



# Science-Switzerland, February – March 2021

News on Swiss science, technology, education and innovation



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## New Swiss Unicorn: Nexthink

Following the closure of a USD 180 million Series D financing round, EPFL spin-off Nexthink, which was co-founded by Pedro Bados and Patrick Hertzog, reached a valuation of USD 1.1 billion, thereby becoming the second unicorn from EPFL after MindMaze. In addition to the investment, which will be used to accelerate Nexthink's innovation, rapid growth and expansion, particularly in the US, the company also announced that Bruce Chizen will join its board of directors. Through a unique combination of real-time analytics, instant remediation, automation and employee feedback across all endpoints, Nexthink provides IT teams with the most complete digital experience (DEX) management platform for discovering, monitoring and proactively improving the digital services that they offer their employees. The company is now close to 700 employees and plans to reach 900 by the end of 2021.

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(EPFL, February 08, 2021)



## ETH Zurich Professor Receives Pritzker Prize

Anne Lacaton, Emeritus Professor at ETH Zurich, and her partner Jean-Philippe Vassal were recently awarded the Pritzker Prize, which is regarded as the most prestigious international architecture prize, for their sustainable and social approach to building design. Lacaton is only the sixth woman to receive the Pritzker Prize, and the first female ETH professor to win an award as prestigious on the international stage as the Nobel Prize or the Fields Medal. The couple decided early on to focus on sustainable architecture, working with existing structures wherever possible – they have never demolished a building to construct a new one in its place and instead have converted many existing buildings into new and often affordable living spaces. As stated by Lacaton, "there is always something positive to take from an existing situation if we observe carefully."

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(ETH Zurich, March 17, 2021)



# 1. Policy

## Funding for Research Facilities of National Importance

(State Secretariat for Education, Research and Innovation, February 05, 2021)

Over the next four years (2021-2024), the Confederation will provide a total of CHF 460 million to 31 research facilities for the Promotion of Research and Innovation (RIPA), which amounts to an increase of CHF 38 million over the previous four-year period. The order of priority for the new budgetary period has remained unchanged, which means that top priority is still given to reinforcing centers of technological excellence, followed by research infrastructures and then research institutes. Of the research facilities, 26 had already begun receiving federal funding in the previous budgetary period, while new additions include two technology transfer centers (Swiss m4m Center and ANAXAM) and three research infrastructures (Gosteli Foundation, EuroTube and the Swiss Polar Institute).

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## 5 Leading Houses for Bilateral Cooperation Programs

(State Secretariat for Education, Research and Innovation, February 25, 2021)

The Federal Council has decided to continue the bilateral cooperation programs with non-European partner countries and renew the mandates with five Leading Houses for the funding period 2021-2024, which include: ETH Zurich (East and Southeast Asia); the Zurich University of Applied Sciences (South Asia and Iran); the University of St. Gallen (Latin America), the University of Applied Sciences Western Switzerland (Middle East and North Africa region); and SwissTPH, in collaboration with the University of Basel (Sub-Saharan Africa). As confirmed by a recent evaluation by the State Secretariat for Education, Research and Innovation, these programs play an important role in the diversification of international research collaborations and result in a significant increase in the number of scientific co-publications by Swiss and non-European partners.



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## ETH Zurich's Strategy and Development Plan 2021-2024

(ETH Zurich, March 03, 2021)

ETH Zurich recently released its "2021-2024 Strategy and Development Plan", which aims to help the ETH community and the institution as a whole chart its course when it comes to education, research, and knowledge and technology transfer. The plan in particular sets out four strategic action areas – data and information, health and medicine, materials and manufacturing and responsibility and sustainability – which tie into the university's strategic priorities from the previous four-year period and contain teaching, research and knowledge transfer priorities that closely link further scientific progress with collaboration between disciplines. The four action areas are also underpinned by ETH Zurich's mission of contributing to prosperity and well-being in Switzerland, as well as to cooperate with stakeholders from every part of the society to preserve the world's vital resources.



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## New Gender Strategy for ETH Domain

(ETH Board, March 05, 2021)

At its meeting in March 2021, the ETH Board adopted the new Gender Strategy for the ETH Domain, which aims to further improve the gender balance, as well as to ensure equal opportunities for women and men in the ETH Domain institutions. In this context, it is important to note that the measures go beyond providing support for childcare facilities, as they also include raising awareness of gender bias and gender stereotypes, as well as taking measures to combat inappropriate behavior. The ETH Domain institutions have also set quantitative targets for increasing the proportion of women in academia, administration and technical professions. Furthermore, the ETH Board decided on how resources will be allocated in 2022 and approved the consolidated reporting for 2020, which will now be submitted to the Federal Council.

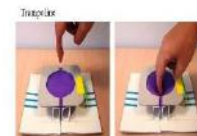
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## 2. Education

### Tactile Books for Blind Children

(University of Geneva, February 04, 2021)

Researchers from the University of Geneva, working in partnership with Université Lumière Lyon 2, recently devised 3D mini-scenarios that children can explore with two fingers, thereby making it easier to identify an object compared to traditional tactile illustrations. This is an important step in ensuring that educational materials and children's books are better adapted to blind children's particular way of perceiving and understanding the world, so that they can have access to education and culture on an equal footing with





other children. As explained by Professor Edouard Gentaz, "blind children don't have the same visual representation codes as other children," which for example means that "they don't interpret dotted lines surrounding a circle as the sun, and a rectangle with small circles below may be nothing like their representation of a bus."

[/web/2021/02-210204-f2](#)

## School for Transdisciplinary Studies at University of Zurich

(University of Zurich, March 03, 2021)

A number of initiatives, teams and departments have emerged at the University of Zurich (UZH) in recent years that deal with interdisciplinary questions, topics and challenges, as well as develop transdisciplinary courses. To promote cross-disciplinary teaching and combine these efforts under a common roof, UZH therefore set up a School for Transdisciplinary Studies (STS) at the beginning of 2021. Designed to supplement Bachelor's and Master's programs, the courses enable students to consider their own subject in relation to others, as well as to capitalize on academic differences. The students also acquire skills that are becoming increasingly important to employers, such as the ability to link up different viewpoints, to consider problems from different perspectives and to work in interdisciplinary teams.



[/web/2021/02-210303-a6](#)

## 3. Life Science

### Artificial Aorta Reduces Heart Failure Patients' Blood Pressure

(EPFL, February 03, 2021)

A team of EPFL engineers led by Professor Yves Perriard recently developed an artificial aorta made of silicon and a series of electrodes, which eases the burden on the heart of patients with heart failure and therefore could offer a promising alternative to heart transplants. The device is implanted just behind the aortic valve and expands to a diameter that is larger than the natural aorta when an electric voltage is applied, thereby reducing the pressure on a patient's heart. As explained by Yoan Civet, the idea is therefore not to replace the heart, but rather, to assist it. The research team has filed a patent for their technology and hope that their discovery can also be used to treat other medical conditions, such as urological disorders, which require a similar approach.



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### 3D-Printed Bioresorbable Airway Stent

(ETH Zurich, February 03, 2021)

A team of ETH Zurich scientists, together with researchers from the University Hospital Zurich and the University of Zurich, recently developed a new type of bioresorbable airway stent that can be adapted to a patient's anatomy and which could greatly simplify the future treatment of upper airway obstruction. The stents are manufactured using a 3D printing process known as "digital light processing", as well as specially adapted light-sensitive resins, and initial tests by the research group of Daniel Franzen confirmed that the implants are biocompatible, bioresorbable and generally did not move from their insertion site. As explained by Professor Jean-Christophe Leroux "this promising development therefore opens up prospects for the rapid production of customized medical implants and devices that need to be very precise, elastic and degradable in the body."



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## Insulin Storage in High-Temperature Settings

(University of Geneva, February 03, 2021)

A team from the University of Geneva and MSF recently demonstrated that a vial of insulin can be stored for 4 weeks after opening and at up to 37°C, without losing efficacy. To come to this conclusion, Professor Leonardo Scapozza's team meticulously reproduced the conditions of the Dagahaley refugee camp (northern Kenya) in order to test insulin storage, before subsequently using high-performance liquid chromatography to analyze the insulin. The results confirmed that all the insulin preparations stored at fluctuating temperatures (25°C to 37°C) recorded a potency loss of no more than 1% and that the insulin activity was completely maintained. According to Philippa Boule these results could therefore "serve as a basis for changing diabetes management practices in low-resource settings, since patients won't have to go to hospital every day for their insulin injections."



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## Low Risk of Coronavirus Infection From High-Touch Surfaces

(Eawag, February 04, 2021)

According to a recent study that was co-authored by Eawag scientists, high-touch surfaces, such as door handles, buttons or keypads, probably play a minimal role in coronavirus community transmission, due to the low concentrations of genetic material from the coronavirus that was found on contaminated samples. However, despite the fact that the risk of infection via this route appears to be low, the researchers nevertheless suggest that sampling should be regularly performed, because as explained by Tim Julian, surveillance of SARS-CoV-2 RNA on high-touch surfaces could be a useful additional tool for providing early warning of COVID-19 case trends. In addition, a second study, which was also co-authored by Eawag, found that while the effectiveness of surface disinfection is relatively limited, hand disinfection substantially reduces the risks of infection.



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## Sophisticated Lung-on-Chip Model

(University of Bern, February 08, 2021)

A team of researchers from the University of Bern, in collaboration with clinical partners from the Inselspital, recently developed a sophisticated second-generation lung-on-chip model that reproduces key aspects of the lung tissue architecture not found in previous lungs-on-chip. This opens up new possibilities for basic pneumological research, understanding lung pathologies, drug screening and precision medicine. As described by Pauline Zamprogno, who developed the model for her PhD thesis, "the new lung-on-chip reproduces an array of alveoli with in vivo like dimensions. It is based on a thin, stretchable membrane, made with molecules naturally found in the lung: collagen and elastin. The membrane is stable, can be cultured on both sides for weeks, is biodegradable and its elastic properties allow mimicking respiratory motions by mechanically stretching the cells."



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## Analyzing Lung Tumor Patterns

(University of Lausanne, February 09, 2021)

In lung adenocarcinoma, each tumor is composed of multiple patterns, similar to a mosaic made with tiles of different shapes. However, although these patterns are routinely used in the clinic to classify patients' tumors, scientists and physicians currently do not know their origin and whether cells in distinct patterns are actually different. To address this shortcoming, researchers led by University of Lausanne Professor Giovanni Ciriello and Dr. Igor Letovanec isolated individual patterns from multiple tumors and spatially analyzed the characteristics of each of them. The results could now serve the design of tools to predict patients' prognosis and personalize their treatments. Moreover, the combination of diverse data



and expertise will be essential to provide a complete picture of the disease and translate scientific discoveries into clinically actionable approaches.

[/web/2021/03-210209-a9](#)

## Bacteria Can "Sleep" Through Antibiotic Attacks

(University of Zurich, February 11, 2021)

A team of researchers led by University of Zurich infectiologist Annelies Zinkernagel recently gained valuable new insights into how some bacteria can withstand treatment by going into a sleep-like state that enables them to tolerate antibiotics, which will contribute to developing new treatments against persistent bacteria. For example, by carrying out various stress tests on the bacterium *Staphylococcus aureus*, which is found on the skin of many people and often causes invasive and difficult-to-treat infections, the researchers discovered that the more extreme the stress conditions, the higher the percentage of persistent bacteria. In addition, by analyzing how persistence mechanism work, the researchers were able to confirm the idea that bacteria do not halt their metabolism but slow it down and change it with great precision.



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## Genetic Patterns of Eating Disorders

(University of Geneva, March 01, 2021)

Following the analysis of the genomes of more than 20,000 British people, a team of researchers from the University of Geneva, HUG, and several other universities recently found that while there are great genetic similarities between anorexia nervosa, bulimia nervosa and binge-eating disorder, there are also notable differences. As summarized by Professor Nadia Micali the similarities lie in the association with psychiatric risks, as anorexia nervosa, bulimia nervosa and binge-eating disorder share genetic risk with certain psychiatric disorders, in particular for schizophrenia and depression, thereby confirming the strong psychiatric component of these diseases. However, the big difference concerns the associated genetics of body weight regulation, which are opposite between anorexia on the one hand, and bulimia nervosa and binge-eating disorder on the other.



[/web/2021/03-210301-7f](#)

## Promising Strategy for Therapeutic Cancer Vaccines

(University of Basel, March 03, 2021)

An international research group led by Professor Daniel Pinschewer of the University of Basel recently developed a promising strategy for therapeutic cancer vaccines. Specifically, the team used two distantly related viruses – "Pichinde" and "Lymphocytic choriomeningitis" – as vehicles to administer specific tumor components, first with the one virus and then, at a later point, with the other, in experiments on mice with cancer in order to stimulate their immune system to attack the tumor. The researchers were subsequently able to measure a potent activation of killer T cells that eliminated the cancer cells. In 20% to 40% of the animals – depending on the type of cancer – the tumor disappeared, while in other cases the rate of tumor growth was at least temporary slowed. Hookipa Pharma is now investigating the efficacy of this novel approach to cancer therapy in humans.



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## Retinal Implants Partially Restore Vision

(EPFL, March 15, 2021)

A team of EPFL engineers led by Professor Diego Ghezzi recently developed a novel retinal implant that could partially restore vision in blind people. Specifically, a pair of camera-equipped smart glasses captures images in the wearer's field of vision, which is sent to a microcomputer placed in one of the eyeglasses' end-pieces. The microcomputer then turns the data into light signals that are transmitted to electrodes





in the retinal implant, which stimulate the retina in such a way that the wearer sees a simplified, black-and-white version of the image. Although the system has not yet been tested on humans, the researchers have already developed a virtual reality program that can simulate what patients would see with the implants, which enabled them to demonstrate that the system is ready for clinical trials.

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## Sensory Bracelet for Early Detection of COVID-19 Infections

(Principality of Liechtenstein, March 22, 2021)

A consortium led by Prof. Lorenz Risch and Dr. Martin Risch recently published the first results of the "COVI-GAPP" study, which could represent a breakthrough in the early detection of COVID-19 infections, as it demonstrated that a sensory bracelet made by Ava was able to detect a COVID-19 infection two days before the first symptoms appeared in 71% of all cases. The sensory bracelet is a licensed medical product that monitors parameters during sleep – skin temperature, resting pulse rate, perfusion, breathing rate and heart rate variability – and is already successfully being used to monitor women's fertility cycles. Following the promising results of this study, which included over 1,100 individuals in Liechtenstein, the bracelet will now be tested in a large-scale trial with over 20,000 individuals in the Netherlands.

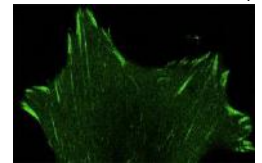


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## Paxillin Enables Cells to Dock at Their Proper Place

(University of Geneva, March 29, 2021)

A team of researchers led by Professor Bernhard Wehrle-Haller from the University of Geneva, in collaboration with the University of Tampere, was recently able to highlight the key role of a protein called "paxillin", which enables cells to perceive their environment and to anchor at their proper place in the body. Specifically, the results demonstrated that without functional paxillin, cells are unable to anchor, regardless of the suitability of their environment. In addition, paxillin also has the function of informing the cell that anchoring has taken place correctly, thus transforming a mechanical response into a biological signal that the cell can understand. This discovery is vital, because these mechanisms are not only essential to the proper functioning of our organs, but they are also involved in the development of metastatic tumors.

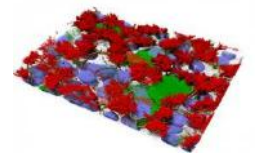


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## SARS-CoV-2 Replicates Better in the Upper Respiratory Tract

(University of Bern, March 31, 2021)

Using specialized human airway cell cultures, a team of researchers from the University of Bern and the Federal Institute of Virology and Immunology recently discovered that respiratory tract temperatures not only significantly impact SARS-CoV-2 replication, but also the subsequent innate immune activation in human cells. Specifically, when mimicking the conditions found in the upper airways (33°C), the researchers found that SARS-CoV-2 was not only able to replicate faster and to a higher extent than at the temperatures typically found in the lower respiratory tract (37°C), but also that the infections with SARS-CoV-2 did not stimulate the innate immune response within these cells as strongly as when they were carried out at 37°C. These findings could in turn contribute to the development of antiviral drugs and preventive measures.



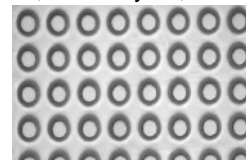
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## 4. Nano / Micro Technology / Material Science

### Overcoming Viscoelastic Braking

(EPFL, February 08, 2021)

Soft substrates are used in a range of applications, especially in the pharmaceutical industry, thanks to their biocompatible and antiadhesive properties. These substrates are so soft that they can be (reversibly) deformed by the capillary forces that occur at the edges of droplets when placed on their surfaces. However, droplets move very slowly on these surfaces, as they have to dynamically deform the substrates and overcome the resistance created by the substrate's viscoelastic properties, which is a big obstacle to their more widespread use. Promisingly, a team of EPFL scientists recently was able to demonstrate that this so-called "viscoelastic braking" can be overcome by placing tiny pillars on the substrate's surface. More fundamentally, the scientists were able to observe, for the first time, the contact between a fluid and a soft substrate in a complex geometry.



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### "Kagome Graphene" for Energy-Efficient Electronics

(University of Basel, February 15, 2021)

A team of researchers from the University of Basel, working in collaboration with the University of Bern, recently produced and studied a compound known as "kagome graphene" for the first time, which could potentially be used in electronic sensors or quantum computers. In particular, the researchers were able to observe that electrons of a defined energy are "trapped" between the triangles that appear in the crystal lattice of kagome graphene, which, as explained by Professor Ernst Meyer, is desirable because "it causes strong interactions between the electrons – and, in turn, these interactions provide the basis for unusual phenomena, such as conduction without resistance." The analyses also revealed that kagome graphene has semiconducting properties.

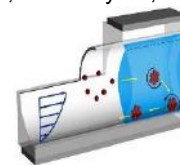


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### Microvehicles to Navigate Blood Vessels Upstream

(ETH Zurich, February 19, 2021)

Researchers led by ETH Zurich Professors Daniel Ahmed and Brad Nelson recently developed microvehicles that are small enough to navigate our blood vessels and can be propelled against a fluid flow using ultrasound. To achieve this, the researchers used magnetic beads made of iron oxide and a polymer with a diameter of 3 micrometers, and studied their behavior in a thin glass tube, which was similar in size to blood vessels in a tumor. The team then employed a magnetic field to induce the particles to cluster into a swarm, before using ultrasound to guide the cluster close to the wall of the tube. Finally, the researchers switched to a rotating magnetic field to propel the microbeads against the flow. Future applications include microsurgery, precisely delivering cancer drugs to tumors and transferring drugs from blood vessels into the tissues of the brain.

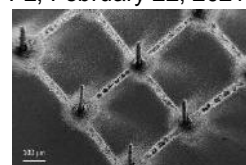


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### Next-Gen Perovskite-Graphene X-Ray Detector

(EPFL, February 22, 2021)

Scientists led by EPFL Professor László Forró recently developed a novel method for producing highly efficient X-ray detectors that can be easily integrated into standard microelectronics to considerably improve the performance of medical imaging devices. To achieve this, the researchers used the aerosol jet printing device at CSEM to 3D-print perovskite layers on a graphene substrate, with the idea that the perovskite acts as the photon detector and electron discharger, while the graphene amplifies the outgoing electrical







signal. The results were stunning, as the method produced X-ray detectors with a record sensitivity and a four-fold improvement on the best-in-class medical imaging devices. Furthermore, as explained by Forró, "it doesn't need sophisticated photomultipliers or complex electronics," which "could be a real advantage for developing countries."

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## Artificial Membranes With Smart Water Regulation Mechanism

(University of Fribourg, February 24, 2021)

A team of researchers led by University of Fribourg Professor Christoph Weder, in collaboration with University of Bonn Professor Lukas Schreiber, recently discovered how environmental conditions affect water transport through the waxy skin layer of ivy and olive leaves, and were subsequently able to successfully mimic this function in artificial membranes, which could lead to the development of active barriers for use in smart packaging and other applications. Specifically, the researchers demonstrated that the asymmetric architecture of both membrane types can lead to directional water transport characteristics, which are regulated by the hydration status of the membranes. The team subsequently prepared artificial nanocomposite membranes that displayed similar characteristics, but unlike leaf cuticles, their composition could be easily varied.

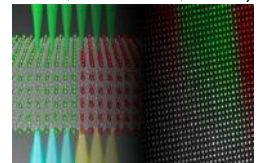


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## Nano-Mapping Phase Transitions in Nickelate Compounds

(University of Geneva, March 18, 2021)

A team of scientists led by Duncan Alexander at EPFL and Professor Jean-Marc Triscone's group at the University of Geneva recently combined two powerful, cutting-edge techniques to precisely determine the metallic and insulating regions of atomically engineered devices made from two rare-earth nickelate compounds with near atomic resolution. This is important because nickelates display an exotic electronic phase transition that consists of turning from a metallic state, which conducts electricity, into an electrically-insulating state as the temperature drops, which is of great interest for the development new approaches in electronics. However in order to control this metal-to-insulator phase transition for potential electronic devices, scientists must first understand how each characteristic phase emerges and evolves across the transition.



[/web/2021/04-210318-1b](#)

## Invisible "Keyhole" Made of Printed Electronics

(Empa, March 18, 2021)

A team of Empa researchers led by Evgeniia Gilshtein recently developed an invisible "keyhole" made of printed, transparent electronics, which cannot be seen by the human eye and can be positioned in suitable locations, such as above a door hinge, on a pane of glass, or even a curved door handle. To achieve this, the team used a metal oxide-based nanoparticle ink, which was made more transparent and conductive than conventional products by dyeing the carrier foil blue after the circuits had been printed and preliminary annealed on the foil. Since the blue ink, unlike a transparent film, can absorb light, this enables the ink to be sintered onto the substrate using high-energy light irradiation, which not only makes the blue color disappear, but also improves the opto-electrical properties of the "secret ink".



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## Construction Materials From Coconut Fibers

(Bern University of Applied Sciences, March 22, 2021)

The Bern University of Applied Sciences spin-off NaturLoop recently announced the launch of its first product, "Cocoboard", which will be produced on an industrial scale in the Philippines and aims to provide a sustainable, inexpensive and local alternative to conventional construction materials. As explained by CEO and co-founder Daniel Dinizo, the company wants to provide complete solutions for the development of sustainable, natural bio-composites made from agricultural by-products, thereby making the Philippines less dependent on imported construction materials and well positioned to manufacture its own materials independently, locally and sustainably. The BFH spin-off has already been supported by the BRIDGE Program, Venture Kick and Switzerland Innovation/Tech4Impact, as well as received startup coaching from Innosuisse.



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## Printing String-Reinforced Road Surfaces

(Empa, March 23, 2021)

Drawing inspiration from a project of the Gramazio Kohler Research lab at ETH Zurich, which demonstrated that outstanding stability can be achieved by simply interlocking gravel with a thread, Martin Arraigada and Saeed Abbasion from Empa's "Concrete & Asphalt" lab are currently investigating how roads could be reinforced with simple means, as well as be easily recycled after use. Specifically, the duo is using a robotic arm to place ordinary string – identical to the one used by every Swiss citizen to bundle waste paper – in a programmed pattern on a layer of gravel, which can be stacked on top of each other. Mechanical tests subsequently demonstrated that a 5-layered gravel-thread package could withstand half a ton (5 kN) of pressure without the stones moving much. The researchers are also modelling everything in 3D on the computer.



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## New Nanotransmitters Improve Efficiency of Power Converters

(EPFL, March 26, 2021)

A team of EPFL researchers led by Professor Elison Matioli and his PhD student Luca Nela recently developed a new type of transistor, which enables power converters to perform at substantially improved efficiencies, especially in high-power applications, such as electric vehicles and solar powers. To achieve this, the team first built several conductive channels into the component, which enabled them to split up the flow of current, thereby reducing the resistance and overheating. This multi-channel design was subsequently combined with nanowires made of gallium nitride and a unique funnel-like structure, which can support high electric fields, as well as voltages of over 1,000 V, without breaking down, to produce a prototype that performed twice as well as the best GaN power devices in the literature.



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# 5. Information & Communications Technology

## Building Digital Competence

(Eastern Switzerland University of Applied Sciences, February 05, 2021)

In order to empower students to thrive in the digital environment, the University of Applied Sciences of Eastern Switzerland (OST) is creating an innovative teaching and learning environment, which will feature a learning factory, multiple labs focusing on digital learning, as well as integrate digital supported teaching methods into all curricula. For example, in the "learning factory" area, a digital learning factory will aim



to create a practice-oriented learning environment with an existing factory, real products and business processes with a strong reference to the lived practice of the Eastern Swiss manufacturing industry, as well as to current research topics. Furthermore, the factory is not located at an OST location, but rather, it takes into account the strengths and experience of the courses and institutes at all OST locations, namely St.Gallen, Buchs and Rapperswil.

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## Cybersecurity Partnerships Launch New Solutions

(startupticker.ch, February 09, 2021)

In order to meet the growing demand for securer solutions to accelerate the digital transformation, Swiss cybersecurity startups are increasingly partnering with a wide variety of organizations to develop innovative new solutions. For example, NetGuardians' Payment Fraud Prevention app, which uses artificial intelligence to detect fraudulent payments in real-time and reduce fraud losses proactively, was recently launched on Finastra's open development platform (FusionFabric.cloud). In addition, Securosys and ConsenSys launched a seamless and secure method for long-term Ethereum 2.0 staking, while Sysmosoft and Entrust are working together to provide a comprehensive solution for digital signature management. Finally, Inpher and Cornami are collaborating to deliver quantum-secure, privacy-preserving computing on encrypted data.



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## Davos Digital Forum Academic Track Anthology

(University of Applied Sciences and Arts Northwestern Switzerland, February 19, 2021)

Following the successful completion of the first Davos Digital Forum Academic Track, which aims to make fresh thinking from the university accessible to a wider audience, the University of Applied Sciences and Arts Northwestern Switzerland recently published approved contributions in an anthology, which provides a plethora of new insights into the digital transformation - ranging from e-government over smart cities to the digital economy and risk 4.0. For example, Oliver Gilbert and Nico Neher wrote about establishing a digital ecosystem for communities and cities, while taking their individual digital degree of maturity into account, while Yannick Hirt and Clemente Minonne illustrated how the B2B sharing economy offers new opportunities to supply chain management.

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## Quantum Computer Links Two Quantum Revolutions

(EPFL, February 19, 2021)

Using the IBM Q computer, EPFL physicists Marc-André Dupertuis, Nicolas Schwaller and Clément Javerzac-Galy were recently able to experimentally verify the tight relationship between quantum entanglement and wave-particle duality for the first time, showing that the former controls the latter in a quantum system. To achieve this, the three scientists studied a system made of two separate quantum elements, represented in the IBM Q as superconducting quantum bits, which, as explained by Dupertuis, enabled them to "indirectly confirm that the duality of each quantum bit can be turned off completely, or set to any desired amount by controlling the degree of entanglement of the pair."

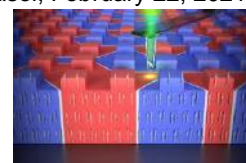


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## Proof-of-Concept Antiferromagnetic Memory

(University of Basel, February 22, 2021)

An international research team led by University of Basel Professor Patrick Maletinsky recently proposed an innovative new data storage medium whereby so-called "domain walls" could be moved in an antiferromagnetic system to define a bit. To achieve this, the researchers first applied a magnetic and an electric field to create two areas ("domains") in which the antiferromagnetic order has different orientations,





as well as to generate a "domain wall" between these two areas. As explained by lead author Natascha Hedrich, the team subsequently found that by selectively structuring the surface of the crystal at the nanoscale to leave behind tiny raised squares, they could control where the domain wall lies on a surface, as the squares alter the trajectory of the domain wall in a controlled manner.

[/web/2021/05-210222-1d](#)

## Security Flaw Detected in Credit Cards

(ETH Zurich, February 22, 2021)

After finding a vulnerability in certain credit cards for the first time last year, a team of ETH Zurich researchers recently found a way to outsmart the PIN codes for other payment cards by using an Android app and two NFC-enabled mobile phones to replicate the effect of the so-called "man-in-the-middle" principle. Specifically, the app falsely signaled to the card terminal that no PIN was required to authorize the payment and that the card owner's identity had been verified. Although the method initially only worked on VISA cards, the team was eventually able to bypass the PIN code verification step with other types of payment cards, namely Mastercard and Maestro, as well by "tricking the card terminal into thinking that a Mastercard card is a VISA card," as explained Jorge Toro. Mastercard has since updated the relevant safeguards.



[/web/2021/05-210222-e6](#)

## Cooperation in Statistical Methods, Data Science and AI

(University of Neuchâtel, February 25, 2021)

The University de Neuchâtel and the Swiss Federal Statistical Office (FSO) recently signed a cooperation agreement in the field of data science and statistical methods for the period 2021-2024. This announcement follows the creation of a Data Science and Statistical Methods division at the FSO, as well as a new chair in data science at the University of Neuchâtel, and further reinforces the valuable partnership between the two institutions that has been in place for around twenty years. For the FSO, this cooperation has led to a system of burden sharing for surveys at both enterprise and individual level, while for the University of Neuchâtel, the great diversity of the topics dealt with at the FSO, their specific issues and, above all, having access to real data, is a source of inspiration which helps to attract a large number of researchers.



[/web/2021/05-210225-3f](#)

## New CSCS Supercomputer: "Alps"

(ETH Zurich, March 23, 2021)

ETH Zurich recently published an interview with CSCS Director Thomas Schulthess, in which he provided an update of the installation of the new supercomputer "Alps", which will be completed in 2023 and will replace the current flagship computer, "Piz Daint". As explained by Schulthess, a central element of the new computer is the Cray Shasta software stack, which will allow them to transition to a so-called "software-defined infrastructure". This means that they will be able to define which services they offer via the software and no longer via the hardware, thereby making their hardware very flexible. In addition, CSCS is also retrofitting the computer center in several expansion phases so that in the future, there will be only one infrastructure, which can not only respond to the very specific requirements of climate simulations, but also support other research areas.



[/web/2021/05-210323-c5](#)



## Smart Camera Operates as if It Were a Human

(ETH Zurich, March 29, 2021)

Seervision recently witnessed a significant upswing in interest from a wide variety of companies seeking to produce professional videos without worrying about the complexity or costs. This is because the ETH Zurich spin-off develops software that can automate cameras in any type of studio – meaning that one person can effortlessly operate and control several cameras at the same time. To achieve this, the Seervision solution features an innovative software, which combines artificial intelligence, image recognition and predictive mathematical models in order to be able to anticipate a person's movement in the image and pan the cameras as if they were operated by a cameraperson. The software furthermore works for various cameras from various manufacturers, which makes the technology flexible and versatile to use.



</web/2021/05-210329-15>

## 6. Energy / Environment

### Aesthetically Pleasing Façades That Produce Energy

(Solaxess, February 10, 2021)

Solaxess was recently awarded prestigious Swiss energy prize "Watt d'Or 2021" by the Swiss Federal Office of Energy for its contribution to the residential district project in Männedorf, which was led by the Stiftung Umwelt Arena Schweiz and the architectural office René Schmid Architekten AG. Among the partners of choice, Solaxess stands out for the integration of its white film technology in the photovoltaic panels installed on the façades of the buildings. This novel technology – a nanotechnological film composed of many materials, including a highly reliable polymer resin – enables Solaxess to produce white and colored solar modules that are totally uniform and without any visible PV cell or connector, thereby providing architects, developers and ultimately owners with active building elements that are cost-effective, durable, and aesthetically pleasing.



</web/2021/06-210210-4b>

### Analyzing Material Systems for Storing Radioactive Waste

(Empa, February 16, 2021)

A team of Empa researchers led by Professor Barbara Lothenbach, together with international partners and research groups from Switzerland, such as the University of Bern and the Paul Scherrer Institute, have been conducting experiments under realistic conditions at the Mont Terri Rock Laboratory to better understand the characteristics of rock formations that could play a role in the storage of radioactive waste. This for example includes modeling the long-term development of the boundary layers between the very different material systems, such as various cement-based materials, the surrounding Opalinus Clay, as well as the steel containers, in experimental approaches lasting several years at different temperatures between 20 and 70 degrees Celsius.



</web/2021/06-210216-41>

### Green Fuels for Aviation

(Paul Scherrer Institute, February 25, 2021)

Researchers at the Paul Scherrer Institute and Empa recently launched a new joint initiative called "SynFuels", which aims to develop a process for producing kerosene from renewable resources. To achieve this, the two research institutes will search for practical ways of linking carbon dioxide and hydrogen to form longer-chain molecules and thus produce synthetic fuels that are even suitable for an aircraft engine. This is



important because there is currently no way around kerosene in aviation for the foreseeable future – be it fossil-based or synthetically produced. Furthermore, as explained by Thomas J. Schmidt, head of the PSI Energy and Environment Division, aviation fuels are the fuels with the highest quality, meaning that if the researchers can manage to produce them from renewable resources, then they will also be able to synthesize all other kinds of fuel.

</web/2021/06-210225-b7>

## Emotions Influence Sustainable Behavior

(University of Geneva, March 02, 2021)

Although emotions are often considered "irrational", they actually play a major role in helping us assess the world and guide our behavior. In this context, University of Geneva Professor Tobias Brosch recently carried out a systematic review of the literature from 2015 to 2020 dealing with the role of emotions in the perception and action towards climate change, whether positive or negative, in order to highlight the main levers of action on which political decisions should be based. The study in particular demonstrated that communication based on fear or hope must be carefully measured in order to avoid any immobility in citizen action, and that actions in favor of sustainable development can trigger a virtuous circle of behavior by making their authors feel a sense of pride that pushes them to continue on this path.

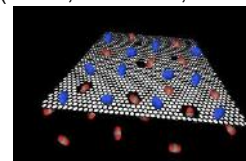


</web/2021/06-210302-9f>

## Highly Efficient Graphene Filter for Carbon Capture

(EPFL, March 03, 2021)

A team of EPFL chemical engineers led by Professor Kumar Varoon Agrawal recently developed a graphene filter for carbon capture that surpasses the efficiency of commercial capture technologies, and can reduce the cost of carbon capture down to USD 30 per ton of carbon dioxide. As explained by Agrawal, their approach to achieve this was relatively straightforward, as they simply "made carbon dioxide-sized holes in graphene, which allowed carbon dioxide to flow through while blocking other gases, such as nitrogen, which are larger than carbon dioxide." The result is a record-high carbon dioxide-capture performance, which enables the EPFL membranes to have a more than ten-fold higher carbon dioxide permeance than current filters (11,800 GPUs), while their separation factor stands at 22.5.



</web/2021/06-210303-31>

## Environmental Risk of Pharmaceuticals

(Eawag, March 03, 2021)

An Eawag research group led by Professor Kathrin Fenner is participating in a large-scale EU project called "PREMIER", which aims to develop a novel information and assessment system for identifying and addressing environmental risks of medicines, particularly for those about which little to no data exists in the public domain. As explained by Fenner, the main focus of their research is on the degradation and transformation of the active substances – how long these degradation processes take and at what point we can assume that these substances no longer have any negative impact on the environment – and in this context, her team is developing a simple but fast degradation test with activated sludge from wastewater treatment plants, as well as a degradation model that starts from the basis of the molecular structure of the substances.



</web/2021/06-210303-4e>

## New Research Program Examines Impacts of Extreme Events

(WSL, March 05, 2021)

WSL recently launched the "Extremes" research program, which aims to foster inter- and transdisciplinary research to equip Swiss stakeholders with appropriate decision-making tools and coping strategies to address future extreme events. The Extremes program will focus on events that are rather infrequent and irregular, but which are likely to have significant consequences for the environment and society. This is important, because although extreme impacts will most likely occur in response to abrupt, compounded or interacting changes in drivers, which often result in non-linear and tipping point behavior, most impact assessments, even under extreme conditions, still rely on a linear extrapolation of known drivers on impacts.

</web/2021/06-210305-5d>



## Generating Voltage From Wood

(Empa, March 15, 2021)

A team of ETH Zurich and Empa researchers recently developed a simple, environmentally friendly process for generating electricity from a type of wood sponge by exploiting the so-called "piezoelectric effect". To achieve this, the researchers placed the wood into an acid bath, which dissolved its rigid structure and left behind a framework of thin cellulose layers that can easily be squeezed together and then expand back into their original form. When pressed together, differently charged areas are displaced against each other, thereby generating an electric current, which can be used as a bio sensor, as well as to generate usable energy. The researchers subsequently found that this wood-modifying process could also be taken over by a naturally occurring wood-degrading fungi, thereby removing the need for aggressive chemicals.

</web/2021/06-210315-a2>



## Artificial Light Affects Plant Pollination

(University of Zurich, March 17, 2021)

A team of researchers from the University of Zurich and Agroscope recently demonstrated for the first time that artificial light at night not only interferes with the nighttime pollination of plants, but also adversely affects insects' pollination behavior during the daytime, which could have consequences for agricultural crop yields, as well as for the reproduction of wild plants. On the basis of their findings, Eva Knop and her colleagues therefore call for "the ecological impact of light pollution to be researched more thoroughly and for actions to be devised to avert adverse effects on the environment." Vitaly, the team stress that they see ways to achieve this even though artificial light is an integral feature of populated areas. Public lighting, for instance, could be carefully designed in combination with new technologies to reduce it to a minimum.

</web/2021/06-210317-ef>



## Observing Photochemical Processes in Airborne Particles

(Paul Scherrer Institute, March 19, 2021)

A team of PSI researchers led by Peter Alpert was recently able to observe photochemical processes in the smallest particles in the air for the first time and discovered that additional oxygen radicals, which can be harmful to human health, are formed in these aerosols under everyday conditions. This is important, because it could help explain why so many people develop respiratory diseases or cancer without any specific cause. To come to this conclusion, the researchers used the brilliant X-ray light from the Swiss Light Source, which, according to Alpert, not only enabled them to "view such particles individually with a resolution of less than one micrometer, but even to look into particles while reactions



were taking place inside them." The team also used a new type of cell, in which a wide variety of atmospheric environmental conditions can be simulated.

[/web/2021/06-210319-4d](#)

## High-Performance Compact Fuel Cell

(EPFL, March 19, 2021)

INERGIO – a spin-off based at the EPFL Innovation Park and born out of 15 years of joint research between EPFL and HEIG-VD – recently unveiled a prototype for a lightweight, eco-friendly, high-performance fuel cell that can supply energy in situations where there is no power grid. The prototype can generate 25W of continuous power, is 80% lighter than similar systems on the market, and employs a solid oxide fuel cell, which offers high fuel-to-electricity conversion yields and does not emit pollutants. Furthermore, INERGIO's system is scalable and can supply between 25W and 500W depending on the intended use. In remote locations, such as mountainous regions, this compact fuel cell therefore offers a safe, silent power source that is not dependent on weather conditions and can operate on its own for extended periods.

[/web/2021/06-210319-eb](#)



## Seismic Sensors and AI to Detect Debris Flows

(ETH Zurich, March 26, 2021)

A team of researchers from ETH Zurich and WSL led by Professor Fabian Walter recently developed a new type of detector that can identify even the smallest vibrations induced by debris flows shortly after they are mobilized, thereby acting as a valuable early warning system. To achieve this, the researchers installed a network of seismometers around the Illgraben catchment, which can be used to record vibrations from debris flows from a distance of several kilometers, depending on the event magnitude. The team then trained a learning algorithm to specifically distinguish the vibrations of a debris flow from other ground vibrations in a continuous stream of seismic data, which, in subsequent tests, was able to reliably detect 13 debris flows and smaller flood events in the summer of 2020, without generating any false alarms.

[/web/2021/06-210326-f8](#)



## Carbon-Neutral "Biofuel" From Lakes

(University of Basel, March 31, 2021)

University of Basel postdoc Maciej Bartosiewicz and Professor Moritz Lehmann recently outlined the potential and theoretical possibilities for using methane from lakes and other freshwater bodies for sustainable energy production. Specifically, the researchers suggest that a hydrophobic gas-liquid membrane contactor could be used to first separate a methane-containing gas mixture from water, before subsequently concentrating the methane. Zeolite minerals are particularly suitable for enrichment, since hydrophobic crystalline substances can adsorb and release gases. This is an interesting approach, because methane from lakes not only makes up about 20% of global natural methane emissions – theoretically enough to meet the world's energy needs – but the carbon bound in the methane also remains within the natural cycle during combustion.

[/web/2021/06-210331-0f](#)





## 7. Engineering / Robotics / Space

### New NCCR Automation

(Empa, February 04, 2021)

The National Center of Competence in Research "Dependable, ubiquitous automation" – or "NCCR Automation" – was recently launched in order to establish Switzerland as one of the world's leading hubs for research, education and innovation in automation and control technology. The new NCCR is funded by the Swiss National Science Foundation and brings together more than 40 scientists from Empa, ETH Zurich, EPFL and the University of Applied Sciences and Arts Northwestern Switzerland, who will investigate new approaches to reliably control complex automation systems and develop applications in the fields of energy, mobility and industrial manufacturing over the coming years. As explained by director John Lygeros, they "want to coordinate research in this area across Switzerland, improve the flow of information between institutions, exploit synergies and make technology transfer more effective." Another important aspect is the promotion of young scientists.



</web/2021/07-210204-1e>

### New Satellites to Better Understand Exosphere's Chemistry

(EPFL, February 05, 2021)

With the support of the EPFL Space Center (eSpace), the EPFL Spacecraft Team has set itself the ambitious goal of launching a constellation of two satellites, called CHESS, in two years, which will help researchers gain a better understanding of the chemical composition of the outermost layers of our atmosphere, as well as of how it has changed over time. To achieve this, the satellites will be equipped with several state-of-the-art instruments, including new mass spectrometers that are being developed jointly by the University of Bern and Spacetek, as well as next-generation Global Navigation Satellite System receivers, which are being developed jointly by ETH Zurich and u-blox. The CHESS mission will also perform in situ tests of a new kind of solar panel designed specifically for spacecraft, based on technology developed at RUAG



</web/2021/07-210205-af>

### New Explanation for Abundance in Intermediate-Mass Exoplanets

(University of Zurich, February 12, 2021)

A team of researchers from the Universities of Zurich and Cambridge, associated with the NCCR PlanetS, recently proposed a new explanation for the abundance in intermediate-mass exoplanets – a long-standing puzzle of astronomy. To achieve this, the team developed a new modelling technique that not only enabled them to simulate the large scale spiral structure in the so-called "protoplanetary disk" of gas and dust from which planets form, but which also includes the small-scale magnetic fields that develop around the growing planetary building blocks. As explained by lead author Hongping Deng, this enabled them to show for the first time that the magnetic fields make it difficult for the growing planets to continue accumulating mass beyond a certain point, which means that giant planets become rarer and intermediate-mass planets much more frequent.



</web/2021/07-210212-5b>



## New Method for Directly Imaging Habitable-Zone Exoplanets

(ETH Zurich, February 17, 2021)

An international team of researchers, which also included members from ETH Zurich, recently developed a new method for directly imaging Earth-like planets capable of sustaining life, and subsequently found signs of a Neptune-sized exoplanet in the Alpha Centauri star system, which is located in a zone that may offer suitable conditions for life. To achieve this, the team examined the Alpha Centauri stars A and B for nearly 100 hours over the course of a month using the "Very Large Telescope" in Chile, while also employing two sophisticated measurement techniques. These included using a new deformable secondary telescope mirror, which made it possible to correct for distortions in the light coming through the Earth's atmosphere, as well as using a coronagraph to alternately block the light from each of the stars in turn at very short intervals.



</web/2021/07-210217-6f>

## New Scientific Collaboration in Solar Research

(University of Lugano, February 24, 2021)

The University of Applied Sciences and Arts of Southern Switzerland (SUPSI) and the Istituto Ricerche Solari Locarno (IRSOL, affiliated to USI) recently signed a collaboration agreement that aims to foster research and innovation in the field of solar research through the development of a new type of high precision polarimetric camera. This will allow IRSOL to consolidate its leading position worldwide in the field of solar spectropolarimetric observation, and SUPSI to further develop its applied research in applied photonics and optoelectronics. Furthermore, this innovative technology also has several promising applications in other fields, such as providing medical diagnostics in real time, which could significantly improve the quality of surgery.



</web/2021/07-210224-fe>

## First Evidence of Global Tectonic Activity on Exoplanet

(University of Bern, March 04, 2021)

Researchers led by Tobias Meier from the University of Bern, as well as ETH Zurich, the University of Oxford and NCCR PlanetS, recently found evidence of global tectonic activity on a planet outside our solar system for the first time. To achieve this, the researchers ran computer simulations with different strengths of material and internal heating sources of the exoplanet "LHS 3844b", which is located 45 light-years from Earth and features a severe temperature contrast that ranges between 800°C on the day side and -250°C on the night side. While most of the team's simulations showed that there was only upwards flow on one side of the planet and downwards flow on the other, some also showed the opposite flow direction, thereby illustrating how a planetary surface and interior can exchange material under conditions very different from those on Earth.



</web/2021/07-210304-bc>

## "Plug & Produce" Concept for Cognitive Robot Platforms

(Bern University of Applied Sciences, March 15, 2021)

Dr. Norman Urs Baier, Head of the Institute for Intelligent Industrial Systems I3S at the Bern University of Applied Sciences, is leading a consortium made up of 17 partners from nine countries to develop and demonstrate a new, modular concept for cognitive robot platforms as part of the recently launched EU Horizon 2020 project "ACROBA". As explained by Baier, the aim is to enable SMEs to manufacture their goods based on a "plug & produce" concept in future, which would allow them to easily integrate robot systems into conventional development processes, as well as to ensure that these systems immediately understand instructions from product and assembly development. This would in turn help increase the



degree of automation in the mass production of customer-specific products, thereby reducing costs, enhancing performance and improving competitiveness.

[/web/2021/07-210315-bb](#)

## 8. Physics / Chemistry / Math

### Kristýna Kantnerová Wins 2021 METAS Award in Chemistry

(Empa, February 08, 2021)

The former Empa scientist Kristýna Kantnerová recently received the METAS Award 2021 in analytical chemistry for her PhD thesis, in which she took a closer look at nitrous oxide, better known as laughing gas, which is considered one of the major drivers of climate change, accounting for 6% of global warming. Specifically, Kantnerová developed a theoretical basis, as well as a novel analytical method for identifying and quantifying very rare, doubly substituted nitrous oxide isotopocules (isotopically substituted molecules), which constitutes an important step towards a better understanding of their formation and how to curb nitrous oxide emissions in the long term. Kantnerová is now continuing her research at ETH Zurich as a postdoctoral researcher in "Sustainable Agroecosystems" group.



[/web/2021/08-210208-4c](#)

### Evidence of Rare Higgs Boson Decay

(CERN, February 08, 2021)

Since the discovery of the Higgs boson in 2012, scientists in the ATLAS and CMS collaborations at the Large Hadron Collider (LHC) have been hard at work characterizing its properties and hunting down the diverse ways in which this ephemeral particle can decay. Now, ATLAS has found first evidence of the so-called "Dalitz decay", which is one of the rarest Higgs boson decays yet seen at the LHC and occurs when a Higgs boson decays to two leptons and a photon. With vast amounts of data expected from the upcoming High-Luminosity LHC program, studying rare Higgs boson decays will soon become the new norm, which will allow physicists to progress from reporting evidence for their existence, to confirming their observation and conducting detailed studies of Higgs boson properties – leading to ever more stringent tests of the Standard Model.



[/web/2021/08-210208-87](#)

### Mathematicians Catalogue All Tetrahedra With Rational Angles

(Quanta Magazine, February 10, 2021)

A group of four mathematicians, including University of Neuchâtel Professor Aleksandr Kolpakov, was recently able to catalogue all the tetrahedra with rational angles, thereby not only answering a basic question about shapes, but possibly also making it easier to find solutions to other equations in the future. Specifically, the researchers established that there are exactly 59 isolated examples plus two infinite families of tetrahedra that are configured in such a way so that all six dihedral angles have rational values, meaning each can be written neatly as a fraction. To achieve this, the mathematicians used techniques from number theory, and the proof's logic in particular hinges on solving a polynomial equation – a type of equation that features coefficients and variables raised to powers.



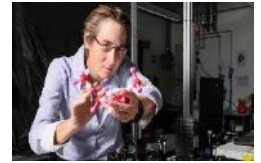
[/web/2021/08-210210-24](#)



## Investigating the Complexity of Aqueous Systems

(EPFL, March 03, 2021)

A team of EPFL scientists led by Professor Sylvie Roke recently discovered that hyaluronan – a polysaccharide that helps establish the viscosity of bodily fluids – influences the behavior of water molecules far more than previously thought, thereby marking a breakthrough in how scientists perceive water's role in biology. To achieve this, the researchers used a new method to better understand how hyaluronan interacts with water at the nanoscale, and found that hyaluronan molecules, which contain many negatively charged ions ("anions"), can orient water molecules over a distance of up to 1,600 water molecules, as opposed to only 3 water molecules, as previously thought. The researchers also discovered a second mechanism that orients water: the electrostatic field of the anions slightly changes the way in which water molecules connect to one another.



</web/2021/08-210303-31>

## New CERN Measurements Point to Physics Beyond Standard Model

(University of Zurich, March 23, 2021)

Researchers of the Large Hadron Collider beauty experiment (LHCb) at CERN, which also includes a group led by University of Zurich Professor Nicola Serra, recently released intriguing new measurements that strengthen hints for a deviation with respect to the theoretical expectations, which, if confirmed, point towards physics beyond the Standard Model, such as a new fundamental force. According to the Standard Model, it is expected that beauty quarks decay with the same probability into a final state with electrons and muons. However, since 2014, measurements at the LHC suggest that this "lepton universality" may be violated in some decays. Now, the ratio of decay products containing electrons and muons was determined with much better precision, and the results indicate evidence for a deviation from the ratio of one in some decays.

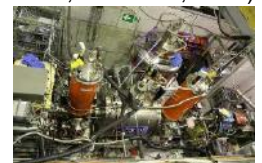


</web/2021/08-210323-18>

## Two New CERN Experiments to Transport Antimatter

(CERN, March 26, 2021)

The CERN Research Board recently approved the development of two new experiments to carry antiprotons from the Antimatter Factory to other facilities for antimatter and nuclear-physics studies. BASE-STEP and PUMA, as the experiments are called, are compact enough to be transported in a small truck or van and are expected to be operational in 2023. BASE-STEP is based on the BASE experiment, which aims to measure and compare the magnetic moments of protons and antiprotons to see if there are differences between the two – if found, such differences could shed light on the imbalance between matter and antimatter in the universe. PUMA on the other hand will transport antiprotons from the Antimatter Factory to CERN's nuclear-physics facility, ISOLDE, for investigating exotic nuclear-physics phenomena.



</web/2021/08-210326-b0>

## 9. Architecture / Design

### Digital Bamboo Pavilion

(ETH Zurich, February 05, 2021)

Students at ETH Zurich recently used innovative technology to create an extremely lightweight and filigree pavilion using bamboo, thereby demonstrating the possibilities of digital fabrication combined with natural construction materials. Bamboo is a rapidly renewable and high-quality raw material with extraordinary properties. As a building material, it can be compared with hardwood species, but due to its hollow core, it is





extremely light-weight and elastic. In this context, the students used this long-established material to create a pavilion weighing just 200 kg. Spreading in three directions to cover a total area of more than 40 m<sup>2</sup>, its minimal supports contribute to the etherealness of the structure. This design-to-fabrication process depends on digital technologies, using purpose-made digital design tools to generate this ultralight yet complex structure.

[/web/2021/09-210205-a8](#)

## PV Module Inspired Art

Despite the fact that there is plenty of space to generate energy on the exterior of buildings, as well as that it is now possible to manufacture aesthetically pleasing photovoltaic (PV) modules, PV façades are currently still rare. However, in an effort to change this, a group of students at the Lucerne University of Applied Sciences and Arts recently designed PV modules for a façade of NEST on the Empa campus, which simulate PV modules in a new guise of colors, patterns and motifs. During an online event to award the best projects, Florence Schöb's "Networked" design was subsequently selected as the winner by the participants, while a six-member jury selected Lynn Balli's "Glasklar" design as the official winning project, which will be installed on the façade of NEST in the summer of 2021.

(Empa, March 01, 2021)



[/web/2021/09-210301-59](#)

## Un-Dress Fashion Awards 2021

On the occasion of the ten-year anniversary of "Un-Dress" – a HSG student project led by Sina Bucheli and Loredana M. that aims to advance the discussion about sustainability in the fashion industry, as well as to demonstrate that there is no need to compromise between the latest fashion trends and sustainability – the university club oikos St.Gallen will be hosting the first "Un-Dress award show" on 21 April. As reported by Anna Schreiter, the event will present twelve sustainable fashion brands from Switzerland, as well as provide guests with the opportunity to experience the items of clothing in St.Gallen museums and parks worn by HSG students. Furthermore, viewers will have the chance to vote for their favorite fashion brand, and together with the expert opinion of a professional jury, the winning brand will be presented with the Un-Dress award.

(University of St.Gallen, March 29, 2021)



[/web/2021/09-210329-57](#)

# 10. Economy, Social Sciences & Humanities

## Push Messages Influence Trading Behavior

Following the analysis of trading data from over 240,000 customers of an online broker over a period of around two years, a team of researchers, including University of St.Gallen Professor Marc Arnold, was recently able to demonstrate that the messages sent by the providers have a significant influence on the users' trading behavior. According to the study, one intuitively obvious effect is that users trade many times more frequently after receiving a push message from the broker. Less obvious, but no less relevant, is the second important finding of the researchers: they were able to demonstrate that investors take significantly higher risks after receiving a message, which, as expressed by Arnold, is particularly alarming "if the customer group with limited financial means reached by online trading is tempted to take higher risks and thus to literally start gambling."

(University of St.Gallen, February 08, 2021)



[/web/2021/10-210208-26](#)

## Inefficiencies of Thematic ETFs

(University of Lugano, February 09, 2021)

Following the analysis of approximately 1,000 U.S. equity exchange traded funds (ETFs) – low-cost investment vehicles that passively replicate the performance of an index and can be traded continuously in the stock market – a team of researchers, including USI Professor Francesco Franzoni, recently revealed significant performance inefficiencies of the increasingly popular “thematic” ETFs. Specifically, although the increasing interest in investing according to good environmental, social and governance (ESG) principles is one of the main drivers for thematic ETFs, to which investors are attracted as a catalyst that could drive change, one of the problems with thematic ETFs is that by the time many investment ideas become fashionable, they have reached their market peak.



</web/2021/10-210209-08>

## Innovative Technologies to Tackle Social Problems

(Bern University of Applied Sciences, March 01, 2021)

The Bern University of Applied Sciences is launching the following two projects, which, under the leadership of Professor Mascha Kurpicz-Briki, will aim to solve social problems using innovative computational linguistics technologies: The "Diversifier-NLP" project aims to help companies use inclusive language in their job advertisements to reach the most diverse talent pool possible. To achieve this, researchers will collaborate with Witty Works, which developed the "Diversifier" to make job profiles attractive for female talent and people from diverse backgrounds; The second project, which is supported by the Swiss National Science Foundation, is entitled "BurnoutWords" and aims to use automation and digitalization to create new methods for recognizing and preventing burnouts.



</web/2021/10-210301-4d>

## IFZ FinTech study

(Lucerne University of Applied Sciences and Arts, March 03, 2021)

The Lucerne University of Applied Sciences and Arts recently published their annual "IFZ FinTech study", which aims to track the developments in the Swiss FinTech ecosystem, as well as to identify the trends related to the business models and challenges of the resident companies. According to the report, the Swiss FinTech sector has grown into a major provider of innovative solutions for the Swiss finance industry over the past few years, with 405 domestic FinTech companies being based in Switzerland at the end of 2020 (+6% compared to 2019). However, there were also signs that the sector's growth might be stalling, as "compared to other leading FinTech ecosystems, the conditions have deteriorated slightly in the past few years," as explained by Professor Thomas Ankenbrand, particularly for social and economic environmental factors.

</web/2021/10-210303-54>

## "Musical Memories" Increase Well-Being of People With Dementia

(University of Zurich, March 04, 2021)

A team of University of Zurich researchers led by Sandra Oppikofer, together with various clinical institutions, recently found that hearing sounds that are linked to positive experiences from the past can considerably increase well-being, especially for people with memory problems, as well as reduce depressive moods and alleviate behavioral problems. To come to this conclusion, nursing staff and carers played so-called "Music Mirrors" – recorded biographical recollections embedded in acoustic tracks – for patients with dementia over a period of six weeks during tricky everyday situations. The researchers also found that the overall mood of the carers and nursing staff improved as well, and that acute feelings of stress decreased. Furthermore, the perceived closeness between the caregivers and their patients with dementia increased.



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## 11. Start-ups / Technology Transfer / IPR / Patents

### "Startup Media House" Presents Startup Stories

(startupticker.ch, February 05, 2021)

The Startup Media House is a joint initiative by Startup Campus Switzerland, the Zurich University of Applied Sciences and Impact Hub Zurich, which aims to make startups more visible to the broad public by building a network of journalists and other content creators who cover the Swiss startup scene. Interested startups can submit their story to the "Startup Media House" page on startupticker.ch for their chance to be featured in an article on startupticker, which will also be sent to journalists who are interested in writing about startups. The Startup Media House is supported by Innosuisse, the Canton of Zurich and startupticker, and recently presented the first selected startups, which included: Pregnolia, Synhelion and Capacity Zurich.



</web/2021/11-210205-b8>

### Record Fundraising Year for EPFL Startups

(EPFL, February 05, 2021)

Despite the pandemic-related uncertainty and economic fallout, EPFL startups had an excellent year in 2020 when it came to fundraising – they attracted a record CHF 293M, and four of them, including Kandou and Sophia Genetics, even managed to bring in over CHF 20M each. ClearSpace also deserves special mention, as it won a CHF 93M contract from the European Space Agency to conduct further development work on its space debris removal system. The pipeline of new businesses also looks solid, with 25 new EPFL spin-offs having been launched in 2020 and 34 new business ideas currently being incubated at EPFL. Furthermore, a record number of EPFL women started their own businesses in 2020 and major technological advancements have been made in critical areas such as sustainability, the environment, energy and social responsibility.



</web/2021/11-210205-e9>

### University of Basel Accelerates Tech Transfer Activities

(startupticker.ch, March 01, 2021)

The University of Basel has been strongly pivoting towards supporting homegrown startups and entrepreneurial action, which for example can be seen in the following new initiatives: FEMtrepreneurs is a Basel-based grass-root movement of passionate women who are aiming to improve visibility and to empower female entrepreneurs. Next, the Propelling Grant aims to financially support high-risk / high-reward scientific discoveries from the University and validate them as a "Proof of Concept." The first two winners in 2020 were NextImmune with Dr. Rajesh Jayachandran and Dedomena, with CEO Virginia Hess and Professor Cedric Duchene-Lacroix. Dedomena is also one of the University's ten official 2020 spin-offs, along with Hornet Therapeutics, Mulier Health, NeoPrediX, Artifex Medical, Rekonas, Cryowrite, Con-Sense, Prosalute and a company in stealth mode.



</web/2021/11-210301-ad>

### ESA Incubator Switzerland Extended Until 2026

(ETH Zurich, March 03, 2021)

Representatives of ESA, ESA BIC Switzerland, ETH Zurich and the Swiss Space Office recently signed a new contract to renew the operation of the Business Incubation Center (BIC) of the European Space Agency ESA in Switzerland for another five years. ESA BIC Switzerland, operated by ETH Zurich, has been running since 4.5 years and has supported over 40 space startups across Switzerland so far.





The very positive feedback from the startups, partners and stakeholders of the Swiss startup ecosystem convinced all involved parties to extend the program.

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## First Swiss Femtech Startup Acceleration Program

(startupticker.ch, March 08, 2021)

The EPFL Innovation Park and Groupe Mutuel recently joined forces in order to launch "Tech4Eva" – a 9-month startup acceleration program which aims to provide an innovation platform for disruptive FemTech startups to join forces with forward-thinking corporations in order to advance and improve technologies relating women's health. To achieve this, the program will help selected startups refine their business models and go-to-market process strategy, as well as to meet investors and potential customers through thematic workshops, roadshows and personalized technical and business coaching. All startups or projects developing innovative solutions to foster women's health are welcome to apply to this program.



[/web/2021/11-210308-a3](#)

## 10-Year Anniversary of "TOP 100 Swiss Startups"

(Venturelab, March 09, 2021)

To celebrate the first 10 years of the "TOP 100 Swiss Startups", Venturelab recently published a special anniversary book entitled "World shapers of tomorrow: Startups building our future", which provides an in-depth overview of the significant impact that the 438 TOP 100 Swiss deeptech startups have had over the past decade. This for example includes the creation of 11,100 jobs, as well as raising CHF 6.1 billion from Swiss and international investors. Furthermore, the publication also highlights several disruptive companies that changed their industry, such as Beekeeper, Bestmile, Climeworks, Covagen, DeinDeal, Doodle, GetYourGuide, MindMaze, Scandit, and Piavita. Finally, a selection of 10 verticals illustrates how Swiss deeptech startups transform our lives and help us build a better and more sustainable future.

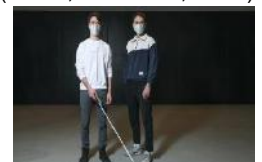


[/web/2021/11-210309-98](#)

## EPFL Changemakers

(EPFL, March 16, 2021)

Twenty EPFL students recently completed the first EPFL Changemakers program – a new joint initiative of EPFL Tech4Impact and EPFL's Start-Ups Unit, which is designed to help students develop leadership and entrepreneurial skills and flesh out their business ideas. Three of these projects for example included: Hikane (initiated by Raphaël Ausilio and Valentin Karam) – a small, affordable system that can detect obstacles for white canes, thereby making life easier for blind and visually impaired individuals; EcoLens (initiated by Alessandra Capurro) – a rating system tied to a database that restaurant managers can use to calculate the carbon footprint of the dishes on their menus; and Green Truck (initiated by Mohamed Khadri and Jules Courtois) – which aims to build a sustainable goods-delivery service by using large utility vehicles that are powered by renewable energy.



[/web/2021/11-210316-4e](#)

## Digital Female Founders

(Lucerne University of Applied Sciences and Arts, March 22, 2021)

A team of researchers led by Sylvie Oldenziel from the Lucerne University of Applied Sciences and Arts recently published a study entitled "Digital Female Founders", which illustrates the motivations, characteristic and competencies that digital female founders bring with them, as well as the path that their company took from the idea, to the foundation, to the present. When asked about the greatest challenges, the digital female founders who were interviewed for this study did not primarily mention gender aspects, but rather topics such as financing, team building, competition and personal well-being. However, the study





also demonstrated that gender-specific issues influence the entrepreneurial day-to-day work of female founders in various ways.

[/web/2021/11-210322-e8](#)

## HSG Founder of the Year 2021

(University of St.Gallen, March 26, 2021)

Dr. Dorina Thiess, representing Piavita, was recently elected as the University of St.Gallen Founder of the Year 2021 during St.Gallen's START Summit – Europe's largest student-run conference for entrepreneurship and technology. Dr. Thiess, together with Sascha Buehrle, founded Piavita in 2016 with the aim of revolutionizing veterinary medicine. Specifically, the company developed a palm-sized measuring device, which houses sophisticated sensors to non-invasively record equine vital signs in real time. Made with UV-resistant, soft-touch material, it is durable, water resistant, and comfortable for long-term use. In addition, Piavita, together with the University of Bern and ZHAW as project partners, and Innosuisse as their funding partner, is currently also developing an advanced birth alert and monitoring solution for equine breeders and vets, called "Piabreed".



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## 12. General Interest

### SNSF Introduces Gender Quotas in Its Evaluation Bodies

(Swiss National Science Foundation, February 05, 2021)

In an effort to help rebalance the gender disparity in academic leadership roles, as well as avoid situations in the future where only a small minority of women is involved in discussions and decision-making, the Swiss National Science Foundation is introducing gender quotas in its evaluation bodies with immediate effect. According to the new rules, men and women each need to hold a share of at least 40% in the Research Council and the Presiding Board, while in commissions focusing on a specific field, the quota is adapted to the respective research area. However, as explained by SNSF gender equality officer Simona Isler, "in disciplines with few women, female representation in SNSF bodies should be raised by around 20% above the average" – a target, which the SNSF hopes to achieve by 2026 at the latest.



[/web/2021/12-210205-96](#)

### Pixelvetica: Preserving Swiss Video Game Heritage

(EPFL, February 12, 2021)

GameLab UNIL-EPFL and the Musée Bolo recently helped to launch a new project called "Pixelvetica", which, in collaboration with Atelier 40a and the support of Memoriav, seeks to showcase and preserve Switzerland's video game heritage. This is important, because video games are extremely rich cultural objects, which comprise several different elements that pose distinct conservation challenges. For example, material interface between the player and the game must be physically maintained, while the source code and metadata must be extracted and archived on a stable medium. However, it is not merely the game itself that must be preserved, but also the cultural practices that develop around it, which is why Pixelvetica assembles a multidisciplinary team that unites competence in archival conservation with cultural and technical knowledge of video games.



[/web/2021/12-210212-5b](#)



## Innosuisse and SNSF Expand Cooperation

(Innosuisse, March 08, 2021)

In order to further bolster the interaction between science and innovation, the Swiss National Science Foundation and Innosuisse recently concluded an agreement, which not only reiterates their shared understanding of the fact that the innovation chain – from basic research to novel products and services – requires coordinated and efficient funding, but also expands their existing cooperation. Specifically, the agreement provides for greater coordination of funding portfolios and policies, while also strengthening cooperation and exchange at an operational and strategic level. For example, Innosuisse and the SNSF have decided to increase the budget of the jointly offered BRIDGE Program, which supports researchers who want to further develop their results with a view to a possible market entry, by 50% to CHF 105 million for the period from 2021 to 2024.

</web/2021/12-210308-75>

## Annual Innosuisse "Discover" Magazine

(Innosuisse, March 09, 2021)

Innosuisse recently published its annual "Discover" magazine, which enables readers to virtually immerse themselves in their funding activities, as well as to discover what it takes to create "world-leading innovation – Swiss-made." The magazine, which is available online, not only contains an insightful review and chronology of Innosuisse's 2020 financial year, but also features themed files on the topics of "What makes Swiss innovation world-class?", "Sustainability and innovation" and "Covid-19 – an opportunity for innovation." In addition, the magazine also highlights several inspiring projects, such as "A hero against food waste, "Our lungs on a chip", Hunting debris in space" and "Making more efficient use of the sun's energy", to name a few,



</web/2021/12-210309-ab>

## EPFL Survey on Women Graduate Careers

(EPFL, March 11, 2021)

An EPFL survey recently traced the careers of its women graduates for the first time and, together with several alumnae's personal accounts, illustrates how effectively these women have integrated into the job market, with 92% of them having reported that they had one or more paid activities. However, the survey also reveals the roadblocks to their professional advancement, such as that they sometimes have to work in unwelcoming environments, along with their hopes for greater gender equality. In this context, the survey suggests that constructive measures could include making alternative public policy choices, changing corporate cultures and building awareness of gender bias, as well as highlights the need to combat all forms of sexism and to encourage a more equal distribution of tasks at home.



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## Opportunity Barometer

(University of St.Gallen, March 16, 2021)

University of St.Gallen Professor Tina Freyburg recently presented the main statements of the special "Chancenbarometer", which was published on the occasion of 50 years of women's suffrage in Switzerland. According to the report, Swiss women are realistic optimists: they see the need for action and the opportunities in controversial issues, such as retirement provisions, immigration and climate change. However, despite the fact that studies on the work completed by women show that they can change existing conditions through individual action, many women nevertheless still regard politics as a sphere over which they, personally, cannot exert any influence. The Chancenbarometer therefore contends that the framework conditions need to be improved to give more women the confidence to help shape political engagement.



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## Introducing the Next Generation Researchers

(University of Zurich, March 24, 2021)

The University of Zurich recently published the latest edition of its "UZH Magazin", which, in particular, presents the following six up-and-coming young researchers who are embarking on a career in academia: Tommaso Patriarchi uses neurosensors to light up the brain and open up new avenues in brain research; Sarah Ebling is developing AI-based language technology that helps people with disabilities access the digital world; Raphaële Preisinger is exploring how Christians around the globe struggled for recognition in the early modern period; Stefan Dudli is using stem cells to find novel ways of treating back pain; Ana Guerreiro Stücklin analyzes brain tumors in children to improve our ability to target them; and Onicio Leal Neto founded a business and wants to harness digital technology to improve the health of children in Malawi.



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## 13. Calls for Grants/Awards

### Making Innovation a Reality – African Health Initiative

(University of Basel, February 28, 2021)

Making Innovation a Reality – African Health Initiative (MIRAH) is a new startup acceleration program, which aims to support the validation and scale-up of novel, equitable and sustainable solutions to systemic health challenges in low- and middle income countries. In this context, the program is currently seeking innovations that cover a broad range of health systems challenges addressing the equitable, efficient and effective distribution of vaccines (including but not limited to COVID-19 vaccines) in Sub-Saharan Africa. The deadline for submissions is 21 May, 2021. MIRAH is run by the University of Basel Innovation Office, the Swiss Tropical and Public Health Institute and the wider Swiss innovation ecosystem, on behalf of the Swiss State Secretariat for Education, Research and Innovation.



</web/2021/13-210228-6d>

### "R'Equip" Grants for Large-Scale Research Equipment

(Swiss National Science Foundation, March 12, 2021)

As part of the "R'Equip" funding scheme, the Swiss National Science Foundation is awarding grants for the acquisition and development of large-scale apparatuses in all areas of science. In this context, a grant pays for the acquisition of equipment worth at least CHF 100,000, and generally covers up to 50% of the acquisition costs. The maximum amount of a grant is CHF 1 million. Researchers who work at the envisaged location of the research equipment and are willing to assume part of the responsibility for its use and maintenance are eligible to submit an application until 2 May, 2021.



</web/2021/13-210312-16>

### Investigator Initiated Clinical Trials 2021

(Swiss National Science Foundation, March 14, 2021)

For the seventh time, the Swiss National Science Foundation is launching a call for clinical studies on topics that are outside the industry focus. Specifically, the "Investigator Initiated Clinical Trials" (IICTs) program targets researchers who wish to conduct an investigator initiated clinical trial and supports trials that are of value to the patients and address important unmet medical and societal needs, but which are not in industry focus. However, the IICT program does not provide support for non-randomized and uncontrolled studies. Researchers wishing to participate must submit a "letter of intent" by 25 May 2021, as well as their proposal by 1 November 2021, using the mySNF platform.

</web/2021/13-210314-ff>

## Young Researchers' Exchange Program with Japan

(ETH Zurich, March 28, 2021)

The Leading House ETH Zurich and the Japanese Society for the Promotion of Science recently established an instrument for funding the exchange of early career scientists between Japan and Switzerland. As part of this program, doctoral students (Master students and early career postdocs in exceptional cases) at Swiss institutions from all scientific fields – including social sciences and humanities – can apply for stays of 3-6 months in Japan, during which, the program will cover airfare and a living allowance in Japan. Switzerland-based prospective applicant must apply to ETH Zurich as the Leading House Asia by uploading the application form with the requested appendices in one single pdf document via the online application form online. The application deadline is 30 June 2021.



[/web/2021/13-210328-2d](#)

## Energy Research Program "SWEET"

(Swiss Federal Office of Energy, March 31, 2021)

The Swiss Federal Office of Energy recently launched the second call for proposals within the energy research program "SWEET" (Swiss Energy Research for the Energy Transition). The main theme of this call, which has a total budget of CHF 20 million, is "Living & Working", and in particular focuses on efficiency measures in everyday life. Applications are open to broad-based consortia in which partners from the private sector and public bodies (cities, municipalities) can also participate. The consortia can also submit proposals for accompanying P+D projects and further implementation measures. Up to an additional CHF 15 million are available for this from the P+D program. The deadline for pre-submissions is 16 June, 2021.



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## Upcoming Science and Technology Related Events

### MODVAL 17

April 20-22, 2021

<https://is.gd/T5mHcs>

Fuel Cells, Batteries, Modelling  
Sion

### SHIFT 2021

May 4, 2021

<https://is.gd/uXqGvZ>

Circular Economy, Procurement  
Kursaal (Bern)

### Business Ideas – Female Founders Edition

April 21, 2021, 2021

<https://is.gd/QiNL2T>

Startups, Innovation  
Online

### Sino-Swiss Energy Innovation Forum

May 6-7, 2021

<https://is.gd/ZWueRu>

Renewables, Energy Grid, Innovation  
Online

### Startup Champions Seed Night 2021

April 29, 2021

<https://is.gd/tglHMx>

Startups, Fundraising, Networking  
Hybrid Event

### Swiss Conference on Data Science

June 9, 2021

<https://is.gd/WRYD7d>

Data Science, Business, Innovation  
KKL Lucerne or Online



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

**State Secretariat for Education, Research and Innovation SERI**  
Swissnex in China

**Innosuisse**

**Swiss Federal Office of Energy SFOE**



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