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Switzerland.

Science-Switzerland, August – September 2022

News on Swiss science, technology, education and innovation

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TOP 100 Swiss Startups 2022

(Venturelab, September 07, 2022)

Widely recognized as a benchmark in Switzerland's startup ecosystem, the TOP 100 Swiss Startup Award – often referred to as the "Swiss Oscar for startups" – recently unveiled the 100 most innovative and promising Swiss startups of 2022. Yokoy, which developed an AI-based, all-in-one spend management platform that combines expense management, supplier invoice management and smart corporate cards, led this year's ranking, followed by Planted (2nd), which is revolutionizing the food industry by creating plant-based proteins made of 100% animal-product-free ingredients, and the equity management platform "Ledgy" (3rd), which helps startups manage their cap table, employee participation plans, funding rounds, and investor relations.
/web/2022/00-220907-02

Ursula Keller Wins Swiss Nobel Science Prize

(ETH Zurich, September 12, 2022)

ETH Zurich physics Professor Ursula Keller recently received the Swiss Science Prize Marcel Benoist – generally regarded as the "Swiss Nobel Prize" among researchers – for her pioneering work in ultrafast lasers. Keller not only invented the revolutionary "SESAM" technology in 1991, which makes it possible to send light pulses from solid-state lasers at femtosecond intervals, thereby enabling previously unimaginably precise interventions in science, industry and medicine, but she also invented the world's most precise clock – the attoclock – which can measure in attoseconds – i.e. in billionths of a billionth of a second – and is thus so accurate that it can be used to measure the fundamental processes of quantum mechanics. Keller was moreover the first woman to be appointed professor of physics at ETH Zurich.
/web/2022/00-220912-b8

Switzerland Remains World's Most Innovative Country

(startupticker.ch, September 29, 2022)

Switzerland was recently named as the most innovative country in the world by the Global Innovation Index (GII) for the 12th consecutive year – an extraordinary feat attesting to the strength of the Alpine nation's innovation ecosystem, as well as of the quality of its public higher education and research institutions. Switzerland in particular topped the charts in innovation outputs, ranking 1st in both "knowledge and technology outputs," as well as in "creative outputs, while also placing among the top five in "institutions" (2nd), "human capital and research" (4th), and "infrastructure (4th). The report moreover highlighted that Switzerland produces considerably higher levels of outputs than other high-income economies at comparable levels of innovation inputs. Switzerland was followed by the United States in second place, and Sweden in third.
/web/2022/00-220929-f0

1. Policy

SNSF Multi-Year Program: 2025-2028

(Swiss National Science Foundation, August 31, 2022)

The Swiss National Science Foundation recently released its multi-year program for the 2025-2028 period, which defines the following four priority areas to support Swiss-based researchers: First, the SNSF is proposing additional measures to overcome the threat of isolation. Second, the SNSF intends to support and improve collaboration between scientists and stakeholders outside academia so that research results can be made use of faster and on a larger scale. Third, the SNSF intends to fund transdisciplinary research that is especially effective in supporting sustainable development goals. And finally, the SNSF aims to provide specific offers for young researchers to advance digitalization in research.
/web/2022/01-220831-e6

Catalyzing One Health With Swiss Diplomacy

(University of Geneva, September 28, 2022)

A team of researchers led by the University of Geneva and the Geneva Science-Policy Interface, in partnership with the Swiss Tropical and Public Health Institute and the Geneva Health Forum, recently published a new policy brief, entitled "Catalyzing One Health with Swiss diplomacy", which proposes three key recommendations and 13 action points to leverage Switzerland's scientific and diplomatic role in One Health. This is an important development, because as underlined by Dr. Rafael Ruiz de Castañeda, Geneva and Switzerland constitute a vital space of scientific excellence and diplomatic tradition, which can unleash the full potential of One Health as a tool for global health governance and action to better prevent, prepare and respond to the next pandemic.
/web/2022/01-220928-42

2. Education

AR Training App for Dental Students

(ETH Zurich, August 04, 2022)

A team of researchers led by Jascha Grübel from the ETH Game Technology Center, as well as Professor Bernd Stadlinger from the ETH AI Center and the Clinic for Cranio-Maxillofacial and Oral Surgery at the Center for Dental Medicine in Zurich, recently developed a new educational app, called AR Osteoclast, which enables dental students to playfully learn about the process of bone resorption by using augmented reality. Specifically, students can use the AR Osteoclasts app to scan certain images in the textbook "Cell-to-Cell Communication: Cell Atlas – Visual Biology in Oral Medicinecall", which in turn teleports them onto the bone surface, right next to a blood vessel, and enables them to not only investigate the bone resorption process from all sides, but also to interact with cells to learn more about their function.
/web/2022/02-220804-08

Empowering Young People on International Youth Day

(EPFL, August 12, 2022)

On the occasion of this year's International Youth Day, EPFL recently provided an insightful overview of how the following two summer programs are helping to empower young people to develop innovative and entrepreneurial solutions for the future in the fields of computer- and communication science: Open to international Bachelor and Master students, Summer@EPFL offers participants a 3-month

summer fellowship to learn new skills, as well as to gain hands-on experience in their chosen field while collaborating with leading senior scientists. In addition, the School of Computer and Communication Sciences also offers an EPFL summer program, called "You too can create your app", which is specifically designed to encourage teenage girls to become interested in mathematics and computer science.
/web/2022/02-220812-d3

Joint USI-SUPSI Master of Advanced Studies in Business Law

(SUPSI, August 16, 2022)

The University of Applied Sciences and Arts of Southern Switzerland (SUPSI) Università della Svizzera italiana (USI) recently signed an agreement to launch the second edition of their joint Master of Advanced Studies (MAS) in Business Law, which will welcome its first cohort on 9 September 2022. This newly-designed program, which will be directed by Professors Samuele Vorpe and Federica De Rossa, aims to strengthen and professionalize the figure of the business lawyer as an external or internal consultant to a company by not only providing students with vital knowledge and skills related to corporate law on the cantonal, federal and international level, but also to finances, such as valuing a company or reading a business plan.
/web/2022/02-220816-75

OST Launches Institute for Social Work During Life Course

(Eastern Switzerland University of Applied Sciences, September 05, 2022)

The Eastern Switzerland University of Applied Sciences (OST) recently launched its second institute – called, the Institute for Social Work During Life Course (Institut für Soziale Arbeit im Lebensverlauf, ISAL) – thereby further expanding its research, service and further education activities. Specifically, the ISAL deals with different life situations and living environments of people of all ages and develops support options for addressees in their psychosocial relationships. At the same time, social and political frameworks for the integration of different living conditions are considered, while also developing theoretically sound solutions to urgent ethical problems within the institute's Center for Ethics and Sustainability (Zentrum für Ethik und Nachhaltigkeit ZEN).
/web/2022/02-220905-e1

University of Zurich Joins Age-Friendly University Network

(University of Zurich, September 08, 2022)

The University of Zurich recently became an official member of the global network of Age-Friendly Universities, which is committed to meeting the needs of older community members through educational programs, research projects, health, and wellness activities, as well as cultural activities. Significantly, this makes it the first university in the German-speaking world to achieve this designation. This is an exciting development, as it not only recognizes UZH's longstanding efforts to provide quality and flexible opportunities for lifelong learning, such as through its low-threshold educational, cultural, and sports programs, but it also reaffirms its commitment to continue to do so in the future by, for example, providing support for relevant research projects, helping older learners access libraries and library media, and combating possible cases of systemic ageism.
/web/2022/02-220908-71

3. Life Science

Improved COVID-19 Vector Vaccine Candidate

(Institute of Virology and Immunology, August 02, 2022)

A team of researchers led by Gert Zimmer and Charaf Benarafa of the Institute of Virology and Immunology (IVI) and the University of Bern recently succeeded in optimizing a promising new Vesicular Stomatitis Virus (VSV)-vectored COVID-19 vaccine candidate, which was originally developed, but ultimately abandoned, by scientists in the USA and Israel, such that it could trigger a superior immune response to SARS-CoV-2 in pre-clinical animal models. Specifically, the team found that by adding the VSV G glycoprotein to the viral vector, intramuscular immunization resulted in high titers of spike antigen-specific neutralizing antibodies, even after a single immunization.
/web/2022/03-220802-33

First Full Connectivity Map of Human Immune System

(ETH Zurich, August 03, 2022)

A team of researchers from the Wellcome Sanger Institute and ETH Zurich recently created the first full connectivity map of the human immune system, thereby not only offering an unprecedented insight into the intercellular wiring of the human immune system, but also providing a new tool that can be used to help highlight promising proteins and pathways for therapeutic interventions. This is an exciting development, because possessing an in-depth understanding of the interactions between immune cells, as well as how this communication fits into the human body as a whole, is not only vital for the development of so-called immunotherapies – treatments that enhance the immune system in order to fight disease – but also for the prevention and treatment of autoimmune diseases.
/web/2022/03-220803-7b

Using AI to Fight Infectious Diseases

(University of Applied Sciences and Arts Northwestern Switzerland, August 03, 2022)

For the past three years, a team of researchers led by Dr Eriberto Natali and Professor Enkelejda Miho from the FHNW School of Life Sciences has been using artificial intelligence to search for antibodies that protect against dengue virus. To achieve this, the team first sequenced B cell repertoires, which provide the blueprint of the antibodies that the team was looking for, from mice that had been immunized against the dengue virus, before subsequently using high-throughput sequencing to obtain several million gene sequences from each mouse. Then, by applying network theory and using machine learning algorithms that can recognize patterns in these huge amounts of data, the team was able to identify rare, strong, neutralizing antibodies, which had been elicited in response to immunization.
/web/2022/03-220803-b3

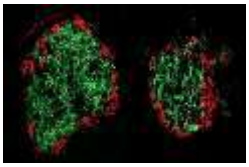
Probiotic Approaches to Combat Legionella

(Eawag, August 09, 2022)

A team of researchers led by Eawag doctoral student Alessio Cavallaro and group leader Frederik Hammes recently published a new review article, in which they outlined several potential probiotic approaches to curb the growth of one of the most reported waterborne-associated pathogens in industrialized countries: bacteria of the genus Legionella. This is a significant development, because although legionellosis is currently still rare, as well as usually mild, cases have not only doubled in the last ten years in Switzerland, which, according to Cavallaro, is a cause for concern, but the bacteria can also trigger a type of pneumonia known as "Legionnaires' disease," which is sometimes fatal. As such, the team ultimately hopes to be able to derive measures to control the growth of Legionella from findings on ecological interactions.
/web/2022/03-220809-ca

Detecting Diabetes Before First Symptoms Appear

(University of Geneva, August 16, 2022)



A team of researchers led by University of Geneva Professor Pierre Maechler and postdoctoral researcher Cecilia Jiménez-Sánchez, in collaboration with colleagues from the HUG, recently found that they could identify the development of diabetes in at-risk people before any symptoms appear, and thus prompt actions to be taken before the situation becomes irreversible, by measuring the level of a small sugar known as "1.5-anhydroglucitol" in the blood. This is a significant development, because as explained by Maechler, this molecule can be easily be identified by a simple blood sampling, followed by an inexpensive specific test, and could thus lead to major progress in the monitoring of people at risk.
/web/2022/03-220816-5c

Automatic Zebrafish Embryo Inspection and Sorting Machine

(EPFL, August 19, 2022)

After years of research and development, EPFL spin-off Bionomous is preparing to bring an innovative new machine to market, which can significantly reduce the time it takes to sort Zebrafish eggs from several hours to just a few minutes. To achieve this, the machine uses a microfluidic system to capture individual specimens, ejecting them one by one onto a notched wheel. As the wheel turns, the eggs go under a camera, whose images are subsequently processed by an artificial intelligence system: healthy specimens are pipetted onto a screening plate or into a petri dish, while rejected samples are sent to a separate container. Excitingly, the machine moreover supports fluorescent imaging in genetically modified specimens, thereby enabling scientists to observe features, such as blood vessels and neurons, in real time
/web/2022/03-220819-6a

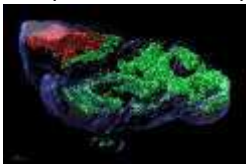
Improving Personalized Care for Female Heart Attack Patients

(University of Zurich, August 29, 2022)

An international team of researchers led by University of Zurich Professor Thomas F. Lüscher and Florian A. Wenzl recently conducted a detailed investigation into the role of biological sex in heart attacks, and found that there are not only notable differences in the disease phenotype observed in females and males, but also that established risk models, which guide current patient management, are less accurate in females, and thus favor the under-treatment of female patients. Based on these findings, the team subsequently used a machine learning algorithm, as well as the largest datasets in Europe, to develop a new, artificial-intelligence-based risk score, which accounts for sex-related differences in the baseline risk profile and improves the prediction of mortality in both sexes.
/web/2022/03-220829-4c

Overview of Technological Advances in Cancer Therapy

(University of Bern, September 01, 2022)



A team of researchers led by Dr. Dilara Akhoundova and Professor Mark Rubin from the University of Bern and the Insel Gruppe recently published an insightful overview of the latest advances in multi-omics tumor profiling, thereby not only providing a critical analysis of the current stages of the translational validation of these technologies, but also a stimulating discussion of future perspectives for their integration into precision treatment. This is an exciting development, because despite their promising potential, there are still a number of hurdles to overcome before these groundbreaking technologies can be used in the clinic. For example, they still need to be standardized, require regulatory approval, as well as often necessitate clinics to update their infrastructure in order to be able to evaluate the significant volume of data generated.
/web/2022/03-220901-17

First Molecular 3D model of Ciliary Base

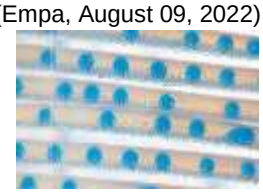
(University of Basel, September 19, 2022)

By combining cryo-electron tomography with data from Expansion Microscopy, a team of researchers led by Professor Ben Engel and Hugo van den Hoek from the Biozentrum was recently able to reconstruct the first molecular model of the ciliary base and observe how it regulates the assembly and entry of large trains of proteins, which carry important cargos out to the ciliary tip and back to the base. This is an exciting development, because as explained by Engel, understanding the transport system and its logistics in detail not only helps them understand how cilia are built and function, but it could also provide new ideas for therapies to defects, which can cause a wide variety of diseases, such as heart, kidney, and lung diseases, blindness or infertility.
/web/2022/03-220919-c8

4. Nano / Micro Technology / Material Science

High-Entropy Ceramic Materials of the Future

(Empa, August 09, 2022)



A team of researchers led by Empa scientists Michael Stuer and Amy Knorpp are currently manufacturing and investigating a mysterious class of entropy-stabilized materials – known as high-entropy ceramics – which are particularly stable at extremely high temperatures and could, thus, for example be used for energy storage and chemical production processes. In this context, the team is in particular working to produce entropic crystals with highly reactive surfaces, which could facilitate and accelerate a chemical reaction that involves combining CO2 and hydrogen to form methane – i.e. transforming a greenhouse gas into a sustainable, storable fuel – as well as developed a special synthesis device – called the "Segmented Flow Tubular Reactor" – to accelerate the progress.
/web/2022/04-220809-f3

High-Tech Patch Seals Surgical Sutures on Intestine or Stomach

(ETH Zurich, August 10, 2022)

As part of his PhD, ETH Zurich Pioneer Fellow Alexandre H. C. Anthis, under the supervision of Professor Inge K Herrmann, recently developed an innovative, high-tech patch, which can not only completely seal surgical sutures on the intestines or the stomach, but also provides an early indication of whether those sutures are leaking. This is an exciting development, because the new patch could in turn not only help prevent serious complications, but also massively cut costs throughout the healthcare system, as complications often result in longer stays in intensive care and lengthy recovery times. To achieve this, Anthis's patch is based on a hydrogel, which contains certain chemical sensor elements that either react to changes in pH caused by escaping gastric acid, or to certain enzymes present in the intestine.
/web/2022/04-220810-97

Ultrasound-Induced Cavitation Enables Tough and Controllable Bioadhesion

(ETH Zurich, August 19, 2022)

Following the discovery by Professor Jianyu Li and his group at McGill University that they can use ultrasound to very effectively stick hydrogel plasters to the skin without the need for chemical bonding, a team of researchers led by ETH Zurich Professor Outi Supponen and her postdoctoral researcher Claire Bourquard, was recently able to uncover the underlying mechanism of these very firm and long-lasting bonds: captivation. Specifically, the researchers explained that the ultrasound creates special bubbles, known as

cavitation bubbles, within the adhesive on the underside of the hydrogel, which immediately implode and cause them to morph into a mini-jet that shoots towards the surface of the skin. There, they subsequently ram molecular components of the adhesive into the epidermis, thereby firmly attach the gel plaster to the skin.
/web/2022/04-220819-b4

"Brain-Like" Memory Effect in Vanadium Dioxide

(EPFL, August 23, 2022)

A team of researchers led by EPFL PhD student Mohammad Samizadeh Nikoo and Professor Elison Matioli recently discovered that they could track an arbitrarily manipulated structural state of a compound known as Vanadium Dioxide (VO2) for up to three hours after an external stimulus – in this case, an electric current – had been applied, thereby making it the first material to be identified as possessing this property. This is an exciting development, because these glass-like functional devices could not only outperform conventional metal-oxide-semiconductor electronics in terms of speed, energy consumption and miniaturization, but also provide a potential route to neuromorphic computation and multilevel memories.
/web/2022/04-220823-0b

5. Information & Communications Technology

Ultracold Circuits

(University of Basel, September 22, 2022)

By improving a special refrigerator and a low-temperature thermometer, an international team of researchers led by University of Basel Professor Dominik Zumbühl, together with colleagues from VTT and Lancaster University, was recently able set a new low-temperature record by cooling an electric circuit on a chip down to 220 microkelvin. This is an exciting development, because it not only constitutes an important achievement for basic physics research, but it also helps pave the way towards a range of applications in quantum technologies, such as the optimization of qubits in quantum computers. To achieve this, the team first exposed a tiny electric circuit made of copper on a silicon chip to a strong magnetic field, before cooling it with a cryostat and eventually ramping down the magnetic field, thereby further cooling it.
/web/2022/05-220922-fe

Naturally-Behaving Virtual Humans

(ETH Zurich, September 23, 2022)

As part of the FAA Revisited project at the Guggenheim Museum Bilbao, an interdisciplinary team of researchers led by ETH Zurich Professors Siyu Tang, Fabio Gramazio and Matthias Kohler recently populated a vertical pedestrian drone-built city with autonomous avatars, thereby not only enabling them to build on their previous research on modelling virtual humans, who can move naturally through their environment for extended periods of time, but also to highlight the exciting potential of collaborations between world-class experts in different fields – in this case, architecture and computer sciences. In this context, Tang and her team recently also launched a second ambitious project with leading partners from academia and industry to develop innovative simulation tools for surgeons to perfect their craft.
/web/2022/05-220923-ce

Deep-Learning-Based Framework to Efficiently Generate Kinetic Models

(EPFL, September 28, 2022)

A team of researchers led by EPFL doctoral student Subham Choudhury, as well as co-principal investigators Professor Vassily Hatzimanikatis and Ljubisa Miskovic, recently released a new, deep-

learning based computational framework, called REKINDLE, which significantly reduces the computational efforts needed to generate kinetic models with dynamic properties matching the ones observed in cells. This is an exciting development, because the novel method not only has a wide range of direct biotechnological applications, as kinetic models constitute important tools for various studies, including bioproduction, drug targeting, microbiome interactions, and bioremediation, but, given that it uses standard, widely used Python libraries, it is also very accessible and easy to use.
/web/2022/05-220928-c3

Computational Shortcut for Neural Networks

(University of Basel, September 30, 2022)

A team of physicists composed of University of Basel PhD students Julian Arnold and Frank Schäfer – both from the research group of Professor Christoph Bruder – recently succeeded in deriving mathematical expressions, which make it possible to directly identify phase transitions from experimentally accessible data without having to train a neural network. This is an exciting development, as it not only considerably reduces computing time, but the derived equations also provide vital insights into the functioning of neural networks, and, by extension, of the physical systems under investigation. Encouragingly, this novel method could potentially even make it possible to detect currently-unknown phase transitions in the future, such as in quantum simulators or in novel materials.
/web/2022/05-220930-ad

6. Energy / Environment

State-of-the-Art Global Fluoride Hazard Map

(Eawag, August 11, 2022)

By combining a new, machine-based model, as well as more than 400,000 measurements, a team of Eawag researchers led by Joel Podgorski and Michael Berg was recently able to produce a detailed map of global fluoride contamination in groundwater for the first time. This is a significant development, because the map not only demonstrates – with a high resolution of 250 meters – where there is a risk of fluoride limits being exceeded, but it also enables researchers to estimate how many people worldwide are at risk from fluoride exposure, based on population figures, as well as data on water consumption. In this context, the team found that approximately180 million people worldwide could potentially be exposed to fluoride contaminated groundwater.
/web/2022/06-220811-81

New Classification Tool to Evaluate Positive Impact of Nonnative Species

(University of Fribourg, August 11, 2022)

A team of researchers led by Dr. Giovanni Vimercati from the group of University of Fribourg Professor Sven Bacher, along with several international experts, recently developed a new classification tool, called "EICAT+", which will enable environmental protection specialists, along with policy-makers, to better gauge the effects that alien species have on the local environment, by also factoring in their positive impacts. To achieve this, EICAT+ evaluates the impact of nonnative species using five semi-quantitative scenarios, which can describe and measure the extent of observed positive effects on biodiversity. This in turn not only make it possible to grasp the underlying mechanisms, but also to determine if their effects on indigenous flora and fauna prove reversible once the nonnative species have been removed.
/web/2022/06-220811-e1

Photovoltaic Potential in Switzerland

(Bern University of Applied Sciences, August 15, 2022)

Bern University of Applied Sciences Professor Christof Bucher recently published an insightful overview, which not only summarizes the potential of various PV system types, but also assesses their relevance for winter electricity production in Switzerland. In this context, Bucher in particular demonstrates that although PV potential is spread over a variety of types of systems, it is important to note that each comes with different advantages and disadvantages. In addition, Bucher's overview also illustrates that Switzerland's existing PV installations generate a fairly modest level of energy in January, but are already producing close to their maximum output at the low point of the reservoirs in April/May.
/web/2022/06-220815-57

Frequency and Drivers of Compound Events in Ocean

(University of Bern, August 16, 2022)

Using monthly open-ocean observations over the period 1982–2019, a team of researchers led by University of Bern Professor Thomas Froelicher as well as postdoctoral researchers Friedrich Burger and Jens Terhaar, recently found that marine heatwaves not only co-occur with extreme ocean acidity events relatively often, but also that these so-called "compound MHW-OAX events" will likely continue to increase in the future due to global warming, and thus potentially cause severe impacts on marine ecosystems. This is a significant development, because although scientists have investigated marine heatwaves for a few years, relatively little is still known about how marine heatwaves co-occur with other extreme events, such as high acidity levels, in the ocean.
/web/2022/06-220816-37

Historical Perspective on Glacial Retreat

(ETH Zurich, August 22, 2022)

A team of researchers led by Erik Schytt Mannerfelt and Professor Daniel Farinotti from ETH Zurich and WSL recently reconstructed the extent of Switzerland's glacier ice loss in the 20th century for the first time, and found that, alarmingly, the country's glaciers lost half their volume between 1931 and 2016. The team also found that not all glaciers are losing mass at the same rate, but rather, that the extent to which they have decreased in volume depends primarily on three factors: the altitude at which a glacier is located; how flat the glacier snout is; and the amount of debris on the glacier. Rather worryingly, the authors moreover warn that the total glacier volume is decreasing at an ever faster rate.
/web/2022/06-220822-3a

Transforming Concentrated Solar Light, Heat and Water Into Hydrogen

(EPFL, August 24, 2022)

A team of researchers led by EPFL Professor Sophia Haussener recently developed an innovative high-temperature electrolysis reactor, which not only allows for the use of earth-abundant materials, but also significantly increases the solar-to-fuel efficiency, compared to low-temperature electrolysis. To achieve this, the team not only utilize concentrated solar radiation to generate high temperatures (> 700°C) for reactant heating, as well as electricity from PV cells to power the electrolyzer, but they also developed a sophisticated design for the solar absorber, which reduces thermal stress in the electrolyzer made of ceramics. Encouragingly, the novel design approach showed a potential of 20% solar-to-hydrogen efficiency, which, according to the researchers, could be further improved by scaling-up the technology.
/web/2022/06-220824-ee

Unprecedented High Temperatures in Arctic Since 7,500 Years

(WSL, August 25, 2022)

Using annually resolved tree-ring records, an international team of researchers from WSL, the University of Geneva, the Institute of Plant and Animal Ecology of the Ural Division of the Russian Academy of Sciences, as well as the University of East Anglia, recently reconstructed the summer temperature

variability at Yamal Peninsula – a hotspot of recent warming – over the past 7,638 years. In doing so, the team was not only able to demonstrate that the rate of industrial-era warming, as well as the magnitude of the temperature anomalies in recent decades, significantly exceed any natural variation, but also that they have elevated the summer temperature to levels above those reconstructed for the past seven millennia – in both the 30-year mean, as well as the frequency, of extreme summers.
/web/2022/06-220825-d0

Commercializing Innovative "Power-to-Gas" Approach

(Paul Scherrer Institute, September 05, 2022)

The Paul Scherrer Institute recently signed a cooperation and licensing agreement with the startup AlphaSYNT in order to commercialize an innovative, new "power-to-methane" approach, called "direct methanation", which provides a more efficient way to not only convert renewable energy sources, such as sewage slurry, into biogas, but also to subsequently store the energy in the form of methane gas. This is an exciting development, because unlike current procedures, which need to separate carbon dioxide (CO2) from the biogas in order to make it pure enough – i.e. containing at least 96 percent methane – to be efficiently used in the natural gas grid, the new method simply mixes the CO2, hydrogen, and biogas in a catalytic fluidized bed reactor, which in turn triggers a chemical reaction that allows additional methane to be produced.
/web/2022/06-220905-52

ETH Board Invests in Additional Climate Protection Measures

(ETH Board, September 22, 2022)

The ETH Board recently decided to allocate CHF 10 million to support additional climate protection measures within the ETH Domain, which aim to further reduce its energy consumption, to produce more renewable energy, as well as to cut its CO2 emissions by approximately 4%. This is an exciting development, because owing in part to their large-scale research infrastructure, the ETH Domain institutions have high energy requirements and depend on having a reliable energy supply. In this context, the new funding will, among others, fund a geothermal probe field at ETH Zurich, the installation of additional photovoltaic equipment at all six institutions of the ETH Domain, efficiency improvements at research facilities, as well as the upgrading of buildings for increased energy efficiency.
/web/2022/06-220922-1a

7. Engineering / Robotics / Space

James-Webb Detects Carbon Dioxide in Exoplanet Atmosphere

(University of Geneva, August 25, 2022)

Using the Webb Telescope's Near-Infrared Spectrograph (NIRSpec) instrument, an international team of researchers, which also included the participation of the University of Geneva, the University of Bern and the NCCR PlanetS, recently detected a clear signal of carbon dioxide on a planet outside the solar system – namely, WASP-39b – for the first time. This is a significant development, because as explained by co-author Elspeth Lee, the clear detection of carbon dioxide in WASP-39b not only provides them with valuable information about the inventory of carbon and oxygen molecules in the atmosphere, but it also gives them an idea of the diverse chemical processes that take place in atmospheres under such extreme conditions, as well as of the possible rock and gas material that the planet may have picked up during its formation phases.
/web/2022/07-220825-55

New Center for Origin and Prevalence of Life

(ETH Zurich, September 02, 2022)

ETH Zurich recently opened a new “Center for Origin and Prevalence of Life”, where, under the leadership of Noble Laureate, Didier Queloz, more than 40 research groups from five departments will work together with their counterparts across the world to investigate the mysteries of the origins of life on- and beyond the Earth. This is an exciting development, because despite already possessing diverse scientific perspectives into our universe’s past, researchers agree that to get to the bottom of life’s greatest mysteries, they need to build bridges between disciplines. In this context, the center will not only focus on four main research areas, but, in addition, numerous research collaborations with international institutions and a new teaching program are to be established, as well as up to six new professorships at ETH Zurich.
/web/2022/07-220902-58

1,000 Days of CHEOPS

(University of Bern, September 12, 2022)

After more than one thousand days in orbit, the CHEOPS telescope – a joint mission by ESA and Switzerland, under the aegis of the University of Bern, in collaboration with the University of Geneva – has demonstrated its functionality and precision beyond expectations, revealing the characteristics of numerous exoplanets, and thus becoming a key instrument for astronomers in Europe and worldwide. During this time, the CHEOPS Science Team, which comprises over 100 researchers working at dozens of institutions all over Europe, has published, or is currently in the process of submitting, over 50 scientific papers. Encouragingly, the team moreover contend that even after 1,000 days in orbit, CHEOPS still works like a charm, and will thus continue to serve the scientific community well until at least September 2023.
/web/2022/07-220912-ff

3D-Printing Swarm of Drones for Construction and Repairs

(Empa, September 21, 2022)

An international team of researchers led by drone expert Mirko Kovac from Empa and the Imperial College London recently developed an innovative, new approach to 3D printing, which enables a swarm of bee-inspired, cooperative drones to work as a team to print 3D materials while flying. This is an exciting development, because as explained by the team, this novel solution is not only scalable, but it could also be used to build and repair structures in unbounded, high or other hard-to-access locations. To achieve this, the new system – known as "Aerial Additive Manufacturing" (Aerial-AM) – not only uses two types of drones, but it also employs a 3D printing and path-planning framework, which enables the drones to adapt to variations in geometry of the structure as a build progresses.
/web/2022/07-220921-a1

New Advanced Manufacturing Center: M2C

(EPFL, September 28, 2022)

EPFL and CSEM recently joined forces to launch a new center for high-precision, advanced, and additive manufacturing technologies – called the Micromanufacturing Science & Engineering Center (M2C) – which will not only catalyze collaboration between academic, institutional, and industrial partners, but it will also serve as an education and training platform for members and users alike. This is an exciting development, because as explained by Bruno Studach, the operational director of advanced manufacturing at EPFL, 3D fabrication methods are raising the bar for precision and digitization, shifting the industrial landscape and taking us toward a future in which objects and computers are increasingly connected.
/web/2022/07-220928-f3

8. Physics / Chemistry / Math

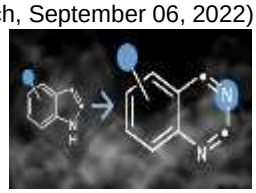
Novel Method to Create Electron-Photon Pairs

(EPFL, August 24, 2022)

A team of researchers from EPFL, the Max Planck Institute for Multidisciplinary Sciences and the University of Göttingen, was recently able to demonstrate a novel method for generating cavity-photons using free electrons in a form of pair states, thereby not only enabling them to precisely detect the involved particles, but also to expand the toolbox of quantum technology. To achieve this, the team used specially fabricated photonic structures to pass the beam of an electron microscope on a built-in integrated photonic chip, which consists of a micro-ring resonator and optical fiber output ports. In this context, whenever an electron interacts with the vacuum evanescent field of the ring resonator, a photon can be generated, thereby causing the electron to lose the energy quantum of a single photon, as well as the system to evolve into a pair state.
/web/2022/08-220824-87

New Reaction Facilitates Drug Discovery

(ETH Zurich, September 06, 2022)



A team of researchers led by ETH Zurich doctoral student Julia Reisenbauer and Professor Bill Morandi recently developed a simple, yet robust, method to expand the five-membered ring of indoles – which occur as a basic core structure in hundreds of natural substances and drugs, such as the sleep hormone melatonin, or the neurotransmitter serotonin – into a six-membered ring by inserting an additional nitrogen atom. This is an exciting development, because as explained by Morandi, although processes for adding a carbon atom to such a ring system have already been developed, similar techniques, which allow for the insertion of a nitrogen atom – which often brings added value in a biological context – are extremely rare.
/web/2022/08-220906-38

9. Architecture / Design

Promoting Sustainable Construction With Low-Tech Approach

(EPFL, August 16, 2022)

Ever since its establishment in 2021, EPFL's Low-Tech Lab has been working to popularize a philosophy known as "low-tech", which promotes the application of simple, reusable technologies that can be easily repaired. In doing so, it ultimately aims to enable a comfortable lifestyle that does not make the climate situation any worse, as explained by master's student Alexis Chanel. To achieve this, the Low-Tech Lab not only offers semester projects to interested students, but also features a showcase project called "rebuiLT", which aims to reuse as many parts as possible of a building being demolished. In this context, doctoral student and Low-Tech Lab technical coordinator Maxence Grangeot revealed that they are currently working on a project to reuse the components of a building constructed in the 1970s in order to create a pavilion in Ecublens.
/web/2022/09-220816-bb

10. Economy, Social Sciences & Humanities

Unequal Distribution of Residential Noise Pollution

(ETH Zurich, August 16, 2022)

An international team of researchers led by ETH Zurich sociologist Andreas Diekmann and Ulf Liebe from the University of Warwick recently published two studies, which not only investigated the objective distribution of residential noise exposure across the population, but also the people's subjective perception of noise. In this context, the team found that although there was only a relatively small income effect, as well as a somewhat stronger effect of having a (non-Western) migration background, in the objectively measured noise pollution experienced by a household, high-income households in particular are far more capable of avoiding exposure to indoor noise. Interestingly, the team moreover found that people's subjective perception of noise also appears to depend their personal attitudes regarding environmental risks.
/web/2022/10-220816-a8

Business Transformation Survey 2022

(Lucerne University of Applied Sciences and Arts, August 22, 2022)

A team of researchers led by Dr. Jan Schlüchter and Julien Nussbaum from the Lucerne University of Applied Sciences and Arts, in collaboration with the SGO Verein, recently published this year's edition of the Business Transformation Survey, which found that although Swiss companies generally rate the relevance of business transformations as high, only about 9% of them exploit their full potential, thereby leaving much room for improvement. Based on these results, the team subsequently derived a list of ten detailed recommendations, including the following three, which the researchers contend are essential: all managers should be personally and authentically committed to the transformation project; there should be a positive error and learning culture in the company or department; speed is the best strategy throughout the transformation.
/web/2022/10-220822-00

Swiss Manufacturing Survey 2022

(University of St.Gallen, August 25, 2022)

A team of Researchers from the University of St.Gallen and ETH Zurich recently published the sixth edition of the annual "Swiss Manufacturing Survey", which aims to provide an insight into the current state of the Swiss manufacturing industry, as well as to ascertain long-term structural changes. Encouragingly, the survey found that after having overcome numerous COVID-19-induced challenges in 2021, Swiss companies once again feel more confident about their economic stability and future plans. At the same time, the survey highlighted that the Swiss industry will continue to be strongly affected by the current geopolitical situation in 2022, thereby making a risk-based view of the entire production network an ongoing task for companies.
/web/2022/10-220825-48

Swiss Romandie Launches New Cultural Observatory

(University of Applied Sciences and Arts of Western Switzerland, August 28, 2022)

The University of Lausanne, the University of Applied Sciences and Arts of Western Switzerland, CDAC, the City of Lausanne and 13 other cities in the French-speaking part of Switzerland – also known as the "Suisse Romande" or "Romandie" – recently joined forces with professional cultural circles to launch the "Observatoire romand de la culture" (ORC), which aims to provide cultural policy stakeholders with reliable, high-quality, comparative data to better understand the issues at hand, as well to develop new decision-

making tools. This is an important development, because as highlighted by the COVID-19 pandemic, possessing a structure that can document the situation of institutions, cultural actors and actors, as well as conduct studies on various subjects related to culture, its ecosystem, and related policies, is arguably more necessary than ever before
/web/2022/10-220828-dc

11. Startups / Technology Transfer / IPR / Patents

Venture Leaders Cleantech 2022

(Venturelab, August 24, 2022)

The following ten Swiss startups were recently selected to join the 2022 edition of the Venture Leaders Cleantech program, which will enable them to not only meet international investors and industry leaders, but also to access industry-specific expertise and networks to grow their companies during a week-long international roadshow in Munich: CLEMAP, CompPair Technologies, dhp technology, Enerdrape, Exnaton, FenX, INERGIO SA, Regli Energy Systems, SoHHytec, and TreaTech. Venture Leaders Cleantech is organized by Venturelab and supported by Alpian, AMAG Group, EPFL, ETH Zurich, EY, Helbling Technik, Romande Energie, Canton Vaud, VISCHER & Patrick Maillard.
/web/2022/11-220824-5f

Strategic Partnership to Promote Innovation and Entrepreneurship

(ETH Zurich, August 25, 2022)

ETH Zurich and UBS recently launched a new strategic partnership, which aims to boost the long-term development of entrepreneurship and innovative capabilities in Switzerland, and as well as to promote the next generation of entrepreneurs. To achieve this, UBS will invest up to CHF 20 million in two joint initiatives over a period of 10 years, which aim to provide students and young entrepreneurs with the necessary toolkit, along with helpful contacts, to successfully implement their ideas and innovations and bring them to market; as well as to encourage more enthusiasm for mathematics, informatics, natural sciences and technology among primary and secondary school students, with a particular focus on target groups that have been less accessible so far.
/web/2022/11-220825-95

Swisscom StartUp Challenge Winners

(startupticker.ch, September 02, 2022)

An expert jury recently selected the following startups as the winners of this year's Swisscom Startup Challenge: Almer Technologies develops compact and lightweight AR glasses to help industrial companies, laboratories, and logistics centers make better use of technology. ECCO2 Solutions AG developed a data-based IoT/AI solution, which can reduce the heat energy consumption in buildings by an average of 15 percent, as well as compile ESG-relevant building data. Mobileup.ch is a platform for buying and selling used smartphones and tablets. SmartHelio developed a software that predicts PV system faults in real time, thereby enabling solar PV plants to avoid downtime and increase turnover by up to 10 percent. Swiss Vault combines hardware and software solutions for better, economical, resilient, and environmentally sustainable data management.
/web/2022/11-220902-ce

Switzerland Tops European Innovation Scorecard 2022

(European Commission, September 24, 2022)

Switzerland once again topped the rankings of the recently-released "European Innovation Scoreboard" (EIS) – an annual publication that provides a comparative assessment of the research and innovation

performance of EU Member States and selected third countries. In this context, the alpine country ranked first for the following six indicators: new doctorate graduates, international scientific co-publications, foreign doctorate students, public-private co-publications, medium- and high-tech product exports, and resource productivity. However, the report also illustrated that, compared to the previous year, Switzerland scored significantly poorer on the criterion of venture capital expenditures (-10.6%), as well as that there is still room for improvement when it comes to digitization and use of information technologies, collaborations between SMEs, as well as knowledge-intensive knowledge exports.
/web/2022/11-220924-6a

12. General Interest

Saccorhytus Fossil is not our Ancestor

(Paul Scherrer Institute, August 17, 2022)

By using a technique known as "X-ray tomographic microscopy" at the Swiss Light Source's TOMCAT beamline, an international team of researchers, which also included beamline scientist Dr. Federica Marone, was recently able to demonstrate that the Saccorhytus – a strange microscopic creature with a mouth and no anus that lived approximately 500 million years ago – was not a deuterostome as initially thought, and thus has nothing to do with our evolutionary origin. Instead, the team contend that the Saccorhytus is in fact an ecdysoszoan – a group that contains arthropods and nematodes. This is a very unexpected finding, because given that the arthropod group possesses a through-gut, which extends from mouth to anus, the team's findings suggest that Saccorhytus had regressed in evolutionary terms, dispensing with the anus its ancestors would have inherited.
/web/2022/12-220817-df

Using DIY to Make Assistive Technologies More Accessible

(University of Lausanne, August 22, 2022)

As part of the "iCare" project, a team of researchers led by University of Lausanne Professor Tobias Mettler, as well as Professors Andreas Judt, Stephan Daurer and Michael Bächle from DHBW Ravensburg, is currently working to develop and evaluate new assistive technology solutions, which have the potential to increase the autonomy and social participation of elderly people, and of patients with dementia in particular. In this context, the team recently investigated the feasibility and desirability of the do-it-yourself (DIY) approach as an alternative to commercial applications, and found that it not only attracts elderly people with a need-based, as well as a hedonic motive, but also that its participatory nature could prove to be particularly beneficial for improving design and use-related aspects of the assistive technology and the DIY intervention.
/web/2022/12-220822-68

Regional Distribution of Megatrends Affecting European Agriculture

(WSL, September 08, 2022)

A team of researchers from the WSL, Agroscope and the Vrije Universiteit Amsterdam recently used a foresight approach to identify, quantify and map four megatrends in European agriculture – namely, climate change, demographic change, (post-) productivism shifts, and increasingly stringent environmental regulations – at the regional scale, thereby enabling them to illustrate where they coincide. In doing so, the team found that, for the most part, Switzerland seems to be well prepared for the changing tides of the times, as the country is not only a pioneer in organic farming, but it also has a surprisingly young farming workforce – for every five older farmers (55+) there is one young one (-35), compared to a ratio of 15:1 in

Portugal or Spain. This is encouraging, as younger farmers tend to be a bit more open when it comes to sustainable production methods.
/web/2022/12-220908-2a

Investigating Physical Activity of Swiss Youth

(Università della Svizzera italiana, September 08, 2022)

A team of researchers led by the Swiss Tropical and Public Health Institute, in collaboration with the Università della Svizzera italiana and the University of Lausanne, recently investigated the physical activity and sports behavior of children and adolescents throughout Switzerland over a period of five years as part of the "SOPHYA" study. In doing so, the team in particular found that the living environment and physical activity of the parents have a significant influence on physical activity behavior during childhood and thus have a long-term impact on the health of children and later adults. For example, the researchers not only found that if the parents themselves were active, the children were also more active, but also that leaving school was often associated with leaving sports clubs.
/web/2022/12-220908-c9

Eawag Signs Cooperation Agreement With IAEA

(Eawag, September 27, 2022)

On the occasion of this year's IAEA General Conference, Janet Hering, the Director of the aquatic research institute Eawag, recently signed a cooperation agreement with the International Atomic Energy Agency (IAEA) in order to further advance groundwater research, as well as to support the sustainable utilization of groundwater resources. Specifically, the agreement, which was initiated and financially supported by the Swiss Federal Office of Energy, pertains to the peaceful utilization of isotopes in the water sector, and in particular aims to support the IAEA in promoting sustainable water use in its member states and thus contribute to the United Nations' Sustainable Development Goals.
/web/2022/12-220927-ae

13. Calls for Grants/Awards

Call: Ambizione Grants for Young Researchers

(Swiss National Science Foundation, August 09, 2022)

The Swiss National Science Foundation recently launched a new call for its Ambizion grants, which aim to support young researchers from Switzerland and abroad to build their scientific profile and become scientifically self-reliant at an early stage by being able to conduct, manage and lead an independent project at a Swiss higher education institution. To achieve this, Ambizione grants, which are awarded for a maximum of four years, therefore not only cover the salary of the selected applications, but also provide the funds needed to carry out the project. Scientists holding non-professorial academic positions at higher education institutions are also eligible to apply. Submission deadline: 1 November.2022.
/web/2022/13-220809-9b

Call: SPIRIT Grants to Promote Cross-Border Research

(Swiss National Science Foundation, August 10, 2022)

The Swiss National Science Foundation recently launched a new call for their "SPIRIT" grants, which aim to lower barriers to international cooperation and assist cross-border collaboration, particularly between researchers in Switzerland and in countries receiving development assistance. In this context, excellent research consortia from two to four countries can apply for a SPIRIT grant and request between CHF 50k

and CHF 500k in project funds for two to four years – at least 30% of which must be allocated to Switzerland, as well as at least 30% to the relevant partner country/countries. Special focus will moreover be given to equal opportunities and the promotion of women scientists, as well as to raising awareness of gender-specific questions. Submission deadline: 2 November 2022.
/web/2022/13-220810-4b

Call: Funding for Large International Research Projects

(Swiss National Science Foundation, August 15, 2022)

The Swiss National Science Foundation recently launched a second call in the FLARE funding scheme, which not only aims to facilitate the development, construction, maintenance and operation of research infrastructures for major international experiments in particle physics, ground based astrophysics and astroparticle physics, but also to enable Swiss researchers to participate in these experiments. As such, FLARE proposals must be scientifically directly related to one or more SNSF grants or it must be demonstrated that the underlying activities are funded through other sources. In this context, the priority of FLARE funding is Switzerland's participation in CERN and the ESO, with a further priority being its participation in neutrino research infrastructure projects in the USA and Japan. Submission deadline: 15 November 2022.
/web/2022/13-220815-7c

Call: Ethics & Trust in Finance for a Sustainable Future

(Observatoire de la Finance, August 24, 2022)

In order to encourage young professionals and academics to reflect on the role of ethics and trust in shaping a more sustainable and responsible financial system for the future, the Observatoire de la Finance recently launched the 9th edition of the "Ethics & Trust in Finance for a Sustainable Future" Global Prize. In this context, candidates under the age of 35 are invited to submit creative, unpublished papers (maximum of 5,000 words) that examine the role of ethics and integrity in finance from various practical angles and disciplinary perspectives. The essay submission deadline is set for 29 May 2023 and an international jury will subsequently allocate USD 20,000 in prizemoney among the winners.
/web/2022/13-220824-d5

Call: Quantum Transition

(Swiss National Science Foundation, September 05, 2022)

Given Switzerland's continued non-associated third country status in the Horizon Europe program, the Swiss National Science Foundation recently launched a call for the Quantum Transition funding scheme, which is aimed at scientists in Switzerland excluded from quantum topics of the Horizon Europe call "Digital and emerging technologies for competitiveness and fit for the green deal." In this context, researchers affiliated to a higher education research center in Switzerland who wish to conduct research in the following quantum fields are invited to submit an application: quantum software ecosystem for quantum computing platforms; quantum computers; quantum simulation platform technologies; quantum communication; and quantum sensing technologies based on effects, such as entanglement and superposition. Submission deadline: 2 November 2022.
/web/2022/13-220905-1c

Call: Swiss Energy Research for the Energy Transition (SWEET)

(Swiss Federal Office of Energy, September 29, 2022)

The Swiss Federal Office of Energy recently launched the fifth call for proposals in the "SWEET" funding program on the topic of "Sustainable Fuels and Platform Chemicals." In this context, researchers are being asked to provide answers to the following three research questions: How can Switzerland meet its future

needs for sustainable fuels and platform chemicals?; How must the technologies for the production, transport, distribution, storage and use of sustainable fuels be further developed so that they can make a tangible contribution to the energy and climate goals?; and How can the additional potential of Swiss farmyard manure be put to profitable use for the production of sustainable fuels? Funding for successful consortium: up to CHF 15 million over a period of 6-8 years. Submission deadline for pre-proposals: 9 December 2022.
/web/2022/13-220929-d9

Upcoming Science and Technology Related Events

101 SICTIC Investor Day Vaud
October 19-20, 2022
https://is.gd/hHHw0y
Software, Developers, Innovation
Basel

Swiss Sustainability Challenge Award Night
October 27, 2022
https://is.gd/gou1Qd
Sustainability, Startups, Zero Waste
Olten

Startup Nights
November 3-4, 2022
https://is.gd/cMJtP2
Startups, Investors, Networking
Winterthur

Swiss Robotics Day
November 4-5, 2022
https://is.gd/eT3Pfy
Robotics, Research, Industry
Lausanne

BioTechX
November 8-10, 2022
https://is.gd/16cK67
Data, AI, Healthcare
Basel

Swiss Innovation Forum
November 23, 202
https://is.gd/AivZbf
Startups, Investors, Networking
Basel

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