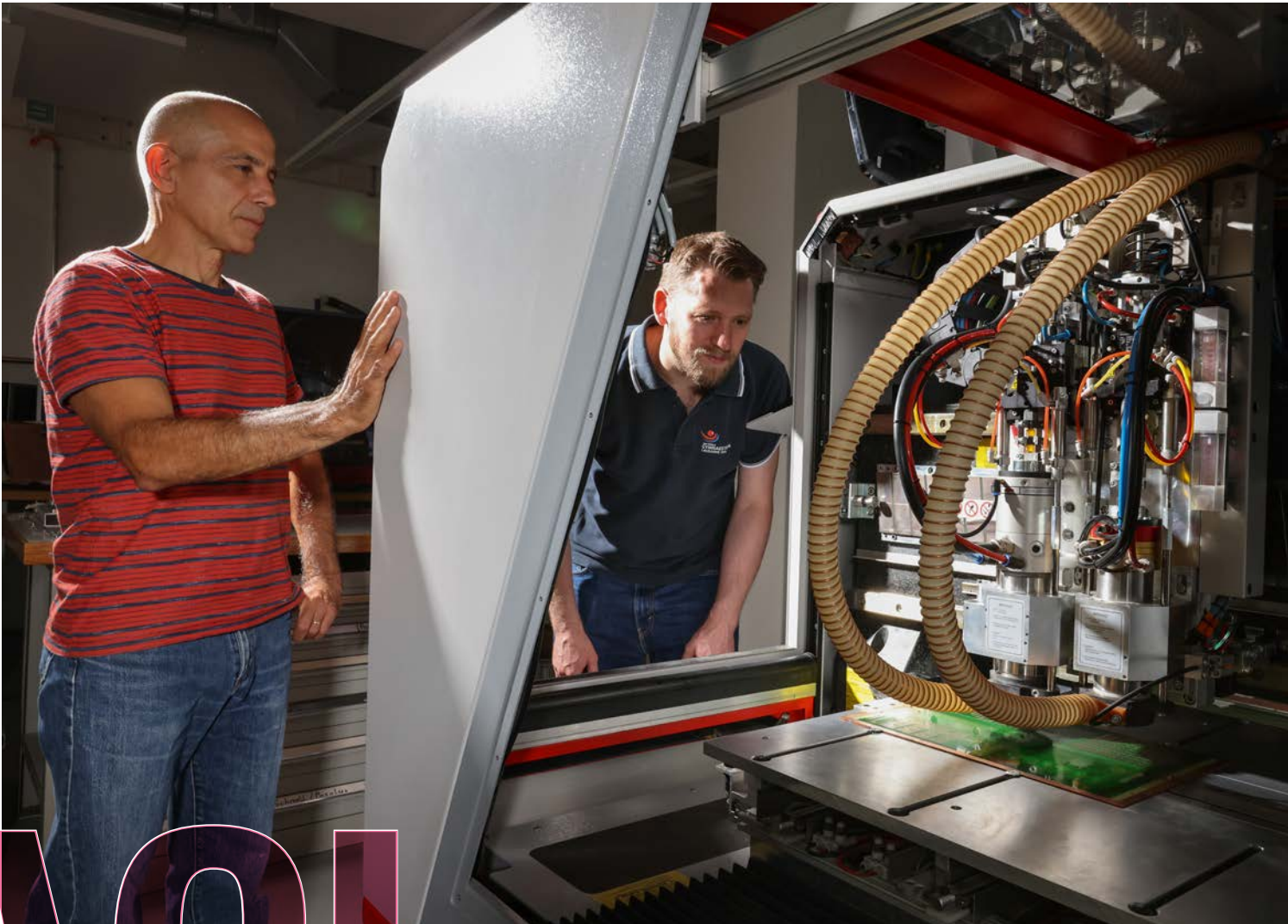
## Contact



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# ACI

## Printed Circuit Board Workshop

Design, Routing, Prototyping and Manufacturing of  
Printed Circuit Boards



## The facility

### 3 Employees

- Electroplating chain
- Laminator
- Photoplotter
- Laser Direct Imager
- Developer
- Semi-automatic Pick & Place
- Micro Placer
- Rework station
- 3D microscope
- Vapor Phase Oven
- Copper Etching Line – Pill
- UV exposure unit
- Drilling/Milling CNC

## Key target groups

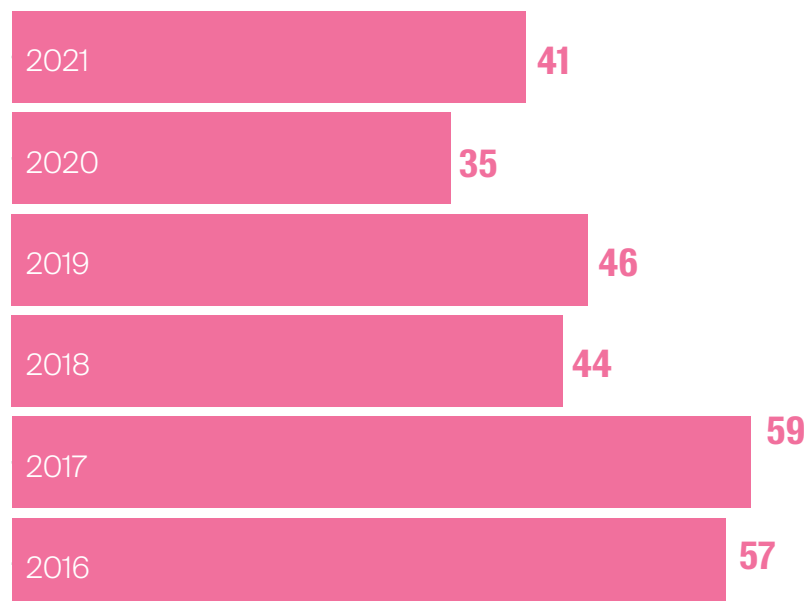
### Provide Manufacturing and Engineering services to:

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects

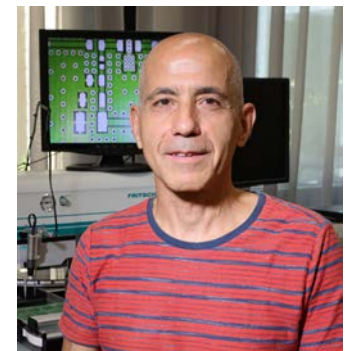
## Services

- Simple or multi-layer PCB design, routing and layout
- Generation of production files.
- PCB manufacturing
- Prototyping
- Assembly
- Photo laser tracing
- Manufacture of thin parts of various materials such as epoxy, copper alloy, etc.
- Chemical etching
- Introductory course on the manufacture of PCBs
- Initiation laboratory and self-service facility
- Manufacturing advice
- **Leadtime to manufacture a PCB: 8 days**

## Number of customers



## Contact



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# ACTIVE

## Mechanical Engineering Workshop

Bespoke Mechanical Design and Manufacturing  
4-5 Axis CNC Machining of Complex Parts  
Metrology



## The facility

7 Employees – 2 Apprentices

### Milling:

- Fehlmann Picomax 56L (4 axis)
- Hedelius C50 (4 axis)
- Hermle C 250, C 400 (5 axis)
- Schaublin 53, 53N

### Lathes:

- Cazeneuve HB 500
- Colchester Triumph 2000
- Nakamura AS200L (4 axis)
- Schaublin 102, 135, 150, 180 CCN (4 axis)

Various flat milling, planing, drilling, folding, sawing and other machines

3D Metrology Machine COORD3-HERA

Welding, brazing

3D Measurement with Hexagon Absolute Arm 7 axis Measuring Arm & Laser scanner

Welding, brazing

## Key target groups

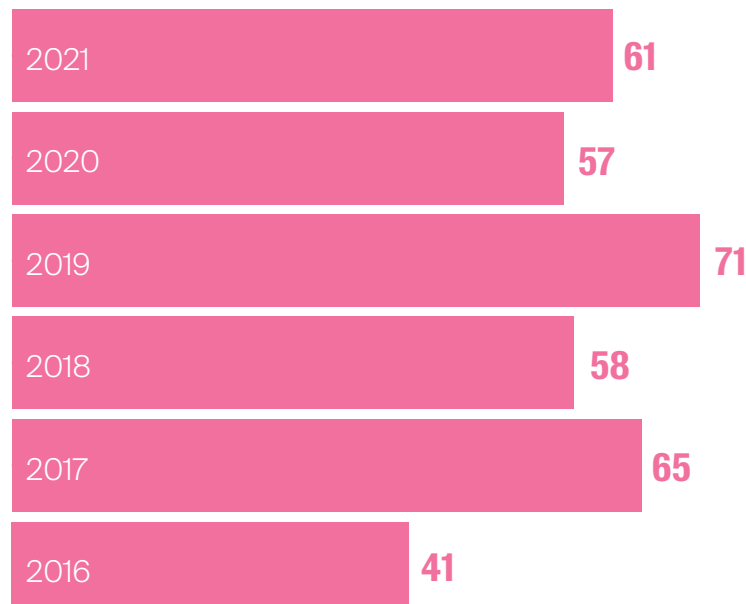
Provide Manufacturing and Engineering services to:

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects

## Services

- Mechanical Engineering Consulting
- 5 axis machining
- CNC Milling: machining of complex skew surfaces, 3D shapes, moulds
- CNC Turning: 4 axis machining of complex solids of revolution
- Conventional milling, turning, drilling for quick turnaround
- Flat and cylindrical grinding
- 3D Measurement: surface point sensing and numerical comparison
- Reverse engineering: 3D laser scanning of surfaces
- Aluminium and stainless steel TIG Welding, brazing, spot welding
- Apprenticeships for CFC polymechanics
- Participation to Mechanical Design Classes

## Number of customers



## Contact



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# ATPR

## MicroTechnique Workshop

5 Axis CNC machining of Complex Small Parts  
5 Axis Laser Cutting – Diamond Turning





## The facility

### 6 Employees

#### Laser Cutter:

- DMG Lasertec 20

#### Milling:

- Fehlmann VERSA 645 linear (5 axis)
- Brother Speedio S500X1 (5 axis)
- DMG ECO 635v (3-4 axis)

#### Lathes:

- Tsugami M06 SYE (4 axis)
- Schaublin 632-Y (4 axis)
- Nanotech Diamond Turning 250 UPL

Heat Treatments with Nabertherm furnace

Various flat milling, planing, drilling, sawing and other machines

## Key target groups

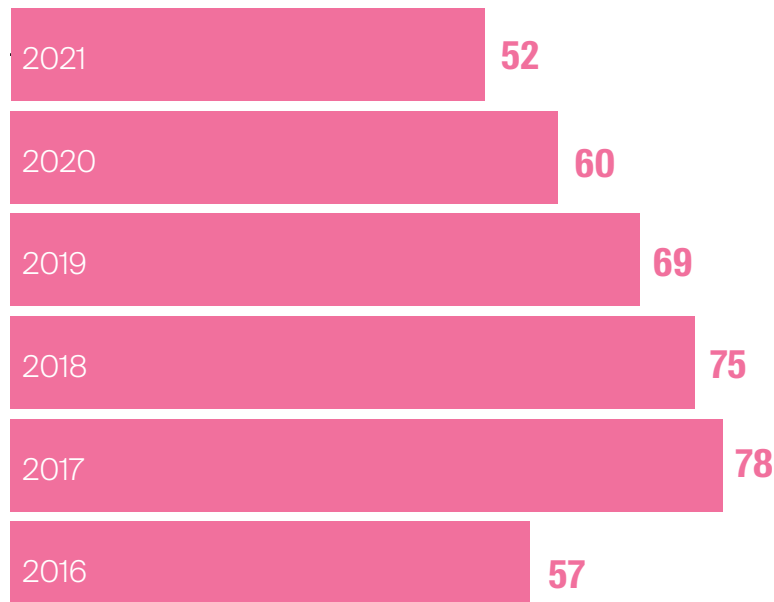
### Provide Manufacturing and Engineering services to:

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects

## Services

- Mechanical Engineering Consulting
- 5 Axis Laser Cutting (up to 2.5mm thick stainless steel)
- CNC Milling: 5 axis machining of complex small parts
- CNC Turning: machining of complex solids of revolution
- High Precision Diamond Turning
- Conventional milling, turning, drilling for quick turnaround
- Flat and cylindrical milling

## Number of customers



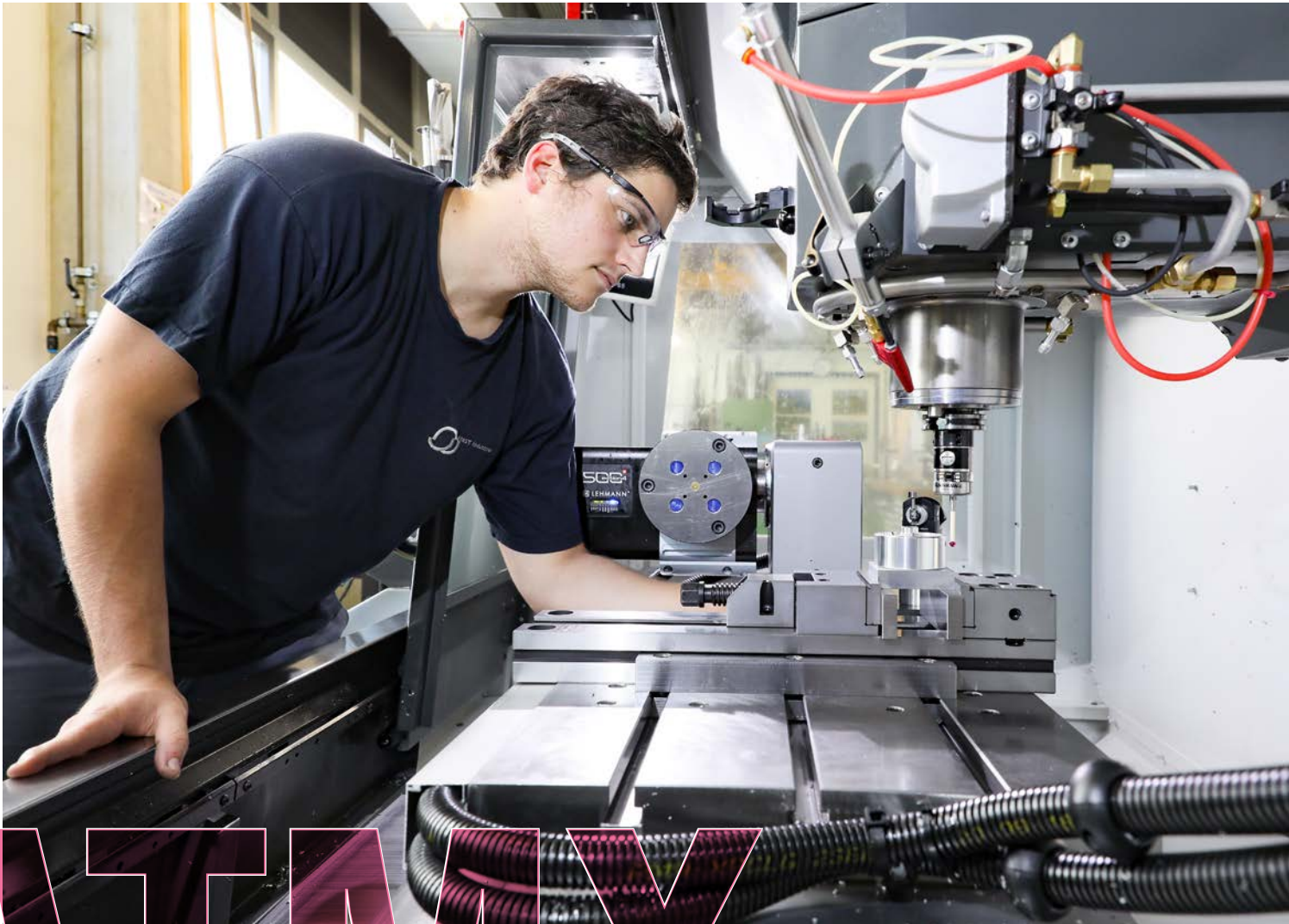
## Contact



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# ATMIX

## Materials Workshop

Electro-Erosion and Waterjet Cutting  
5 Axis CNC Machining of Complex Parts



## The facility

5 Employees – 2 Apprentices

### EDM:

- AgieCharmilles Form 20
- Fanuc Wire Robocut  $\alpha$ -0B,  $\alpha$ -C400iA

### Waterjet Cutting:

- OMAX 5555

### Milling:

- Aciera F5, Schaublin 53N
- Haas DT-1 (4 axis)
- VF-2SSYT (5 axis)
- UMC-500 (5 axis)

### Lathes:

- Haas ST-10Y (4 axis)
- Haas ST-20SSY (4 axis)
- Reiden R 200 – 2
- Schaublin 102 N – VM, 125 VM, 150

Various flat milling, grinding, drilling, sawing, folding and other machines - Welding, brazing

## Key target groups

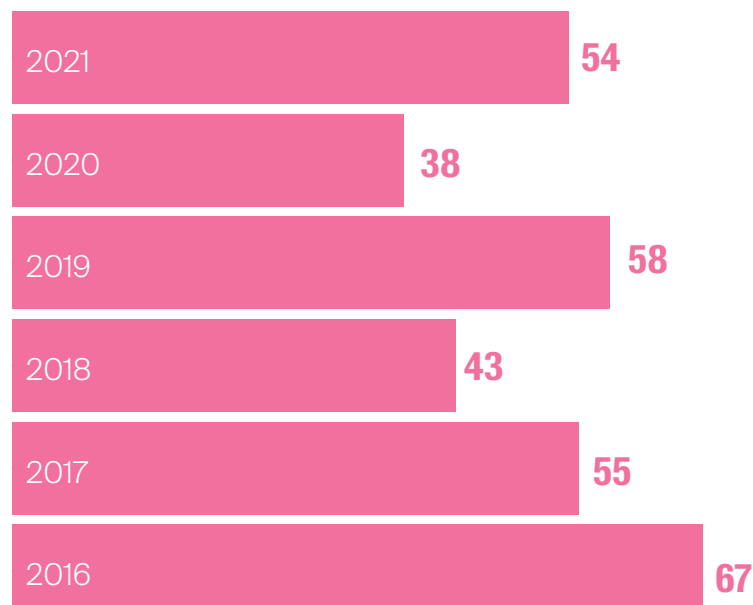
Provide Manufacturing and Engineering services to:

- EPFL and partner universities
- Laboratories
- Teaching Projects
- Make Projects
- Post-Doctoral, Doctoral, Master, Bachelor projects
- DLL (Practical Work for students)

## Services

- Mechanical Engineering Consulting
- 2 or 4 axis EDM (Electroerosion)
- Waterjet Cutting of complex 2D shapes and numerous material types
- CNC Milling: 5 axis machining of complex skew surfaces, 3D shapes, moulds
- CNC Turning: 4 axis machining of complex solids of revolution, specimens for material testing
- Conventional milling, turning, drilling for quick turnaround
- Flat and cylindrical grinding
- Aluminium and stainless steel MIG/MAG/TIG Welding, brazing, spot welding
- Ceramic Cutting
- Vacuum Pump Maintenance
- Apprenticeships for CFC Polymechanics

## Number of customers



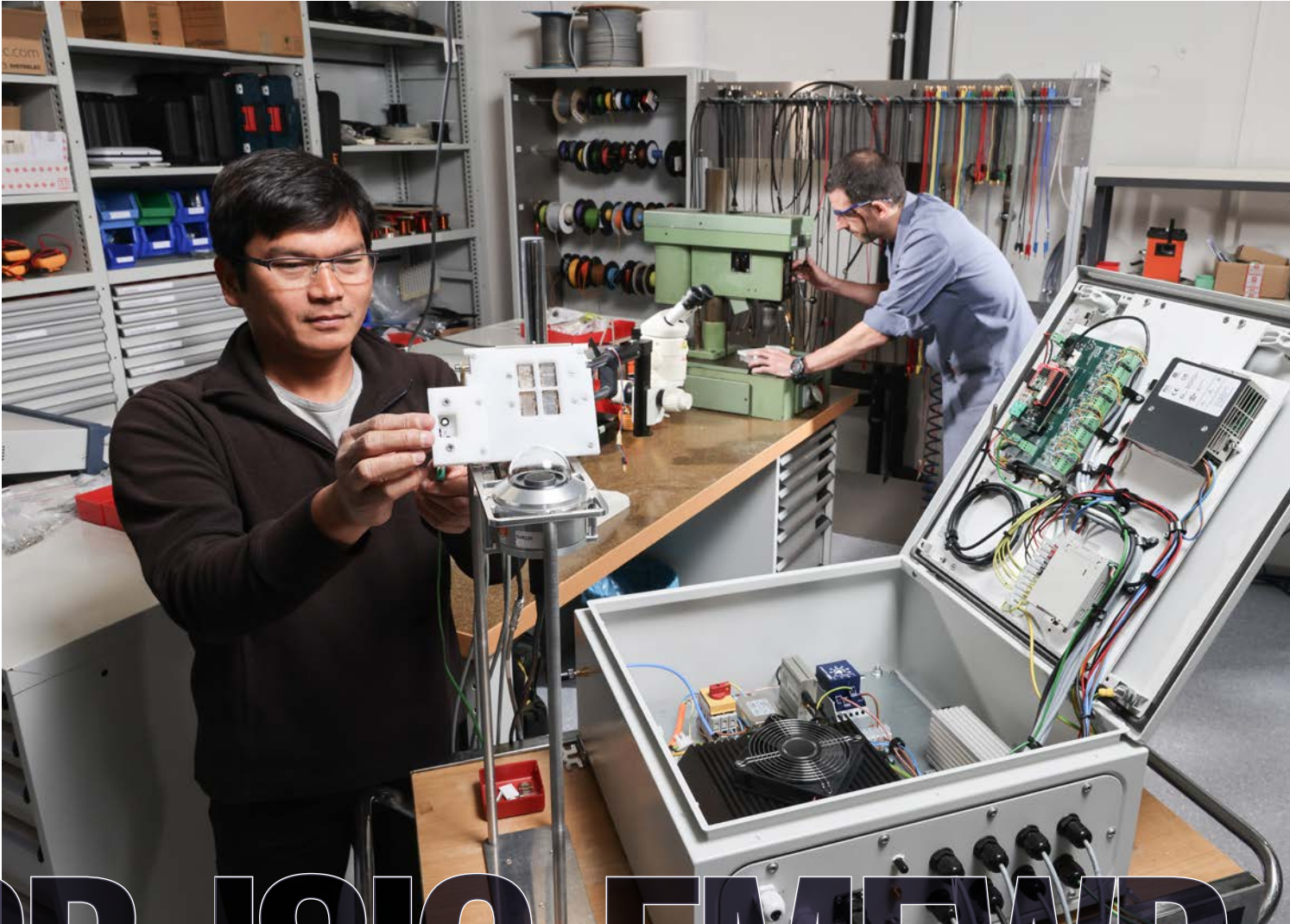
## Contact



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# SB-ESIC-EMEWP

## Electronic and Mechanical Engineering Workshops Platform

Technical development and engineering design, production, optimization and support



## The facility

### 18 staff members

- 9 Technical Employees
- 5 Electronic Engineers
- 4 Polymechnic Trainees

### Technical instruments

- Conventional Lathe
- Precision drilling and milling machines
- CNC multiaxis (3 to 6 axis)
- Electro-erosion
- Ultrasonic technology
- 3D printing machines
- Welding machines (Tig, plasma)

## Services

- Project development, prototyping, consultation and technical advices.
- Design & production of small and medium size instruments for rechearch projects.
- Modification and optimization of existing equipment.
- Repairing, support and maintenance of scientific equipment.
- Automation of data processes and acquisition.
- Providing small consumables such as batteries, extension cables, electric appliances.

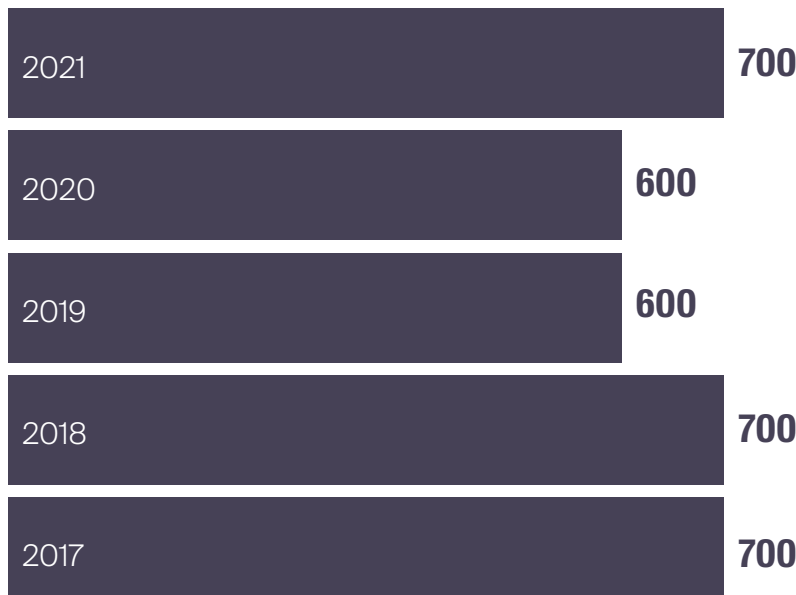
## Key target groups

More than 700 users, from academic research groups of ISIC-SB but as well from STI, SV and ENAC in Valais Wallis.

### More than 52 laboratories active in :

- Analytical Chemistry (ISIC)
- Chemical Engineering (ISIC)
- Inorganic Chemistry (ISIC)
- Organic Chemistry (ISIC)
- Physical Chemistry (ISIC)
- Renewable Energy (ISIC)
- Engineering (STI - Sion)
- Neuroscience (SV - Sion)
- Environmental Engineering (ENAC - Sion)

## Number of users



## Contact



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CMi

# EPFL Center of MicroNanoTechnology

The largest academic clean room in Europe where users carry out controlled processing of micro- and nanoscale structures



## The facility

1'400 m<sup>2</sup> of clean room  
21.4 FTE dedicated staff members

Over 20 years of expertise

Over CHF 50 M scientific equipment:

- E-Beam Writer
- DUV Stepper
- Photolithography
- Etching
- Thin films
- Metrology
- Packaging

## Services

Over 100 scientific equipment covering a very wide range of processes

- World-renowned professional infrastructure
- Process technology expertise
- Customized training
- Daily personalized support in the specific field of activity of each user
- Technical expertise of the equipment
- Security and safety

## Key target groups

- 600 Users
- 100 laboratories

Many EPFL laboratories :

- School of STI : IBI, IEL, IGM, IMT, IEM
- School of FSB : IPHYS, ISIC, SPC
- School of FSV : BMI, GHI, IBI, ISREC
- School of ENAC : IIC IIE

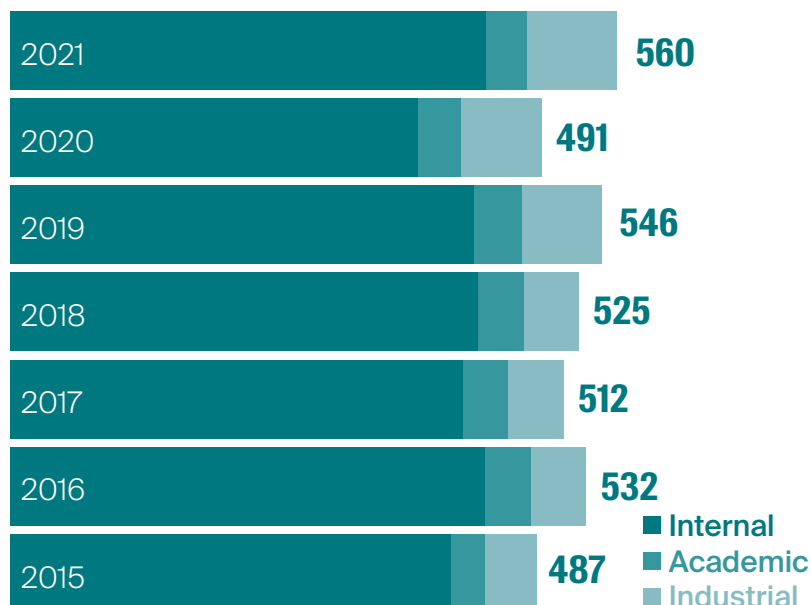
External : AMI, CERN, CSEM, EMPA, ETHZ, PSI, UNIGE, UNIFR, WYSS, CHUV

60 start-ups, SMEs, large companies

## Major publications

1. Armin Feist, et al. *Kippenberg, & Claus Ropers (2022). Cavity-mediated electron-photon pairs. Science, 377(6607), 777-780.*
2. J. Bues, et al. *Deterministic scRNA-seq captures variation in intestinal crypt and organoid composition, Nature Methods. 2022-02-14.*
3. T.-H. Shen, et al. *Switchable wetting of oxygen-evolving oxide catalysts, Nature Catalysis. 2021. Vol. 5, p. 30.*
4. N. Gjorevski, et al. *Tissue geometry drives deterministic organoid patterning, Science, 7 Jan 2022, Vol 375, Issue 6576.*
5. E. Nitiss, et al. *Optically reconfigurable quasi-phase-matching in silicon nitride microresonators, Nature Photonics. 2022-01-06.*

## Number of users



## Contact



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# PHYS-AT-PH -AT-BSP

## Electronic and Mechanical Engineering Workshops

Development, construction, assembly of original and complex components of scientific installations





## The facility

### 14 dedicated staff members

- Over 45 years of experience and practice.
- The mechanical workshops of IPHYS are equipped with several types of machines and have significant know-how in several fields of application such as:
  - Project studies and designs
  - Conventional and CNC 3, 4 and 5-axis milling and turning (large machining capacities)
  - TIG and Plasma welding
  - Laser cutting (Plexiglas, wood, cardboard but not metal)
  - EDM machining equipments
  - Various measurements and assemblies
  - Training of apprentices

## Key target groups

### More than 400 users

- 47 IPHYS laboratories.
- Support for specific EDM works: STI, ISIC, SPC, ENAC.
- Support in specific laser cutting works: STI, ISIC, SPC, Startups.

## Services

- Studies, designs and technical advices in relation to your project.
- Support and technical advices to doctoral students in their research projects and Masters.
- Expertise in UHV and cryogenics components.
- Expertise in development and construction (CAD CAM).
- Assembly of complex systems (mounting, gluing, welding, etc.).

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# IPHYS-CRP

## Clean Room of micro and nano fabrication

Cleanrooms of the School of Basic Sciences managed by the Institute of Physics «IPHYS». Micro-nano-fabrication facilities for advanced research projects.



## The facility

180 m2 of clean room  
2.0 FTE dedicated staff members  
Over 25 years of expertise

Over CHF 2.3 M scientific equipment:

- Deep-UV Photolithography
- Dry-Etching
- Thin films deposition
- Metrology / Characterization

## Services

20 scientific tools covering a wide range of processes.

- Professional infrastructure-Expertise in process technology
- Customised training
- Daily support tailored to the specific field of activity of each user.
- Technical expertise in equipment
- Safety and security

## Key target groups

- 90 Users
- 31 laboratories

Many EPFL laboratories :

- School of SB : IPHYS, ISIC, SPC
- School of STI : IBI, IEL, IGM, IMX, IMT
- School of SV : BMI, GHI, IBI, ISREC
- School of ENAC : RESSLAB

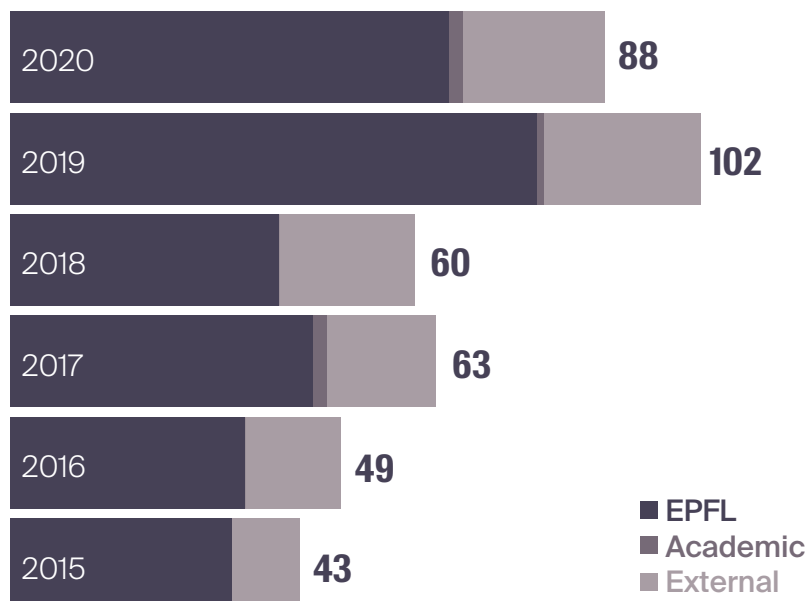
External : CERN, CSEM, EMPA, UNIGE, UNI SUSSEX

24 startups, PME, large companies

## Major publications

1. Stachurski J. et al. **Single photon emission and recombination dynamics in self-assembled GaN/AlN quantum dots.** *Light Sci Appl* 11, 114 (2022)
2. A. Siddharth, T. et al. **Near ultraviolet photonic integrated lasers based on silicon nitride.** *APL Photonics* 7, 046108 (2022)
3. Z. Li, et al. **"Tightly confining lithium niobate photonic integrated circuits and lasers"**. *arXiv:2208.05556*, 2022
4. L. Grigory et al. **"Low-noise frequency-agile photonic integrated lasers for coherent ranging"**, *Nat. Comm.* 2022

## Number of users



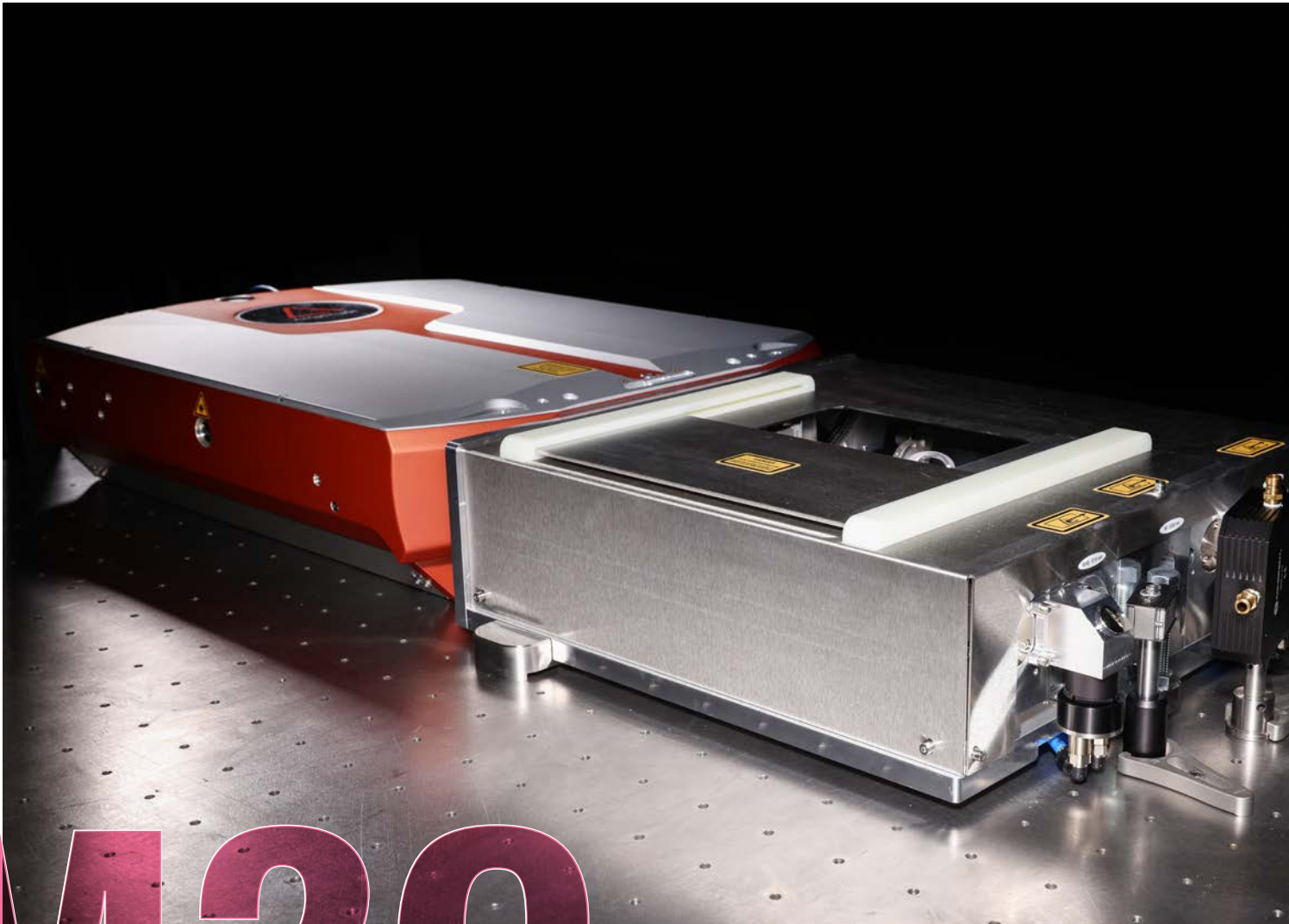
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# M2C

## Micro-manufacturing Science and Engineering Center

Technology platform for research in free-form manufacturing technologies for micro-engineering applications and smart systems



## The facility

### Laser powder bed fusion metal 3D printing

- D 100 mm x H 100 mm building volume
- Precious and reactive metals capable
- 200 Watt, D 30 μm, 1070 nm laser spot

### Femto-second laser source and platform

- 100 W with 2nd & 3rd harmonics
- 220 mm XY and 6 mm Z high-precision platform

### Pick & place tool micro-assembly tool

- 6 + 1 DoF hexapod platform for placing and bonding
- < 10μ precision

Additional equipment for covering the whole value chain in high-precision free-form manufacturing to come in 2022 (material preparation, fabrication tools and characterization instruments)

## Services

- Design for Additive Manufacturing,
- Fabrication of 3D printed samples in a large variety of metals and alloys,
- Fabrication of 3D printed samples combining polymers and conductive tracks,
- Free form manufacturing and processing in transparent materials,
- Surface nano & micro-structuring,
- Micro assembly on complex topographies,
- Physical characterization of materials
- Mechanical characterization of parts from submicron to cm scales

## Key target groups

### EPFL and CSEM researchers active in :

- Metallurgy and materials science,
- Design for Additive Manufacturing,
- Multi-material free-form manufacturing,
- Functional integration & customization
- High-precision assembly,

In parallel, thanks to the capabilities provided by its partners and the technology platform, the M2C aims to foster multidisciplinary projects and collaborations between industry and academia

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**New facility,  
no data available yet**



# PTBET

## Bioengineering and Technology Facility

The PTBET started its activities in Spring 2021 with the goal to enable translational research through bioengineering and technology.



## The facility

- The PTBET aims to serve as a bidirectional bridge between the biomedical and EPFL research communities.
- As a center of expertise in translational bioengineering, the PTBET facility aims to enable innovation, support research and federate the wider interdisciplinary community active in translational bioengineering.
- The facility encompasses educational activities, research and development, and an open-access facility infrastructure to support your research needs.

## Services

- Advanced cellular models development: organoids, organ-on-chips, and tissue explants.
- Microphysiological and microfluidic systems: design, prototyping and implementation.
- Assay developments: biological process automation, long-term timelapse 3D high-content and high-throughput imaging.

## Key target groups

- Located in the AGORA Cancer Research Center next to the CHUV hospital in Lausanne, the facility caters to translational researchers from the partner institutions: EPFL, CHUV, Unil, HUG, UniGe and Ludwig Cancer Research.
- The facility welcomes external partners from pharma, industry and start-ups.

**New facility,  
no data available yet**

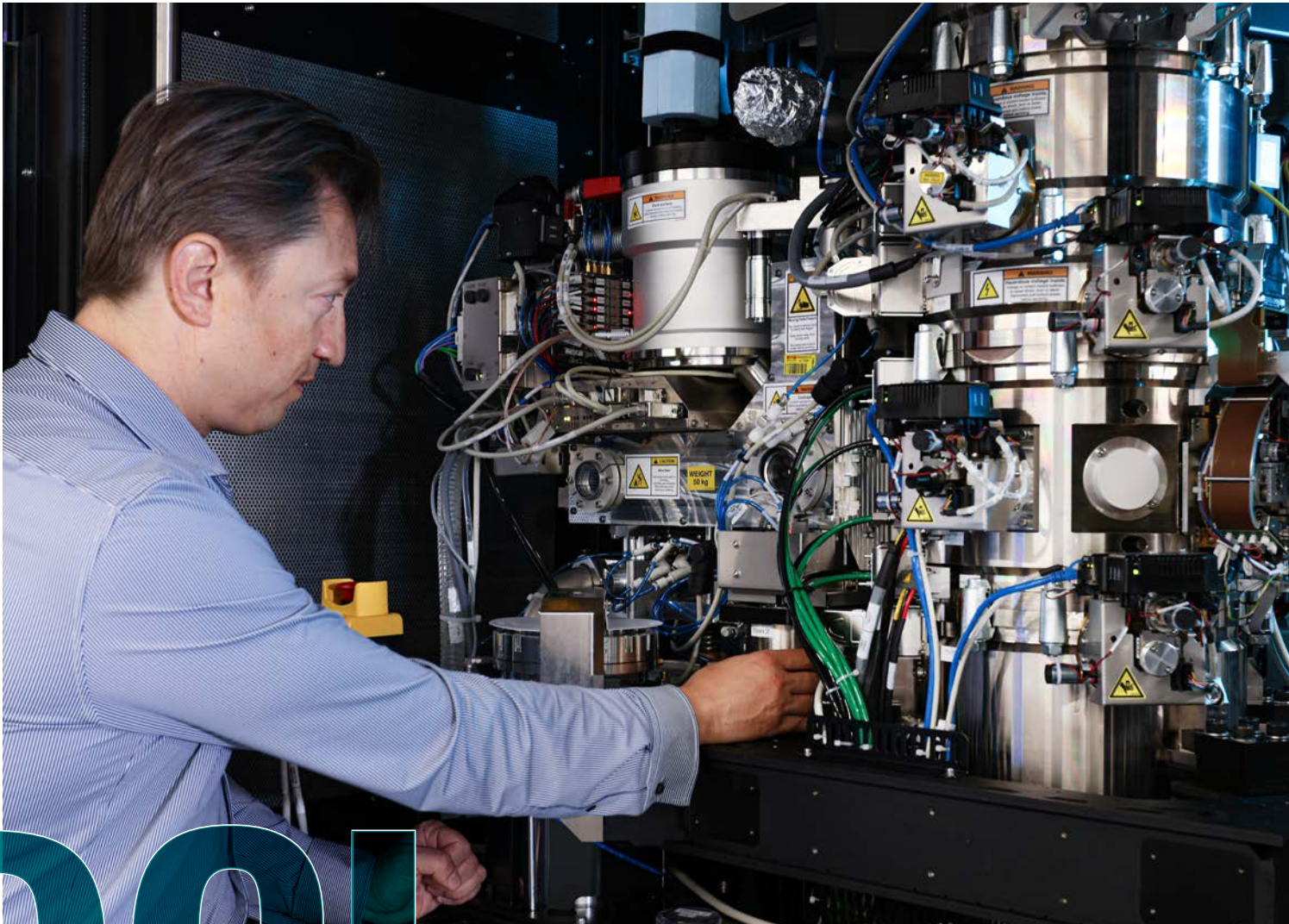
## Contact



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DCI

# Dubochet Center for Imaging

The Dubochet Center for Imaging provides outstanding cryo-electron microscopy technologies with high-resolution data collection and fast image processing





## The facility

4 cryo-EM specialists with more than 10 years of experience

We are open since 22 November 2022

3 microscopes at the Lausanne campus

- 2 Titan Krios G4 (300kV, C-FEG, SelectrisX, Falcon4) for high-resolution data collection
- 1 Glacios (200kV, X-FEG, Falcon4) for high-throuput screening

3 microscopes at DCI-Geneva campus

- G2 Sphera (200KeV, LaB6)
- Talos L120C (120 KeV, LaB6)
- Talos Arctica (200 KeV, X-FEG)- 1 TEM

## Services

- Optimization of freezing conditions
- Advice on use of electron microscopy for targeted research questions.
- Training on electron microscopes and data processing software.
- Electron microscopy “full-services” (sample preparation, freezing optimization, high-resolution data collection, structure and model building)
- Organization of theoretical/practical courses and project-oriented training
- On-the-fly image processing

## Key target groups

- >300 Users
- Pls: group leaders, professors
- Researchers at EPFL/UNIL/UNIGE: postdocs, staff scientists,
- Students at EPFL/UNIL/UNIGE: bachelor, master and PhD level.

**Additional groups:**

- Scientists from Switzerland and EU
- Pharmaceutical Companies

## Major publications

1. Tafur, L., Hinterdorfer, K., Gabus, C. et al. **Cryo-EM structure of the SEA complex**. *Nature* (2022). <https://doi.org/10.1038/s41586-022-05370-0>
2. Babatunde Ekundayo, Davide Torre, Bertrand Beckert, Sergey Nazarov, Alexander Myasnikov, Henning Stahlberg, Dongchun Ni. **Structural insights into the regulation of Cas7-11 by TPR-CHAT**. *Accepted in Nature Structural and Molecular Biology*, 2022.
3. Pacesa, M., Loeff, L., Querques, I. et al. **R-loop formation and conformational activation mechanisms of Cas9**. *Nature* 609, 191-196 (2022).

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New facility,  
no data available yet



# CiME

## Interdisciplinary Centre for Electron Microscopy

Imaging and Spectroscopy for characterisation  
of materials, cells and molecules



## The facility

9.7 dedicated staff members

Over 40 years of expertise

14 microscopes on the Lausanne campus

- 3 SEM
- 7 TEM
- 3 FIB
- 1 CL SEM

2 microscopes on the Sion campus

- 1 SEM
- 1 TEM

## Services

Advice on use of electron microscopy for targeted research questions, training on electron microscopes and data processing software.

- **Feasibility studies:** evaluation on feasibility, demonstration of sample preparation, setting up of new/customized experimental procedures and initial measurements. Scientific support for data processing and data analysis. Mostly for short projects and/or risky/new projects (researchers and PIs).
- Electron microscopy “full-services” (sample preparation, conduction of experiments and data processing/analysis)
- **Students:** theoretical courses and project-oriented training, regular courses

## Key target groups

- 300 Users
- PIs: MER, group leaders, professors
- Researchers at EPFL: postdocs, staff scientists, MER
- Students at EPFL: bachelor, master and PhD level.

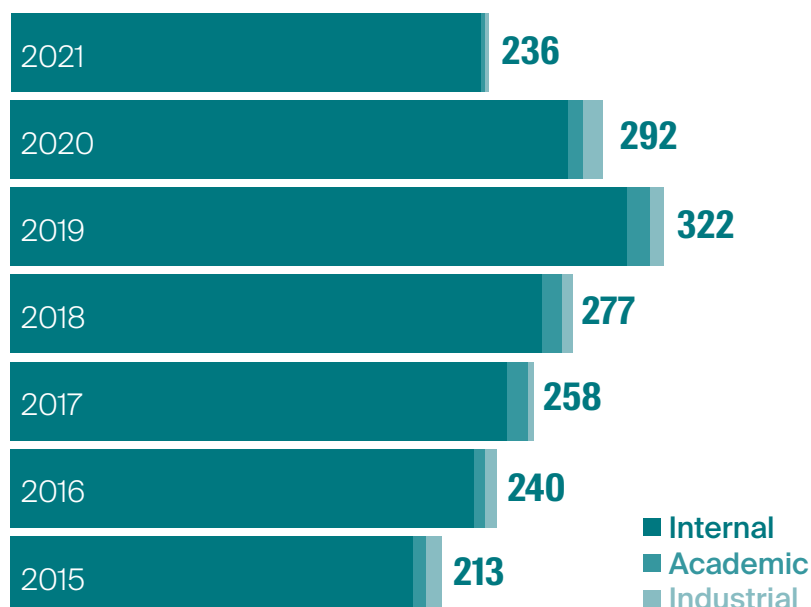
**Additional groups:**

- Scientists at Swiss or other Universities
- Companies

## Major publications

1. Luis Francisco Villalobos et al. **Bottom-up synthesis of graphene films hosting atom-thick molecular-sieving apertures**, *PNAS* 2021 Vol. 118 No. 37 e2022201118;
2. Alberto Beccari et al. **Strained crystalline nanomechanical resonators with ultralow dissipation**, <https://arxiv.org/abs/210702124>
3. Marco Cantoni and Lorenz Holzer. **Advances in 3D focused ion beam tomography**, *MRS BULLETIN • VOLUME 39 • APRIL 2014*, DOI
4. Craig Fenwick et al. **A highly potent antibody effective against SARS-CoV-2 variants of concern**, *Cell Reports Volume 37, Issue 2, 12 October 2021, 109814*
5. Jianfeng Huang et al. **Potential-induced nanoclustering of metallic catalysts during electrochemical CO<sub>2</sub> reduction**, *NATURE COMMUNICATIONS | (2018) 9:3117; DOI: 10.1038/s41467-018-05544-3*

## Number of user



## Contact



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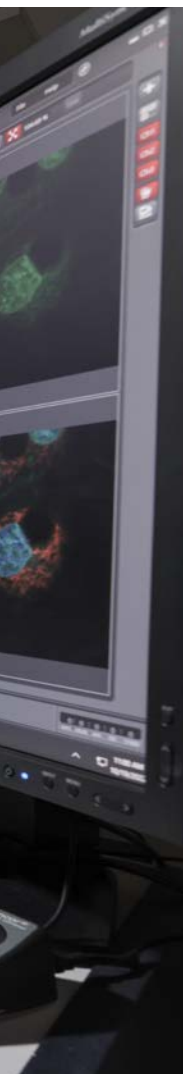
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# PTBIOP

## Bioimaging and Optics Facility

The PTBIOP facility provides cutting edge instrumentation and expertise in light microscopy and image analysis.



## The facility

**PTBIOP's team is composed of 7 (6.7 FTEs) specialized staff members.**

The PTBIOP provides access to cutting edge light microscopes covering in particular the needs of scientists in life sciences:

- 7 point scanning confocal microscopes
- 2 multiple beam scanning confocal microscopes
- 3 wide-field scopes equipped for live cell imaging
- 2 slide scanners
- STED, SIM, FLIM, STORM setups
- Light-sheet and Lattice light-sheet systems
- 4 image processing work-stations

## Services

- The PTBIOP provides high level expertise in light microscopy and state of the art image analysis tools.
- The team offers training and consultation on designing, running and analyzing experiments using light microscopy.
- The team also participates in the teaching of multiple Master and PhD courses in microscopy and image processing.

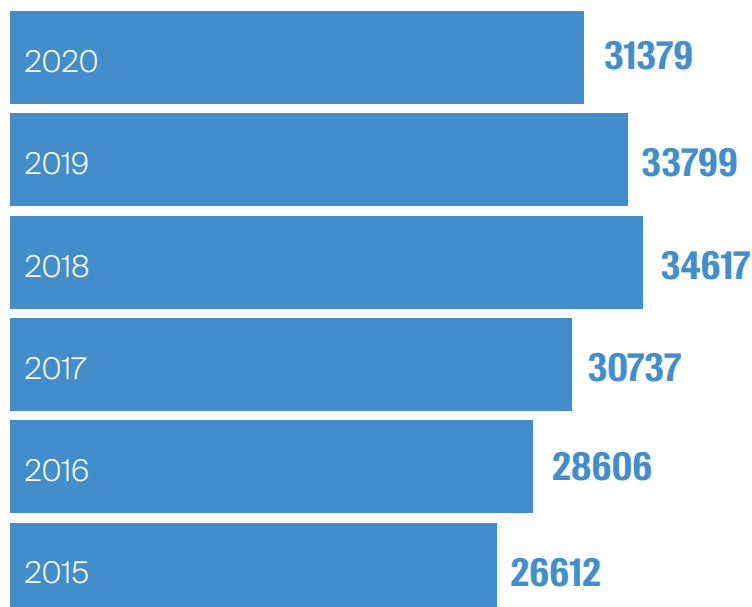
## Key target groups

- Around 400 users per year including Master students, PhD students, postdocs and senior scientists
- 90 different laboratories including EPFL faculties of SV, STI, SB, ENAC and scientists from Swiss universities and companies.

## Major publications

1. Boehm U, et al. **QUAREP-LiMi: a community endeavor to advance quality assessment and reproducibility in light microscopy.** *Nat Methods*, 2021, in press
2. Guiet R, et al. **DEVILS: a tool for the visualization of large datasets with a high dynamic range.** *F1000Research*, 9:1380, 2020
3. Battistella C, et al. **Cellular Uptake and Intracellular Trafficking of Poly(N-(2-Hydroxypropyl) Methacrylamide).** *Biomacromolecules*, 20: 231-242, 2019
4. Laroche T, et al. **Development of Sample-Adaptable Holders for Lightsheet Microscopy.** *Front Neuroanat*, 13: 26, 2019
5. Burri O, et al. **TRACMIT: An effective pipeline for tracking and analyzing cells on micropatterns through mitosis.** *PLoS One*, 12: e0179752, 2017

## Instrument usage hours



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# CIBM

## Center for Biomedical Imaging

Multimodal Imaging (MRI, PET, Microscopy) and Spectroscopy (EEG, MRS, EPR, UV-Vis-NIR) for Clinical and Preclinical interdisciplinary studies



## The facility

CIBM is an inter-institutional research center and platform founded in 2004 by EPFL, UNIL, UNIGE, CHUV and HUG. The **30 dedicated staff members** provide expertise in EEG, MRI, PET, Signal Processing and access to state-of-the-art infrastructure.

### EPFL:

- 7T MRI (head only)
- 9.4TMRI , 14.1TMRI
- MR Spectroscopy
- RF Technology lab for MRI coil development
- Neurochemistry Lab with P2 subunit , 2 high-resolution Brightfield & Fluorescence microscopes and bench-top EPR EMXnano

**CHUV** : 3T MRI, EEG ---> 0.55T MRI arriving in 2023

**HUG** : 3T MRI, PET

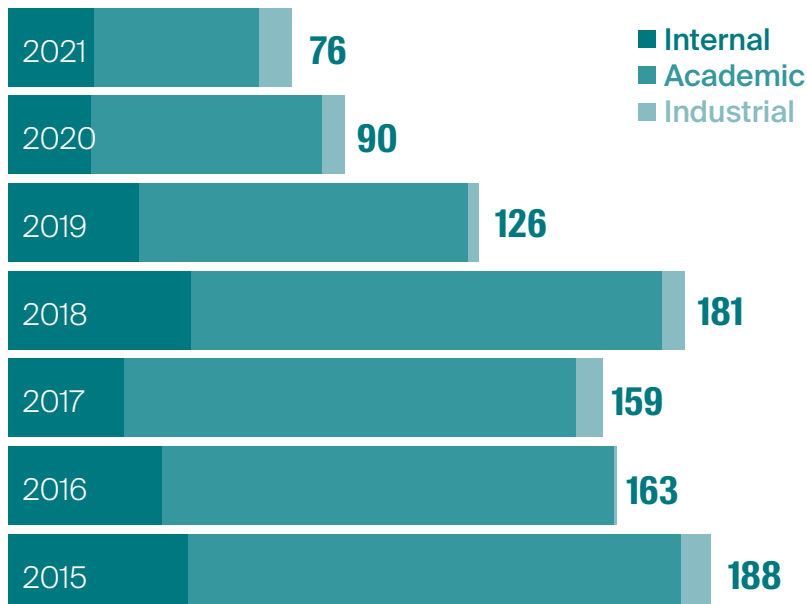
**UNIGE** : 3T MRI, EEG

**Campus Biotech** : 7T MRI (full body CE marked)

## Major publications

1. *Pierzchala et al. Central nervous system and systemic oxidative stress interplay with inflammation in a bile duct ligation rat model of type C hepatic encephalopathy - Free Radical Biology and Medicine*
2. *De Matos et al. Gd3+-Functionalized Lithium Niobate Nanoparticles for Dual Multiphoton and Magnetic Resonance Bioimaging - ACS Appl. Nano Mater.*
3. *Wenz et al.. Dipole-fed rectangular dielectric resonator antennas for magnetic resonance imaging at 7T: The impact of quasi-transverse electric modes on transmit field distribution - Frontiers in Physics*

## Number of users



## Key target groups

Researchers, scientists, academics and clinicians, as well as students at the bachelor, master and PhD level from EPFL, UNIL, UNIGE, CHUV and HUG.

### Additional groups:

- Other Swiss and international academic Institutions
- Start-ups, SME and MultiNational Companies (MNC)

## Services

- Advice on project feasibility, practical training on use of the equipment and safety rules, set-up of protocols and experiments, data acquisition and analysis, as well as data management
- Set-up of fMRI and PET paradigms
- Spectroscopy acquisition, analysis and interpretation
- Supervision and analysis of MR spectroscopy and fMRI for clinical diagnosis or presurgical evaluation
- Advice and administration of the regulatory and ethical requirements in accordance with Swiss law on human research and animal experimentation
- Provision of professional radiographers for clinical trials
- Provision of veterinarians and animal physiologists for preclinical trials
- Dev. of anesthesia protocols, experim./surgical models
- Molecular/cellular biology expertise and histochemistry/immunohistochemistry
- Disease characterization and modeling
- Preclinical drug testing (MRS/MRI/PET/EPR)
- RF coil development
- Phantom designing for the MRI contrast agent testing, MRS modeling and RF coil testing
- Oxidative stress detection in healthy and disease

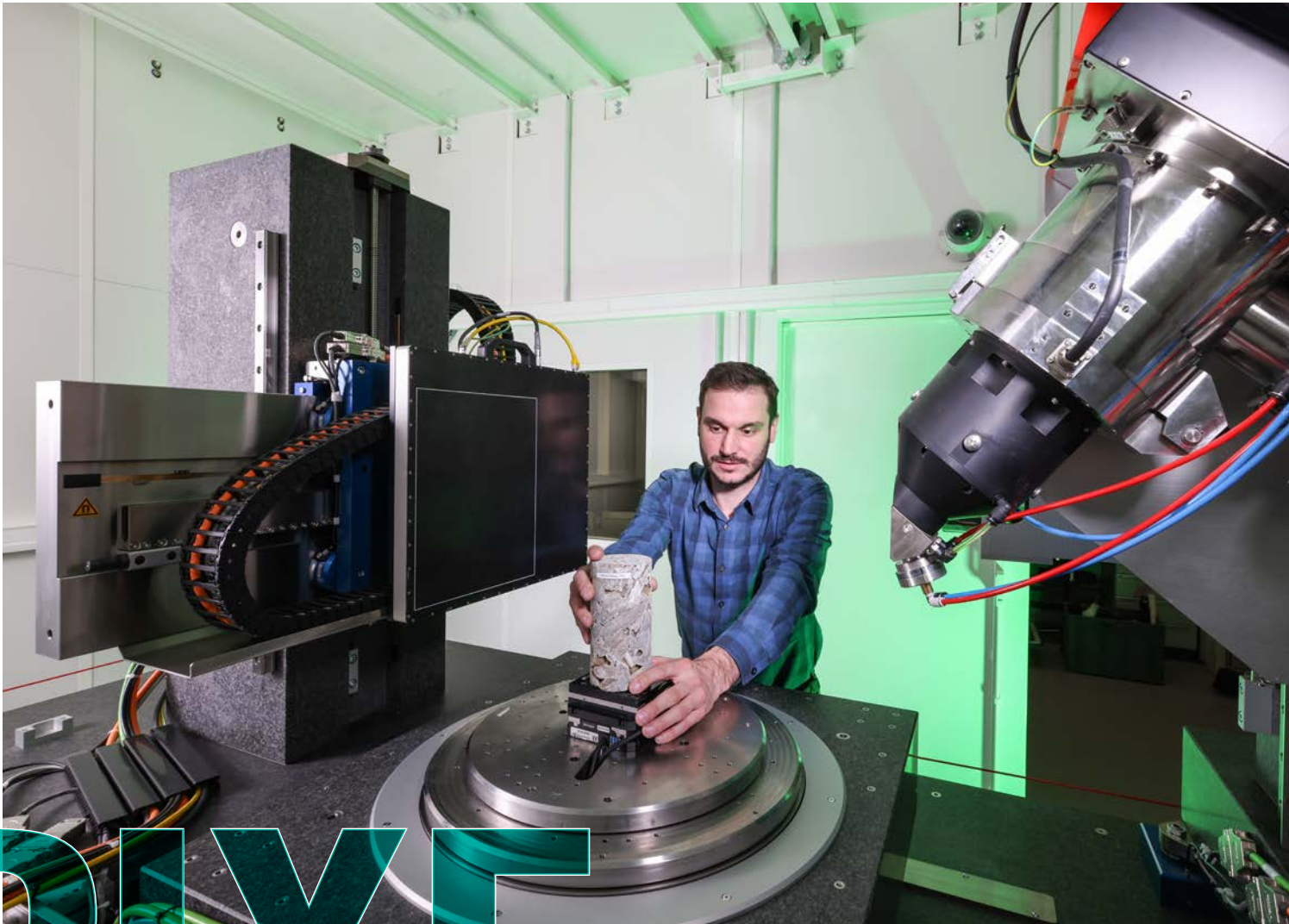
## Contact



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# PIXE

## Interdisciplinary Platform for X-ray micro-CT

A new X-ray micro-CT platform dedicated to the visualization and characterization of natural and engineered materials





## The facility

- An ultra high performance micro-CT system (Ultratom with dual X-ray tubes 230/160 kV).
- A dedicated technical specialist.
- Expertise with various natural and engineered materials
- Force cells for in situ mechanical testing.
- Dedicated graphical stations for image analysis.
- 3D visualisation and post-processing software with advanced features

## Services

- Advice on use of micro-CT for targeted research questions
- Feasibility studies: evaluation on feasibility, sample preparation, setting up of new/customized experimental procedures and measurements.
- Scientific support for data processing and data analysis.
- Students: project-oriented training

## Key target groups

### EPFL labs or research groups

- PI: professors, MERs, group leaders.
- Researchers: postdocs, scientific collaborators.
- Students: at bachelor, master and PhD levels.

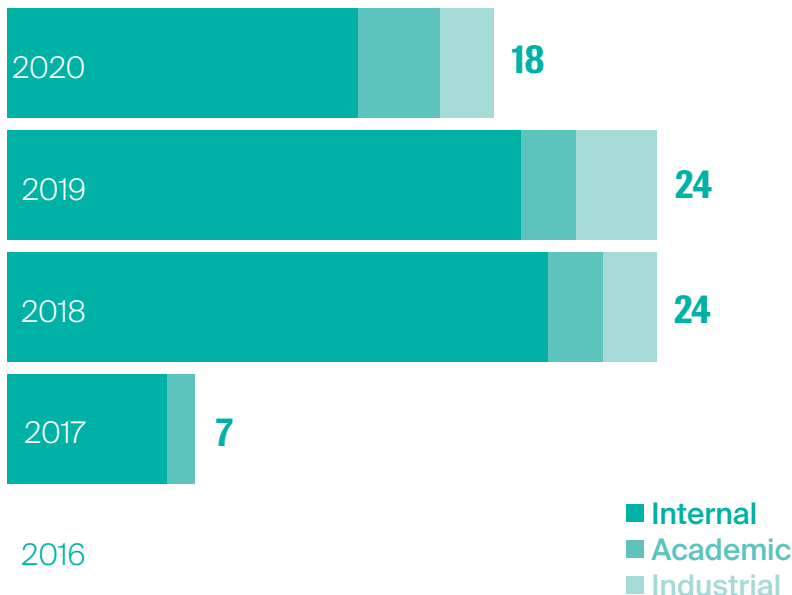
### Additional groups:

- Other academic institutions.
- Companies.
- Museums, Art centers,...

## Major publications

1. **Neuromechanics:** Lobato-Rios, et al. *NeuroMechFly, a neuromechanical model of adult Drosophila melanogaster*. *Nat Methods* 19, 620–627 (2022).
2. **CO2 Captation:** Stavropoulou, E., Laloui, L. *Evaluating CO2 breakthrough in a shaly a caprock material: a multi-scale experimental approach*. *Sci Rep* 12, 10706 (2022).
3. **Rocks:** Vasileios Giamas, et al. *Effectiveness of X-ray micro-CT applications upon mafic and ultramafic ophiolitic rocks*, *Micron*, 10.1016/j.micron.2022.103292, 158, (103292), (2022).
4. **Soils:** Le Bayon, et al. *Use of X-ray microcomputed tomography for characterizing earthworm-derived belowground soil aggregates*. *Eur J Soil Sci.* 2021; 72: 1113–1127.
5. **Soil mechanics:** Terzis, D., Laloui, L. *3-D micro-architecture and mechanical response of soil cemented via microbial-induced calcite precipitation*. *Sci Rep* 8, 1416 (2018).

## Number of users



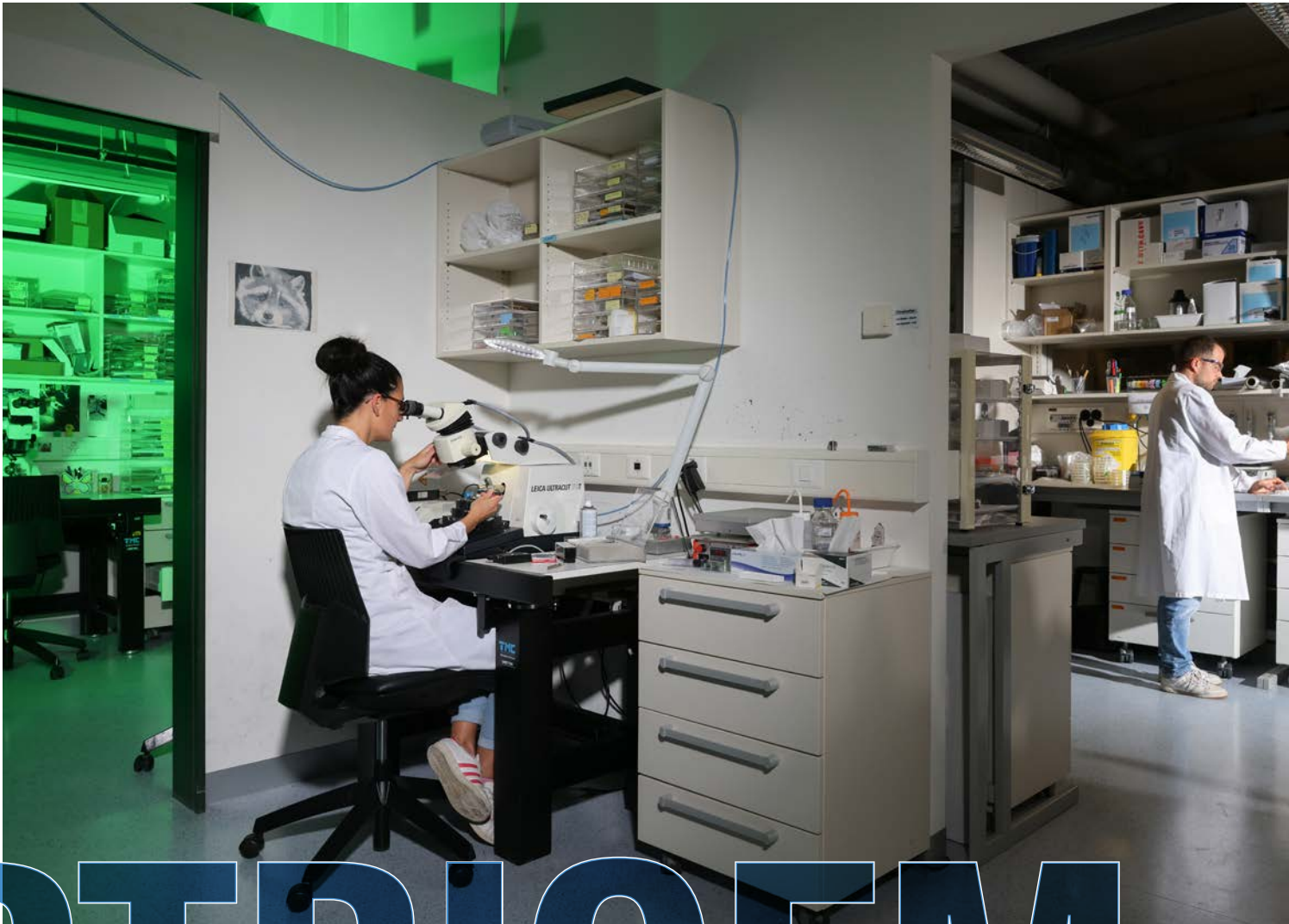
## Contact



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# PTBIOEM

## Biological Electron Microscopy Facility

The PTBIOEM facility specializes in the preparation and imaging of all types of biological samples using scanning and transmission electron microscopes.



## The facility

- The PTBIOEM is part of the Faculty of Life Sciences and is situated in the Life Sciences AI building.
- The facility houses equipment, and space for preparing cells, tissues, and organs for all forms of electron microscopy, as well as 5 (4.6 FTEs) staff expert in all techniques.

## Services

The PTBIOEM offers service, training and advice on the preparation and imaging of biological samples with scanning and transmission electron microscopy which is done in collaboration with the Interdisciplinary Center for Electron Microscopy.

These projects include techniques such as:

- chemical and cryo-fixation
- Immunocytochemistry
- correlative light and electron microscopy
- block face scanning electron microscopy
- cryo-immuno electron microscopy

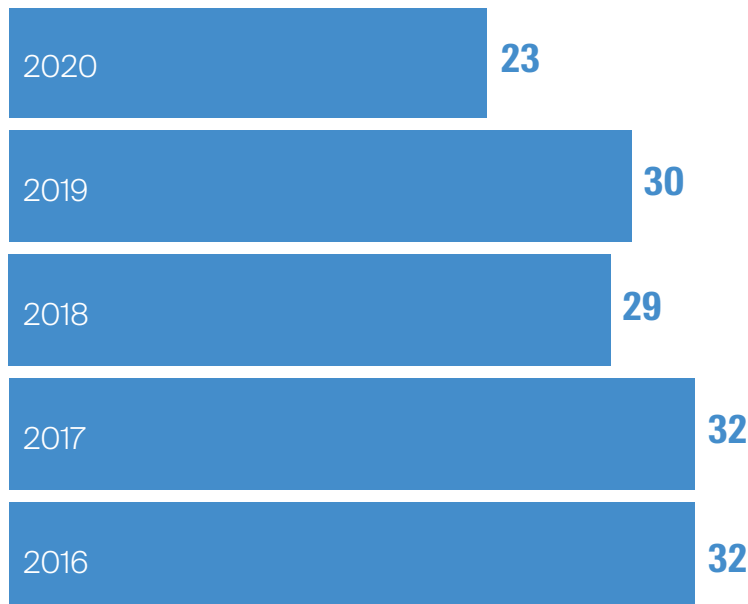
## Key target groups

The PTBIOEM is used by research groups across the entire EPFL campus needing help in preparing or imaging biological material with electron optics.

## Major publications

1. *Balestra F.R., et al. TRIM37 prevents formation of centriolar protein assemblies by regulating Centrobin. Elife, 10: e62640, 2021*
2. *Sharma K., et al. Early invasion of the bladder wall by solitary bacteria protects UPEC from antibiotics and neutrophil swarms in an organoid model. Cell Rep, 36: 109351, 2021*
3. *Bacq A., et al. Amygdala GluN2B-NMDAR dysfunction is critical in abnormal aggression of neurodevelopmental origin induced by St8sia2 deficiency. Mol Psychiatry, 25: 2144-2161, 2020*
4. *Zeng Q., et al. Synaptic proximity enables NMDAR signalling to promote brain metastasis. Nature, 573: 526-531, 2019*
5. *Van der Henst C., et al. Molecular insights into Vibrio cholerae's intra-amoebal host-pathogen interactions. Nat Commun, 9: 3460, 2018*

## Number of projects



## Contact



Contact  
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# IC-IT

## IC - Cluster

The IC Cluster is a flexible infrastructure aiming at offering computing and storage services to researchers. Projected services range from bare-metal to containers



## The facility

The current infrastructure comprises:

- 7500 Cores
- 500 GPUs
- 1.5 PB raw capacity to store datasets readable in S3
- 100 TB of NVMe dedicated to the scratch volume

Nearby the users, the IT Team from IC School helps the researchers to achieve their goals providing customized solutions

## Services

Hardware as a Service (HaaS) provides you with a self-service portal to provision physical servers that you can personalize. Root access is possible, giving you full flexibility for the operating system (OS) or packages to install.

Containers as a service (CaaS) provides our researchers to upload, organize, run, scale they workloads using container-based virtualization. With a pay-per-use model our users can quickly allocate and deallocate computational resources.

## Key target groups

IC, CDM and CDH people with a field of research in:

- Artificial intelligence
- Machine learning
- Computer vision
- Signal & image processing
- Data Sciences

## Statistics

**CaaS:**

- + 25 labs
- 100 users
- 650 jobs per week
- Workloads between 0-8 GPUs

**HaaS:**

- Servers with 1.5TB of memory
- 1300 Reservations in 2021
- 250 distinct users

**Datasets:**

- 25 datasets totalling around 200TB
- Stored on a distributed object store based on Ceph.
- Access is possible using the S3 protocol

## Contact



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# SCITAS

## Scientific IT & Application Support

Provides access to scientific equipment, operational expertise as well as professional software development in high-performance computing



## The facility

- **30k cores and 148 GPUs available** for massively parallel, state of the art computing resources for scientific computing and HPC
- **19.45 FTE dedicated staff members** with over 10 years of expertise

## Services

### Maintenance and access to high-performance hardware:

- server-grade microprocessors and GPUs
- high bandwidth, low latency network
- 6 PB of high throughput, shared, parallel filesystem for storage
- User oriented performance software ecosystem services
- Professional high-performance software development and engineering services
- Gateway for national and international resource access

## Key target groups

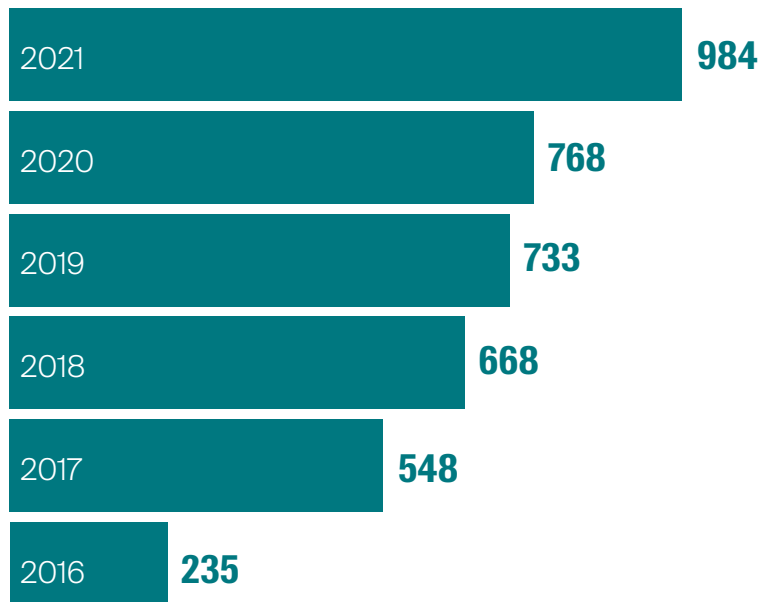
### 100+ EPFL labs, 750+ Users from:

- Fundamental Sciences and Engineering
- Artificial intelligence, Machine learning
- Life Sciences
- Visualization and Data Sciences
- Master and Ph.D. students

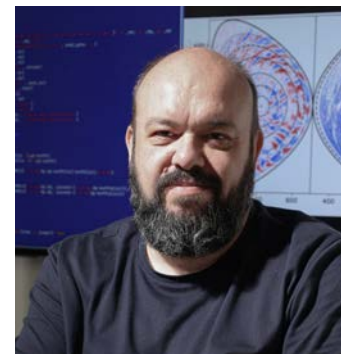
## Major publications

1. *D Rossinelli et al. High-Throughput Lossy-to-Lossless 3D Image Compression, IEEE Transactions on Medical Imaging, 2021*
2. *C Schäfer et al. Lenstool-HPC: A High Performance Computing based mass modelling tool for cluster-scale gravitational lenses, Astronomy and Computing, 2020*
3. *D. S. Oliveira et al. Validation of edge turbulence codes against the TCV-X21 diverted L-mode reference case, Nuclear Fusion, 2022*
4. *S. Zhang et al. Numerical evaluation of test setups for determining the shear strength of masonry, Materials and Structures, 2018*
5. *D. Crichton et al. Hydrogen Intensity and Real-Time Analysis Experiment: 256-element array status and overview, Journal of Astronomical Telescopes, Instruments, and Systems, 2022*

## Number of users



## Contact



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# BICC

## Bioinformatics Competence Center

The BICC, which started its activity in 2019, has the expertise to offer and develop customized data analysis that go beyond standard protocols.





## The facility

- an inter-institutional Center part of the Faculty of Life Sciences (EPFL) and Faculty of Biology and Medicine (UNIL).
- Its main mission is to offer researchers at UNIL, EPFL, and their partner institutions access to highly qualified resources in the field of bioinformatics for all aspects related to treatment and analysis of data.
- It is situated in AAB and Genopode buildings.
- The facility is composed of 12 persons (8 FTE), providing services for punctual as well as long term collaborative research.

## Services

The BICC is currently dealing with requests as diverse as the analysis of RNAseq data, methylation, ChipSeq, Hi-C, alternative splicing, genome assembly, the analysis of flow or mass cytometry data, the analysis of the effects of mutations on proteins, the detection of mutations in tumors, proteomics, lipidomic, metabolomics, some image analysis projects, as well as various data formatting, aggregation and presentation, for example as custom websites.

## Key target groups

- Groups which lack internal bioinformatics support or require specialized skills not found internally
- Data generation platforms which require help with bioinformatic setup or support
- So far groups mostly from UNIL, EPFL and CHUV used our services, with occasional users from UNIBE, UNIGE and other academic institutions.

## Major publications

1. Baumgaertner P., et al. **Unsupervised Analysis of Flow Cytometry Data in a Clinical Setting Captures Cell Diversity and Allows Population Discovery.** *Front Immunol*, 12: 633910, 2021
2. Bibert S., et al. **Transcriptomic Signature Differences Between SARS-CoV-2 and Influenza Virus Infected Patients.** *Front Immunol*, 12: 666163, 2021
3. den Hoed J., et al. **Mutation-specific pathophysiological mechanisms define different neurodevelopmental disorders associated with SATB1 dysfunction.** *Am J Hum Genet*, 108: 346-356, 2021
4. Kaushal A., et al. **CTCF loss has limited effects on global genome architecture in Drosophila despite critical regulatory functions.** *Nat Commun*, 12: 1011, 2021
5. David F.P.A., et al. **ASAP 2020 update: an open, scalable and interactive web-based portal for (single-cell) omics analyses.** *Nucleic Acids Res*, 48: W403-W414, 2020

## Number of users



## Contact



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# SULTAN

## SUpraLeiter TestAnlage

Characterization and qualification of high magnetic field, forced flow, high current density superconductors



## The facility

### World-wide largest magnet test facility with magnetic field up to 11 Tesla

- Hosted by the Paul Scherrer Institut in Villigen (Argovia) and run by EPFL
- 40 years of experience in facility operation and related R&D
- 20 individuals involved in sample preparation, facility operation and maintenance
- Typically 1 sample test per week
- Operated up to 40 weeks per year

## Services

- Technology hub for the testing and evaluation of the characteristics of high current superconducting cables
- R&D in the area of low (LTS) and high-temperature superconductivity (HTS)
- Major contributor to the research and development effort for the magnets of the future DEMO fusion plant (EUROfusion Consortium)

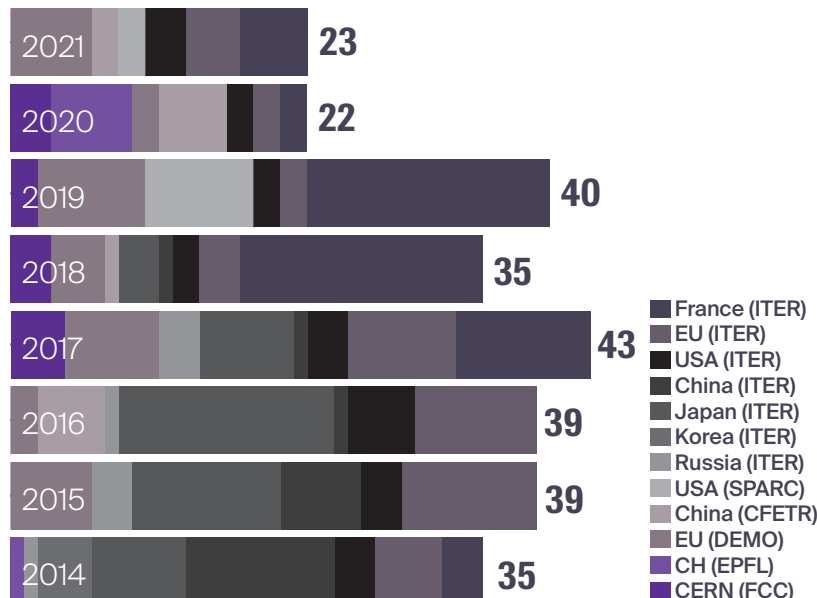
## Key target groups

- Reference facility for the qualification of the Nb3Sn superconductors of the ITER tokamak (manufactured in Europe, China, Japan, Korea, Russia and the USA)
- Other public (e.g. CFETR/CRAFT in China) and private (e.g. CFS/SPARC in the USA) initiatives addressing the challenges for the realization of fusion energy
- Research infrastructures employing strong magnets (e.g. particle accelerators for CERN)
- Industry (conductor manufacturers)

## Major publications

1. A. Devred et al. «Challenges and status of ITER conductor production» *Supercond. Sci. Technol.*, Vol. 27 (2014), Art. No. 044001, DOI:10.1088/0953-2048/27/4/044001.
2. N. Mitchell et al. «The use of Nb3Sn in fusion: lessons learned from the ITER production including options for management of performance degradation» *Supercond. Sci. Technol.*, Vol. 33 (2020), Art. No. 054007.
3. E.E. Salazar et al., «Fiber optic quench detection for large-scale HTS magnets demonstrated on VIPER cable during high-fidelity testing at the SULTAN facility» *Supercond. Sci. Technol.*, Vol. 34 (2021), Art. No. 035027.
4. O. Dicuonzo et al., «Upgrade and Commissioning of the SULTAN Facility to Host Quench Experiments on HTS High Current Conductors» *IEEE Trans. Appl. Supercond.*, Vol. 31 (2021), Art. No. 9500505.
5. K. Sedlak et al. «DC Test Results of the DEMO TF React&Wind Conductor Prototype No. 2», *IEEE Trans. Appl. Supercond.*, Vol. 29, (2019), Art. No. 4801005.

## Facility use (weeks)



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# SPC-TCV

## Tokamak à Configuration Variable

Exploration of the physics of magnetic  
confinement Technology test bed for the  
development of fusion energy



## The facility

**Largest asset at EPFL, 30 years of experience in facility operation**  
**One of the very few national fusion reactors in Europe selected to implement the European Roadmap to**

### Fusion Energy

- Most flexible (experimental/ operational) mid-size tokamak worldwide
- ~75 individuals involved in operation
- ~70 state-of-the-art diagnostic systems

## Services

- Experimental campaigns aiming at exploring plasma performance, real time control, plasma heating et cetera to improve the tokamak concept
- Hub to test new fusion technologies, plasma diagnostics and actuators
- Prepare the physics basis for the ITER and DEMO projects

## Key target groups

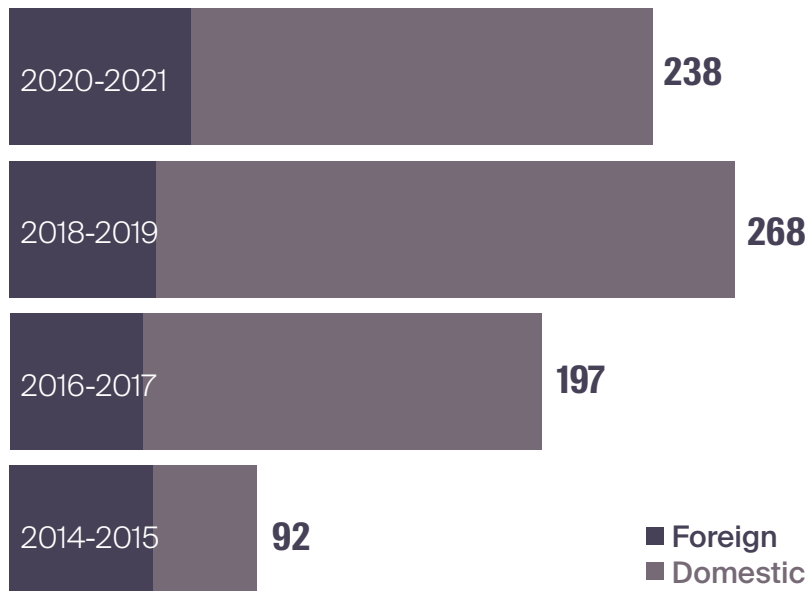
Scientists in plasma physics from the EPFL Swiss Plasma Center, the EUROfusion Consortium and other international projects of the fusion community

Education of PhD students in fusion and training of operators from other facilities (e.g. the ITER project)

## Major publications

1. C. Theiler et al, «**Results from recent detachment experiments in alternative divertor configurations on TCV**», *Nucl. Fusion* 57, 072008 (2017),
2. T. Ravensbergen, M. van Berkel, A. Perek, C. Galperti, et al, «**Real-time feedback control of the impurity emission front in tokamak divertor plasmas**», *Nature Communications* 12, 1105 (2021)
3. Coda et al, «**Enhanced confinement in diverted negative-triangularity L-mode plasmas in TCV**», *Plasma Phys. Control. Fusion* 64, 014004 (2022)
4. J. Degraeve, F. Felici, et al, «**Magnetic control of tokamak plasmas through deep reinforcement learning**», *Nature* 602, 414 (2022)
5. H. Reimerdes and the TCV Team, «**Overview of the TCV tokamak experimental programme**», *Nucl. Fusion* 62 042018 (2022)

## Number of users



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