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Science-Switzerland, December 2020 – January 2021

News on Swiss science, technology, education and innovation

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Science Barometer Switzerland: COVID-19 Edition

(University of Zurich, December 16, 2020)

A team of researchers from the University of Zurich and the University of Münster recently published a special "COVID-19 edition" of the Science Barometer Switzerland, which not only revealed that confidence and trust in science and research among the Swiss population have increased during the COVID-19 pandemic, but that their general interest in science and research has risen as well. Furthermore, 77% of the population "strongly" or "very strongly" agree that the expertise of scientists is important in slowing the spread of the coronavirus, with some 63% also wanting scientists to be actively involved in political debates on the present pandemic – but with a single voice. This latest Science Barometer Switzerland survey was financed by the Swiss Academies of Arts and Sciences, and was conducted in November 2020 in the form of an online representative survey of Swiss residents aged 15 or over.
/web/2020/00-201216-f2

Approved Upgrade of Swiss Light Source

(Paul Scherrer Institute, December 21, 2020)

The Swiss Parliament recently came to an agreement regarding the Swiss Dispatch on Promotion of Education, Research and Innovation (ERI) for 2021 to 2024, which contains, among other things, the budget that the ETH Domain is to receive for the coming years. This includes the budget of 99 million Swiss francs that will be required for the planned renovation of the Swiss Light Source (SLS) at the Paul Scherrer Institute, which means that the upgrade project known as “SLS 2.0”, can now proceed. This will provide SLS with a significantly more intense X-ray beam, thereby enabling researchers to obtain more data in the same amount of time. As explained by Project Leader Hans Braun, "for experiments that previously would have required 24 hours of continuous measurement, we will only need a little more than half an hour after the renovation."
/web/2020/00-201221-0c

Energy Prize Watt d’Or 2021

(Swiss Federal Office of Energy, January 07, 2021)

Following the reception of 64 applications at the end of July, the Swiss Federal Office of Energy recently awarded the following projects with the coveted Watt d’Or trophy, which recognizes outstanding products or services in the energy sector: Adaptricity AG (Energy Technologies); Romande Energie, together with ABB Switzerland (Renewable Energy); Hydrospider AG, together with Hyundai Hydrogen Mobility AG, H2 Energy AG and the Association pro H2 Mobilität Schweiz (Energy-efficient Mobility); and Mettiss AG, together with Beat Kegel, as well as the Stiftung Umwelt Arena Schweiz, together with architect René Schmid (Buildings and Spatial Development).
/web/2021/00-210107-4f

1. Policy

ETH Board in Favor of Full Association with Erasmus+

(admin.ch, December 11, 2020)

The ETH Board recently discussed a number of topical matters relating to educational and research policy, and in particular, declared itself to be in favor of Switzerland’s full association with Erasmus+. The Board emphasized that it is convinced that the benefits to the Swiss universities outweigh any additional costs, and highlighted that Swiss universities rely on these networks in order to continue to improve the quality and attractiveness of their educational offerings, as well as to position themselves successfully at the

international level. In addition, the ETH Board was gratified to note that, of the 48 newly appointed professors in 2020, around 40% are women, which is the highest proportion ever. Finally, the ETH Board also appointed Marc Bachelot as Interim Vice President for Finance at EPFL, and Carsten Schubert as a member of the Eawag Directorate.
/web/2020/01-201211-16

Revised Ordinance for Swiss Participation in EU Framework Programs

(Federal Department of Economic Affairs, Education and Research, January 20, 2021)

The Federal Council recently approved the revised ordinance relating to Switzerland's participation in the EU research and innovation framework programs, which will enter into force on 1 March 2021. This was done in order to ensure Switzerland's participation in the next generation of EU programs and activities (2021-2027), including Horizon Europe, Euratom, ITER and Digital Europe. As before, the revised ordinance covers Switzerland's participation as an associated country in EU programs and regulates the corresponding accompanying measures. It also contains the legal basis for federal financial aid in the event that Switzerland is only partially associated with these programs or can only participate temporarily as a third party, as well as provides rules for other programs, initiatives and projects that are co-financed by the EU programs and Switzerland.
/web/2021/01-210120-5c

Long-Term Climate Strategy 2050

(admin.ch, January 28, 2021)

The Federal Council recently adopted the "Long-Term Climate Strategy for Switzerland," which formulates ten basic strategic principles that will shape Swiss climate policy in the coming years, with the aim of having net-zero greenhouse emissions by 2050. To achieve this, the strategy not only establishes strategic targets for key sectors, but also shows to which extent emissions that are difficult to avoid are likely to remain until 2050 – these must in turn be offset by carbon capture and storage (CCS) or by negative emissions technologies (NETs). Crucially, the Long-Term Climate Strategy also builds on the measures and targets of the revised CO2 Act, which is due to come into force in 2022, and which is a key prerequisite for achieving the long-term net-zero climate target.
/web/2021/01-210128-ec

2. Education

New ETH-HSG Joint Executive MBA Program: "emba X"

(ETH Zurich, December 29, 2020)

ETH Zurich and the University of St.Gallen recently launched a joint Executive MBA program called the "emba X", which aims to combine the two universities' know-how in technology and management, as well as their networks, in order to develop socially responsible, well-rounded 21st century leaders. To achieve this, the 18-month program not only teaches the essentials of leadership, technology and general management with a focus on applied knowledge, but also challenges students to develop solutions to current societal issues during so-called "sprint weeks", as well as to advance their social and leadership skills through "Skill Building Interventions". Applications for the February 2022 cohort have been open since 1 February 2021.
/web/2020/02-201229-dc

Impact of Distance Learning on Student Performance

(University of Geneva, January 19, 2021)

With many universities having had to transition to distance learning as a result of COVID-19 restrictions, a new study led by the University of Geneva, in collaboration with EPFL and the University of St.Gallen, recently revealed that although online courses appeared to improve exam results for high-potential students by 2.5%, the results for students with learning difficulties decreased by 2%. According the study, which is based on data collected in 2016-2017, this learning gap between different student profiles is mainly due to their behavior and motivation, which the authors argue create educational inequalities when streaming is introduced. In this context, the study also offers several effective blended learning solutions, where streaming complements face-to-face teaching.
/web/2021/02-210119-cd

3. Life Science

Magnetic Bacteria as Micropumps

(ETH Zurich, December 08, 2020)

A team of ETH Zurich researchers led by Professor Simone Schürle was recently able to use so-called magnetotactic bacteria – which absorb iron dissolved in water in order to be able to align themselves with the Earth's magnetic field and navigate in a directed manner – to control liquids at the micro level. To achieve this, the researchers applied relatively weak rotating magnetic fields to spin the bacteria along the desired directions, which in turn allowed them to confine the bacteria's pumping action – the bacteria produce an effect similar to that of a micropump, meaning they are able to move active substances present in the fluid surrounding them in different directions – with pinpoint accuracy. The researchers are now thinking about ways to use magnetic bacteria in the human bloodstream to precisely deliver cancer drugs to a tumor.
/web/2020/03-201208-01

Killifish Accelerate Research on Aging

(University of Lausanne, December 15, 2020)

A team of University of Lausanne researchers led by Professor Alejandro Ocampo established Switzerland's first colony of African turquoise killifish to better understand the process of aging, as well as to investigate therapies that could delay the development of age-associated diseases. This aquatic vertebrate not only constitutes a promising model because of its short lifespan (about six months), but crucially, the killifish also presents many biological functions common to mammals, such as the capacity of cell regeneration, a closed blood circulation, and a functional heart. Furthermore, killifish also develop many of the characteristics of human aging, thereby opening up new horizons for the study of aging, as well as for research in the fields of development, neurology, cardiology, and immunology.
/web/2020/03-201215-bb

AI-Based System to Predict the Evolution of COVID-19

(EPFL, December 16, 2020)

EPFL recently launched a pan-European research program called "Digipredict", which aims to develop a digital twin that can detect serious complications in COVID-19 patients by employing breakthrough technology in the fields of artificial intelligence, smart patches and organs-on-chips. As explained by Professor Adrian Ionescu, these "data collection devices and AI algorithms," will subsequently "give doctors objective, quantitative information for making clinical decisions with as little error as possible." Beyond contributing to the fight against COVID-19, the researchers also hope that their technology will

revolutionize the detection, monitoring and personalized treatment of inflammatory disease in general. A prototype should be ready in around two years; clinical trials will follow.
/web/2020/03-201216-5b

Nighttime Aircraft Noise Can Cause Fatal Cardiovascular Failure

(Empa, December 17, 2020)

A team of researchers from the Swiss Tropical and Public Health Institute (Swiss TPH) and Empa recently demonstrated that acute nighttime aircraft noise can cause fatal cardiovascular failure within two hours of exposure. To come to this conclusion, the researchers modeled noise exposure based on a list of all aircraft movements at Zurich Airport from 2000 to 2015 and used a so-called "case-crossover design" to separate the effect of unusually high or low noise exposures on mortality from other factors. According to Martin Röösli of Swiss TPH, the team subsequently found that "aircraft noise was the cause of approximately 800 out of 25,000 deaths from cardiovascular failure near Zurich Airport" during the analyzed time period, which demonstrated that aircraft noise can have similar effects on cardiovascular mortality as emotions such as anger or excitement.
/web/2020/03-201217-b1

Predicting Epileptic Seizures Days in Advance

(University of Geneva, December 18, 2020)

Despite years of research, it remains difficult, if not impossible, to predict the onset of epileptic seizures, which is a severe handicap for patients, who are forced to take medication and / or adjust their lifestyles. However, by recording neuronal activity over at least six months using a device implanted directly in the brain, a team of neuroscientists from the University of Geneva and the Inselspital – working with the University of California, San Francisco and Brown University – recently succeeded in developing a technique that can predict seizures between one and several days in advance. This approach, which detects individual cycles of epileptic activity, is remarkably reliable, and prospective clinical trials are now in the pipeline that could give people with epilepsy the power to plan their lives according to the likelihood of having a seizure.
/web/2020/03-201218-83

Brain Stem Cells Divide Over Months

(University of Zurich, December 21, 2020)

By employing state-of-the-art microscopy and genetic analyses, scientists at the University of Zurich led by PhD student Sara Bottes and postdocs Baptiste Jaeger and Gregor Pilz were recently able to observe stem cells in the adult mouse brain that divide over the course of several months to create new nerve cells. Although the existence of long-lasting stem cell division had already been suggested by earlier studies, this is the first time that researchers were able to provide direct proof, which has several implications for future therapeutic approaches. As explained by Professor Sebastian Jessberger, "since we now know that there are stem cells that can divide over a longer period, our aim is to increase the division activity of these cells and thus the formation of new nerve cells, for example in the context of neurodegenerative conditions such as Alzheimer's disease."
/web/2020/03-201221-cd

Smart Molecules Heal Wounds

(University of Basel, December 23, 2020)

Although the human body is well equipped to deal with minor injuries thanks to the process of clotting, this mechanism is often insufficient to prevent excessive bleeding following a serious injury. In emergencies, medical staff can administer coagulation factors isolated from donated blood, but as explained by University of Basel Professor Michael Nash, these substances are "expensive to isolate, have a short shelf life and do not work very efficiently." Nash and his team have therefore been developing smart molecules that can interact with the body's own clotting mechanism to reinforce the resulting clot, thereby closing the wound more quickly and effectively. As a result, these so-called "ELPs" could not only be used in the treatment of major injuries, but also for patients with hereditary coagulation disorders or in cases where clotting is hindered by anticoagulant medications.
/web/2020/03-201223-a6

First Capillary Exploring Endovascular Microrobots

(EPFL, December 23, 2020)

A team of EPFL scientists led by PhD student Lucio Pancaldi and Assistant Professor Mahmut Selman Sakar recently engineered tethered microscopic devices that could be introduced into capillaries with unprecedented speed and ease. These devices consist of a magnetic tip, as well as an ultra-flexible body made of biocompatible polymers, and work similar to a fishhook gradually being released into a river. As explained by Pancald, they "simply hold onto one end of the device and let the blood drag it to the most peripheral tissues, gently rotating the magnetic tip of the device at bifurcations to choose a specific path." Since no mechanical force is applied directly at the vessel wall, the risk of causing any damage is very low. Moreover, harnessing blood flow could reduce the operation time from several hours to a couple of minutes.
/web/2020/03-201223-2c

Map of Brainstem Circuits for Fine Motor Skills

(University of Basel, January 06, 2021)

A team of researchers at the University of Basel and the Friedrich Miescher Institute for Biomedical Research were recently able to identify specific groups of neurons in the so-called "lateral rostral medulla" (latRM) brainstem region that are responsible for various fine motor activities of the forelimbs. As explained by first author Ludwig Ruder, "relatively simple forelimb actions, such as reaching for food, are accomplished by latRM neurons with direct projections to the spinal cord," while more complex forelimb movements, which also involve the fingers, are controlled by latRM neurons with connections to neurons in other brainstem regions. This study not only expands our understanding on which neuronal populations control which movements, but also helps researchers better hypothesize how diseases or injury may impair fine motor skills or other behaviors.
/web/2021/03-210106-a9

All Populations Have an Equivalent Virus Protection Potential

(University of Geneva, January 14, 2021)

Scientists from the University of Geneva, in collaboration with Cambridge University, recently demonstrated that despite the great heterogeneity of HLA variants in individuals, which are responsible for the so-called "adaptive" immune system, all populations benefit from an equivalent potential when it comes to virus protection. To come to this conclusion, the team used several databases and computer tools to model the HLA-peptide binding forces, which enabled them to observe that the HLA-A and HLA-B molecules distinctly recognize very different peptide families – and, it follows, potentially as many viruses. Furthermore, the team found that even in populations that have reduced genetic variability, there are

molecules in the immune system capable of countering viruses from very different families, which gives them a protective potential equivalent to other populations.
/web/2021/03-210114-f0

Restoring Age-Related Muscle Deterioration

(EPFL, January 20, 2021)

A team of EPFL researchers from the lab of Professor Johan Auwerx recently discovered protein aggregates that deposit in skeletal muscles and not only contribute to muscle aging, but also directly damage mitochondria. However, by boosting the levels of nicotinamide adenine dinucleotide (NAD+) – a biomolecule that is essential for maintaining mitochondrial function, and whose levels decline during aging – the researchers were able to reduce the age-related amyloid protein aggregates in worms, human muscle tissue and aged mice, which turned on the defense systems of mitochondria in cells and restored muscle function. As explained by first author Mario Romani, drugs that boost the so-called "mitochondrial quality control" could therefore be tested in the clinic to reverse these age-related proteotoxic aggregates and rejuvenate tissues.
/web/2021/03-210120-d7

New Multidisciplinary Center for Infectious Diseases and Immunity

(University of Bern, January 20, 2021)

The University of Bern, with generous financial support from the Vinetum Foundation, recently established the "Multidisciplinary Center for Infectious Diseases and Immunity" (MCIDI), which aims to study the origin and course of infectious diseases, as well as their impact on health, society and economics, by adopting the "One Health" approach. In this context, the newly-established center will not only benefit from the existing medical and veterinary network in Bern, which is available for teaching and research (university institutes, clinics, laboratories and others), but also from its proximity to the decision-making, political institutions. Furthermore, due to fact that the MCIDI has been organized as a virtual center, the creation of initial infrastructure is not necessary.
/web/2021/03-210120-22

Larger Synapses Transmit Stronger Signals

(University of Zurich, January 21, 2021)

A team of University of Zurich and ETH Zurich neuroscientists recently demonstrated that the size of synapses determines the strength of their information transmission – specifically, the bigger the synapse, the stronger its signal. According to Professor Kevan Martin, this not only closes a key knowledge gap in neuroscience, but it is also "critical for advancing our understanding of how information flows through our brain's circuits, and therefore how the brain operates," as well as how neurological disorders arise. Furthermore, by proving that each synapse in fact has several sites that can release packets of neurotransmitters simultaneously, the researchers were also able to resolve another longstanding puzzle in neuroscience and concluded that synapses are much more complex and can regulate their signal strength more dynamically than previously thought.
/web/2021/03-210121-1f

Detailed Tumor Profiling for More Effective Cancer Treatments

(ETH Zurich, January 21, 2021)

A team of researchers from the University Hospitals in Zurich and Basel, ETH Zurich, the University of Zurich and Roche have been conducting a large-scale clinical study involving 240 patients as part of the "Tumor Profiler" project, which aims to carry out a thorough and highly precise investigation into the molecular and functional properties of tumors. This study is particularly unique because it harnesses a suite of

advanced tumor-testing methods to explore how these can be combined in a clinically meaningful way, with the hope of demonstrating that the "widespread use of advanced profiling methods in oncology is not only possible but offers specific clinical benefits," as explained by Professor Viola Heinzelmann. Furthermore, the Tumor Profiler approach also aims to expand treatment options for patients in terms of personalized medicine in the long-term.
/web/2021/03-210121-3e

MRI Helps Unravel the Mysteries of Sleep

(EPFL, January 22, 2021)

Scientists at EPFL and the Universities of Geneva, Cape Town and Bochum recently joined forces to investigate brain activity during sleep with the help of MRI scans and discovered that our brains are much more active than we thought. In particular, the researchers were surprised to find that although overall brain activity decreases during light stages of sleep, communication among different parts of the brain becomes much more dynamic, which, as explained by doctoral assistant Anjali Tarun, is most likely due to the instability of brain states during this phase. The researchers also found that interactions between brain networks break down with increasing sleep depth, which helps show that "consciousness is the result of interactions between different brain regions, and not in localized brain activity," as stated Tarun.
/web/2021/03-210122-49

Ready-to-Use T-Cell Cancer Therapy

(University of Basel, January 25, 2021)

A team of University of Basel researchers led by Professor Gennaro De Libero and Dr. Lucia Mori is aiming to use their discovery of a specific population of cancer-fighting immune cells, called "MR1T cells", to develop clinically applicable treatments that will mark the next milestone in cell-based cancer therapy. As explained by Mori, these MR1T cells can be stored in liquid nitrogen for extended periods, which means that doctors could consult a table to determine which of the prepared MR1T cells can be used for the type of cancer concerned, and the corresponding cells could then be collected from storage. In order to move their idea from the laboratory into clinical practice, the researchers founded the startup "Matterhorn Biosciences", which recently received seed funding of USD 30M to make universal, ready-to-use T cell cancer therapies a reality.
/web/2021/03-210125-c4

How Gut Bacteria Influence Our Decisions

(University of St.Gallen, January 25, 2021)

An interdisciplinary team of researchers from the University of St.Gallen and the University of Bern is conducting a study to better understand how intestinal microbiomes influence our decisions in various spheres of life. In doing so, the current study also contributes towards transferring existing data and discoveries from medical and microbiological research to socially relevant issues in economic research. Findings so far suggest a possible link to the willingness to take risks, to self-control and impatience, or even to the willingness to help other people. The researchers are still looking for eligible candidates to take part in the study, who, in addition to a small remuneration, can also receive a free laboratory analysis of their intestinal microbiome, should they wish.
/web/2021/03-210125-13

Risk-Taking Linked to Particular Brain Features

(University of Zurich, January 28, 2021)

University of Zurich neuro-economists Gökhan Aydogan, Todd Hare and Christian Ruff, together with an international research team, recently investigated the genetic characteristics that correlate with risk-taking behavior and found that the genetic disposition for risk-taking is mapped in several areas of the brain. To come to this conclusion, the study combined genetic information and brain scans from more than 25,000 people, and as a result, broke new ground in several regards. For example, it is the first time that the foundations of risk-taking behavior have been investigated with such a large and representative sample. It is also the first study to examine possible influencing factors in combination, rather than in isolation. However, at present, it is still unclear to what extent the connection between genetic disposition and neurobiological expression is causal.
/web/2021/03-210128-74

4. Nano / Micro Technology / Material Science

Novel Perovskite Can Detect Gamma Rays

(EPFL, December 09, 2020)

A team of scientists led by the labs of EPFL Professors László Forró and Andreas Pautz recently developed a game-changing perovskite material that can be used as a cheaper and highly efficient alternative to gamma-ray detectors. This perovskite is based on crystals of methylammonium lead tribromide (MAPbBr3), which, unlike market-leading crystals, can be grown from abundant and low-cost raw materials, and synthesized in solutions close to room temperature without needing expensive equipment. Furthermore, these perovskite crystals not only showed high clarity with very low impurities, but by developing a unique method called “oriented crystal-crystal intergrowth,” the team was able to make a whole liter of crystals weighing 3.8 kg in total, which is considerably more than the volume of most lab-grown metal halide perovskites used for gamma ray-detection.
/web/2020/04-201209-50

Multilayer System Hosts Two Different Skyrmion States at Room Temperature

(Empa, December 16, 2020)

A team of Empa researchers led by Hans Josef Hug recently succeeded in producing a tunable multilayer system in which two different types of skyrmions – small magnetic objects that could revolutionize the data storage industry, as well as enable new computer architectures – can exist at room temperature. To achieve this, the researchers inserted a ferrimagnetic multilayer between two ferromagnetic multilayers, so that the two outer layers create a high density of skyrmions and influence the central layer in such a way that some skyrmions from the outer layers can enter the middle one. This in turn creates two different types of skyrmions that can be used for the bits “0” and “1”. The aforementioned achievement was especially important because it overcame a major challenge towards practical applications, as skyrmions previously only existed at extremely low temperatures.
/web/2020/04-201216-8d

High-Performance Fibers That Change Colors When Damaged

(Empa, January 05, 2021)

A team of researchers from Empa and ETH Zurich recently developed a coating for high-performance fibers that changes color when exposed to high temperatures through friction or fire, thereby clearly indicating whether a rope will continue to provide the safety it promises in the future. To achieve this, the researchers first applied silver to the fiber itself – in this case PET and Vectran – which serves as a reflector, before adding an intermediate layer of titanium nitrogen oxide to ensure that the silver remains stable. Finally, the amorphous layer that causes the color change is applied – germanium-antimony tellurium (GST) – which crystallizes when exposed to elevated temperatures, thereby changing the color from blue to white. Potential uses include safety equipment for firefighters or mountaineers, as well as load ropes in production facilities, on construction sites, etc.
/web/2021/04-210105-01

First Truly Reprogrammable Mechanical Metamaterial

(EPFL, January 21, 2021)

EPFL post-doc Tian Chen recently developed a metamaterial – a material that does not occur naturally and whose mechanical properties result from its designed structure rather than its chemical composition – whose mechanical properties can be reprogrammed on demand, and whose internal structure can be modified by applying a magnetic field. As explained by Chen, "the idea was to develop a single material that can display a range of physical properties, like stiffness and strength, so that materials don't have to be replaced each time." Chen's discovery marks a fundamental step forward, as it is the first time scientists have developed a truly reprogrammable mechanical metamaterial, and it also opens up many exciting avenues for research and cutting-edge industrial applications.
/web/2021/04-210121-4e

5. Information & Communications Technology

Digitalization, Home-Office and Cyber-Security

(University of Applied Sciences and Arts Northwestern Switzerland, December 08, 2020)

In order to better understand the effect of COVID-19 on Swiss SMEs when it comes to digitization, home-office and cybersecurity, the University of Applied Sciences and Arts Northwestern Switzerland, along with several partners, conducted a representative survey of 503 CEOs between August to October 2020. While it is unsurprising that the number of employees working from home increased substantially during the lockdown – from 10% to 38% – it is interesting to note that 16% of employees continued to work from home even after these restrictions were eased, representing a 60% increase compared to before the lockdown. More worrying however is that despite the fact that a quarter of the SMEs fell victim to a serious cyberattack, many companies continue to underestimate its risks, which is mainly due to a lack of information.
/web/2020/05-201208-88

Bacterial Nanopores Open Future of Data Storage

(EPFL, December 14, 2020)

A team of EPFL bioengineers recently developed a nanopore-based system that can read data encoded into synthetic macromolecules with higher accuracy and resolution than similar methods on the market, and which could help us move away from conventional data storage devices that are rapidly maxing out in capacity and endurance. Furthermore, the system is considerably cheaper than using DNA for data-storage, offers longer endurance and is "miniaturizable", meaning that it could easily be incorporated into portable data-storage devices. As explained by Professor Matteo Dal Peraro, "this work clearly shows

that a biological nanopore can read hybrid DNA-polymer analytes," which is exciting, as it "opens up new promising perspectives for polymer-based memories, with important advantages for ultrahigh density, long-term storage and device portability."
/web/2020/05-201214-b1

Higher Education Digitalization Initiative

(University of Zurich, December 16, 2020)

In the next 10 years, the joint Digitalization Initiative (DIZH) by Zurich's higher education institutions aims to explore the effects and opportunities of digitalization, as well as to develop innovative technologies. Interdisciplinary in nature, its research will focus on conveying digital skills and developing innovative solutions in collaboration with partners from local industry. In addition to the University of Zurich, this large-scale science project will involve the Zurich University of the Arts, the Zurich University of Applied Sciences and the Zurich University of Teacher Education. The initiative recently entered its operational phase, as explained by DIZH head Lesley Spiegel, and in this context, the first round of calls for postdoc positions and bridge professorships, as well as for infrastructure and lab projects, has been launched.
/web/2020/05-201216-88

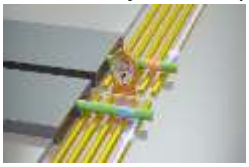
Light-Based Processors Boost Machine-Learning

(EPFL, January 08, 2021)

An international team of scientists from EPFL, as well as from the Universities of Oxford, Münster, Exeter, Pittsburgh, and IBM Research – Zurich, recently developed a photonic processor that uses rays of light inside silicon chips to process information much faster than conventional electronic chips. To achieve this, the researchers developed a hardware accelerator for so-called matrix-vector multiplications, which are the backbone of neural networks, while using a chip-based "frequency comb" as a light source. This "provides a variety of optical wavelengths that are processed independently of one another in the same photonic chip," as explained by Professor Tobias Kippenberg, which enables the researchers to use multiple wavelengths of light for parallel calculations, thereby speeding up tasks in the field of machine learning.
/web/2021/05-210108-a7

Electrically Switchable Qubit

(University of Basel, January 11, 2021)



A team of physicists from the University of Basel and the Eindhoven University of Technology recently produced a new type of quantum bit (qubit) that can be switched from a stable idle mode, which is suitable for storing quantum information, into a much faster, but less stable, calculation mode by applying an electrical voltage. These qubits were created in the form of so-called "hole spins," which materialize when an electron is deliberately removed from a semiconductor, and the resulting hole has a spin that can adopt two states: up and down – analogous to the values 0 and 1 in classical bits. The researchers were subsequently able to use an electrical switch to manipulate the spin qubits at record speed, and as the qubit is extremely small, it should in principle be possible to incorporate millions or even billions of these qubits onto a chip.
/web/2021/05-210111-b2

New Language-Analysis Program: Texthero

(EPFL, January 12, 2021)

EPFL Master's student Jonathan Besomi, under the supervision of Professor Kenneth Younge, recently developed a program called "Texthero", which lets users generate representations of textual data with just a few lines of code, thereby simplifying the analysis of natural languages. To achieve this, the program "takes a text made up of unstructured data, cleans it up, generates a representation of it by converting it into digital format, and finally visualizes it," which in turn "gives users an overall idea of the structure of a completely unfamiliar text," as explained by Besomi. Designed as open-source software and written in the Python programming language, Texthero swiftly won over developers around the world and has already been downloaded over 23,000 times so far.
/web/2021/05-210112-08

Ensuring Reliable and Trustworthy AI

(ETH Zurich, January 20, 2021)

Despite the fact that there have been significant advances in the development of AI in the past decade, many AI models are still overwhelmed when it comes to productive, real-world use outside controlled research environments, which can result in errors and unwanted behaviors. To address this issue, the ETH Zurich spin-off "LatticeFlow" has therefore been developing a product that assesses the robustness and reliability of AI models, while providing actionable insights into how to improve them and ensure safety. Although Petar Tsankov, Pavol Bielik, Martin Vechev and Andreas Krause only founded the spin-off six months ago, they are already working with several well-known institutions, such the SBB, and were recently able to close a USD 2.8 million Series B financing round, which will support their ambitious vision of ensuring reliable and trustworthy AI.
/web/2021/05-210120-75

More Stable Quantum Computers

(Paul Scherrer Institute, January 22, 2021)

A team of Paul Scherrer Institute researchers recently put forward a detailed plan of how to create faster and better-defined quantum bits ("qubits"), which could help make an entirely new kind of computation and data processing possible. To achieve this, the researchers proposed that the qubits would reside on individual atoms from the class of rare-earth elements, built into the crystal lattice of a host material. Targeted laser pulses could then momentarily transfer the information to the atom's electrons and thus activate, as well as entangle, the qubits, which could subsequently be used to produce logic gates, which form the basis for quantum computers. PSI researcher Manuel Grimm further underlined that their method has the distinct advantage of being at least ten times as fast as previous comparable proposals, as well as less error-prone by the same factor.
/web/2021/05-210122-a0

6. Energy / Environment

Explore Different Energy Simulations With "Power Check"

(Eastern Switzerland University of Applied Sciences, December 04, 2020)

With Switzerland striving to reduce energy consumption, increase energy efficiency and promote the use of renewable energy as part of its Energy Strategy 2050, the Eastern Switzerland University of Applied Sciences recently launched an online app called "Power Check," which allows users to simulate different energy scenarios, create their own scenarios, and compare them with the current situation in

Switzerland, as well as with the scenarios of other users. Containing over 35,000 real data values per year (2014-2019), per energy source (nuclear, thermal, solar, wind and water power stations), and per consumer, Powercheck.ch is currently not only the most detailed, publicly available and free simulation tool of the Swiss electricity supply, but it is also very intuitive to use, thanks to its easily interpretable tables and graphics.
/web/2020/06-201204-fa

Carbon-Neutral University of Zurich Campus in 10 Years

(University of Zurich, December 10, 2020)

With the University of Zurich aiming to be a carbon-neutral institution in 10 years, the Executive Board and the Extended Executive Board recently approved the “2030 Implementation Strategy for the Sustainability Policy,” which defines how this is to be achieved. For example, air travel of staff will be reduced over the long term and everyday sustainable behavior will be promoted, such as by focusing on making the food offered in on-campus eateries more sustainable. Furthermore, as explained by sustainability delegate Lorenz Hilty, the university is also developing areas of research that are important for sustainability but are not yet mainstream, and aims to bring sustainable theory and sustainable practice closer together so that the university can be used as a “living lab” for researching sustainability issues and measures.
/web/2020/06-201210-48

University of Bern Aims to Become Climate-Neutral in 5 Years

(University of Bern, December 14, 2020)

The University of Bern has set itself the goal of becoming a climate-neutral institution by 2025 in all areas where it can directly influence it. To achieve this, university is currently analyzing its carbon footprint in order to identify all areas in which CO2 emissions are directly or indirectly generated, as well as to determine which areas can be influenced by the university. This will subsequently be used to calculate the reduction potential, define reduction measures and identify suitable projects to offset CO2 emissions accordingly. Furthermore, as CO2 emissions from air travel are considerable at research-intensive universities, such as the University of Bern, the University Executive Board has decided to implement a “traffic light” scheme, which will determine for which European destinations the train must be chosen, and for which destinations the train has priority over air travel.
/web/2020/06-201214-03

ReMaP: An Ecosystem for Energy Research

(Empa, December 14, 2020)

On the road to a sustainable energy system, technologies for the flexible conversion and efficient storage of energy are becoming increasingly important, which is why ETH Zurich, Empa and the Paul Scherrer Institute launched a new type of research platform in 2019, called "ReMaP", to investigate these pressing issues in a realistic way. To achieve this, the project integrates infrastructure from different institutions, particularly the "ESI" and "ehub" platforms, uses two demonstrators ("NEST" and "move"), and thanks to its control and simulation frameworks, allows users to design experiments that establish real-time connections between any number of physical devices in different locations, as well as digital models of devices, and that investigate their interactions.
/web/2020/06-201214-a4

Reducing Pesticide Use With Degradable Nanoparticles

(University of Fribourg, December 14, 2020)

A team of researchers from the University of Fribourg recently discovered how certain silica nanoparticles could act as a traceless, degradable, and highly efficient treatment against some plant pathogens. To achieve this, the researchers synthesized silica nanoparticles with similar properties to those found in plants, and subsequently demonstrated that they can boost resistance against a model bacteria in a dose-dependent manner by stimulating the plant's defense hormone, salicylic acid. In addition, the researchers were also able to show that nanoparticle uptake and action occurred exclusively through the leaf pores (stomata) that allow the plants to breathe and that the nanoparticles did not distribute further in the plants. Finally, the particles degrade without leaving a trace in the presence of water – an important consideration for environmental and food safety.
/web/2020/06-201214-00

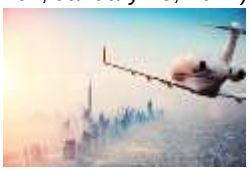
Downstream Passage Facilities That Communicate With Fish

(Eawag, December 17, 2020)

Although fish ladders have been fitted to hydroelectric plants and other obstacles for over 100 years to assist migrating fish, there is a distinct lack of downstream passage facilities that actually work in practice, due to the fact that fish follow the strongest flow and therefore often struggle to find the weak flow that leads to the safe bypass. In order to address this shortcoming, an interdisciplinary team of engineers from ETH Zurich, as well as fish biologists from Eawag, recently developed a new "curved-bar rack" system that uses pressure and flow differences to guide fish out of the main flow and into the safe fish passage. Laboratory tests have shown that the system, which works by influencing fish behavior, is particularly effective for cyprinid fish and salmon parr.
/web/2020/06-201217-f5

Options for Achieving Carbon-Neutral Aviation

(ETH Zurich, January 13, 2021)



A team of ETH Zurich researchers led by Professor Marco Mazzotti recently compared the options to make air travel carbon-neutral in the future that appear to be the easiest to implement in the short and medium term and evaluated them according to factors such as cost-effectiveness. Based on their analysis, the researchers concluded that the most favorable option is to continue powering aircraft with fossil fuels, but then to remove the associated CO2 emissions from the atmosphere using CO2 capture plants and to store that CO2 permanently underground (carbon capture and storage, CCS). However, the team also emphasized that there are other ways to make air travel carbon-neutral, and underlined that in order for CSS to work, science, industry and politics will have to work hard in the coming years to plan and build the necessary infrastructure.
/web/2021/06-210113-73

Energy Transition Modelling

(ETH Zurich, January 20, 2021)

A team of ETH Zurich researchers, supported by the Swiss Federal Office of Energy, is developing the "Nexus-e" modelling platform, which aims to facilitate the analysis of how technological, economic and regulatory developments will affect the complex Swiss power system in the coming decades. To achieve this, the platform combines five energy modules to incorporate knowledge and methods from various disciplines, thereby making it possible to map the energy system, as well as the interaction of its components, much more extensively than conventional, isolated simulations of sub-systems. Furthermore, Nexus-e will serve as a modelling infrastructure for research and education, and will also be used and further developed by

interested parties outside the university, thereby making it a generally recognized, practical testing environment.
/web/2021/06-210120-6d

7. Engineering / Robotics / Space

Swiss Space Research

(State Secretariat for Education, Research and Innovation, December 07, 2020)

At the 43rd COSPAR Assembly, the Swiss National Committee on Space Research recently submitted its 2018-2020 report entitled “Space Research in Switzerland,” which not only highlights the active role played by the Swiss space community in space research, but also presents the various institutions and the many missions and projects that are currently under way. Overall, the report illustrates that Switzerland is active in many areas of space research, such as Earth observation activities and research on microgravity, which, in part, can be explained by its extensive financial resources – Switzerland has the 7th largest ‘national’ budget within ESA. At the same time, Switzerland recognized early on that space science is only possible through cooperation, and as a result, it has always focused on niches, both in science and in industry.
/web/2020/07-201207-58

Engineering Humanitarian Aid initiative

(ETH Zurich, December 10, 2020)

ETH Zurich, EPFL and the ICRC recently launched the "Engineering Humanitarian Aid initiative," which aims to accelerate efforts to leverage new technology to improve the provision of humanitarian aid. Under its aegis, projects will be carried out in three strategic areas – energy and the environment; data sciences and digital technologies; and personalized health and related technologies – and the hope is that, by optimizing how resources are deployed, this unique partnership will significantly benefit populations that are most in need. Current projects for example address privacy issues related to biometric data (Carmela Troncoso), use artificial intelligence to map vulnerable populations (Konrad Schindler and Devis Tuia), and aim to improve the availability of medical equipment in conflict zones (Stephan Wagner).
/web/2020/07-201210-eb

1st Anniversary of CHEOPS Studying Exoplanets

(University of Bern, December 17, 2020)

Since its launch on 18 December 2019, the CHEOPS telescope in Earth’s orbit has already demonstrated its functionality and precision beyond expectations, with highlights such as revealing details of one of the most extreme exoplanets, as well as using its maneuverability to evade space debris. CHEOPS is the first Swiss-led mission of ESA, and as such, “really stands out in Swiss space activity,” while also reflecting on the strong collaboration between universities and industrial partners, as stated by Renato Krpoun, head of the Swiss Space Office. Furthermore, despite the extraordinary circumstances of the COVID-19 pandemic, CHEOPS scientists have nevertheless already carried out a detailed study of an extreme exoplanet, and according to Professor Willy Benz “the next papers are already in preparation.”
/web/2020/07-201217-20

Making Industrial Robots Smarter and More Versatile

(EPFL, December 17, 2020)

EPFL spin-off AICA recently developed an AI-based software that makes industrial robots easier to program and more capable of adapting. To start, the software is made up of preprogrammed tasks that operators can select, based on their requirements. The robot can then adapt to variations, such as a change in size when working on a new batch, and if a task becomes too complicated for the robot, the program will automatically search the database for a solution. Furthermore, AICA's system was designed with collaborative robots in mind, and as a result, it enables robots to "switch between different tasks instantly based on a simple physical interaction," as explained by cofounder Baptiste Busch.
/web/2020/07-201217-67

Star-Formation Activity of Typical, Nearby Galaxies

(University of Zurich, December 22, 2020)

Despite substantial progress towards understanding how stars form in a galactic environment, it remains unclear what ultimately determines the level of star formation in galaxies. However, by using a new statistical method based on Bayesian modeling, a team of astrophysicists from the University of Zurich was recently able to shed new light on this topic by revealing that, in typical star-forming galaxies, molecular and atomic hydrogen are converted into stars over approximately constant timescales of 1 and 10 billion years, respectively. As explained by Professor Robert Feldmann, "these findings therefore suggest that star formation is directly linked to the overall gas reservoir and thus set by the rate at which gas enters or leaves a galaxy."
/web/2020/07-201222-b0

Neurofeedback Reduces Perceived Weight of Prostheses

(ETH Zurich, January 07, 2021)

Despite the fact that prosthetic legs are usually less than half the weight of a natural limb, leg amputees nevertheless often perceive the weight of the prosthesis as too high. In order to address this issue, a team of researchers led by ETH Zurich Professor Stanisa Raspopovic has therefore been developing prostheses that provide feedback to the wearer's nervous system, with the aim of tricking an above-knee amputee's brain into believing that the prosthetic leg is similar to its own leg. Following their successful demonstration that wearers of such neurofeedback prostheses can move more safely and with less effort, the researchers recently published another study that showed that neurofeedback also reduces the perceived weight of the prosthesis by 23%, thereby taking the experience of patients with an artificial device closer to that with a natural limb.
/web/2021/07-210107-c4

Stable Quadcopter Flight Despite Motor Failure

(University of Zurich, January 13, 2021)

Robotics researchers at the University of Zurich, in collaboration with the Delft University of Technology, recently demonstrated how onboard cameras can be used to keep damaged quadcopters in the air and flying stably – even without GPS. To achieve this, the researchers equipped their quadcopters with two types of cameras – standard ones, which record images several times per second at a fixed rate, and event cameras, which are based on independent pixels that are only activated when they detect a change in the light that reaches them – as well as developed algorithms that combine information from the two sensors in order to track the quadrotor's position relative to its surroundings. This in turn enables the onboard computer to control the drone as it flies – and spins – with only three rotors.
/web/2021/07-210113-60

Printing Overhangs Without Support Material

(Zurich University of Applied Sciences, January 13, 2021)

A team of Zurich University of Applied Sciences researchers recently developed a novel 3D printing process that allows them to print overhangs without needing support structures. To achieve this, the researchers not only designed a new printhead, which is rotated 45° around a horizontal axis and is equipped with a vertical, rotational axis, so that it can rotate freely around its own axis, but unlike conventional FDM printing techniques, the printhead also no longer follows layers parallel to the build platform. Instead, it moves on the surface of a 45° cone, which enables it to print overhangs of up to approximately 100°. Furthermore, this novel design requires less material, lowers printing times and substantially reduces post-processing, as no support material needs to be removed.
/web/2021/07-210113-6a

Seven Exoplanets With Similar Densities

(University of Zurich, January 22, 2021)

Discovered in 2016 some 40 light-years away, the seven exoplanets orbiting the star TRAPPIST-1 offer a glimpse at the tremendous variety of planetary systems that likely fill the universe. Since their detection, an international team of researchers, including from the Universities of Bern, Geneva and Zurich, has continued to study the planetary family with multiple space- and ground-based telescopes, and recently published a new study that shows that the exoplanets have remarkably similar densities, thereby providing clues about their composition. Co-author Caroline Dorn furthermore added that the TRAPPIST-1 system is not only fascinating because they can "learn about the diversity of rocky planets within a single system" around this one star, but also because they can "actually learn more about an individual planet by studying its neighbors as well."
/web/2021/07-210122-7b

CHEOPS Finds Unique Planetary System

(University of Bern, January 25, 2021)

A team of researchers from the University of Bern, the University of Geneva and the NCCR PlanetS recently found that five of the six planets orbiting the star TOI-178, located over 200 light years away from Earth, are in a harmonic rhythm despite very different compositions – a novelty. To achieve this, the scientists employed the high precision and target-pointing agility of the CHEOPS space telescope, as well as previous data from the TESS mission, the ESO's spectrograph ESPRESSO, and others, which enabled them to not only measure the periods and sizes of the planets, but also to estimate their densities. As concluded by astrophysicist Adrien Leleu, "the system turned out to be one that challenges our understanding of the formation and evolution of planetary systems."
/web/2021/07-210125-6f

8. Physics / Chemistry / Math

AR Website for Chemistry and Biology Education

(EPFL, December 04, 2020)

EPFL scientists Luciano Abriata and Fabio Cortés recently designed a website called "MoleculARweb," which allows teachers and students to explore concepts from chemistry and biology by manipulating virtual molecules in augmented reality using regular laptops, tablets, and smartphones. The website, which was developed as part of a Spark grant from the Swiss National Science Foundation, is freely available, without registration, in English, French, German, Italian, Spanish, and Portuguese, and features numerous

interactive AR teaching activities, which are tailored to chemistry and biology courses at the level of high school and the first two or three years of university courses.
/web/2020/08-201204-23

Understanding Exponential Growth

(ETH Zurich, December 09, 2020)

Despite the fact that the coronavirus outbreak offered the public a crash course in statistics, with terms like “doubling time” and “logarithmic scales” appearing in the news every day, this does not mean that everyone will be able to comprehend the speed of the spread, particularly because exponential growth is a notoriously difficult concept to understand. In this context, a team of researchers from ETH Zurich and the Lucerne University of Applied Sciences and Arts recently decided to take a closer look at the so-called “exponential growth bias” and found that the ability to grasp the magnitude of exponential growth depends on the way in which it is framed and communicated. The authors further contend that similar phenomena might also be observed in the banking and finance industry, or when it comes to legal or environmental policy-making.
/web/2020/08-201209-e7

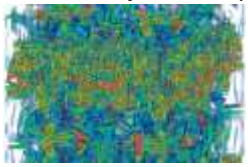
ETH Quantum Center

(ETH Zurich, December 17, 2020)

Quantum research is one of the most promising research areas being pursued today, as the hope is that the principles of quantum mechanics will trigger pioneering breakthroughs in a variety of fields, such as computing, sensor technology, communication and data security, and ultimately lead to new applications. In this context, ETH Zurich recently took a further step to expand its activities in this domain by founding the new ETH Quantum Center, which not only aims to "foster collaboration among researchers from different departments and specialist areas," as explained by Professor Andreas Wallraff, but also to forge a greater public presence. The university previously also launched a new Quantum Engineering Master’s program and recently began the recruitment process for two new professorships, as part of the ETH+ initiative on quantum research.
/web/2020/08-201217-33

Using AI to Automate Turbulence Modelling

(ETH Zurich, January 04, 2021)



A team of researchers led by ETH Zurich Professor Petros Koumoutsakos was recently able to successfully automate the modelling of turbulence for the first time, which is crucial for designing cars and heart valves, predicting the weather, and even retracing the birth of a galaxy, to name a few. To achieve this, the researchers combined new reinforcement learning algorithms with turbulent flow simulations on the CSCS supercomputer "Piz Daint," thereby enabling the turbulence model to learn by "playing" with the flow. As explained by Koumoutsakos, this method not only outperformed well-established modelling approaches, but it also "offers a new and powerful way to automate multiscale modelling and advance science through a judicious use of AI."
/web/2021/08-210104-a3

World's Best Magnetically Shielded Walk-In Chamber

(Paul Scherrer Institute, January 18, 2021)

A team of Paul Scherrer Institute researchers, together with VACUUMSCHMELZE, recently built a 25 cubic meter chamber whose walls dampen any external magnetic influence by a hundred thousand times in order to help to clarify a fundamental question: Why does matter – and by extension, why do we – exist at all? To achieve this, the researchers will install the so-called "n2EDM experiment" in the chamber,

which aims to search for a previously undiscovered physical quantity – the electric dipole moment of the neutron – by artificially generating a precisely defined magnetic field inside the magnetically shielded room and measuring the reaction of the neutrons. Despite delays due to the corona crisis, the researchers hope that the experiment will be fully assembled by the end of 2021 and will deliver the first measurement results after just two months in operation.
/web/2021/08-210118-2e

Most Precise Measurement of the Helium Nucleus

(Paul Scherrer Institute, January 27, 2021)

An international team of researchers, including from the Paul Scherrer Institute and ETH Zurich, recently measured the radius of the atomic nucleus of helium five times more precisely than ever before, which will enable physicists to test fundamental physical theories, as well as to more accurately determine natural constants. To achieve this, the researchers worked with "muonic helium" – exotic atoms in which both electrons have been replaced by a single muon, which is similar to an electron, but around 200 times heavier – which made the state-of-the-art facilities at PSI particularly crucial, as it is the only research site in the world where enough so-called "low-energy muons" can be produced for such experiments. According to these new findings, the mean charge radius of the helium nucleus is 1.67824 femtometers (1 meter = 1 quadrillion femtometers).
/web/2021/08-210127-2c

Record-Breaking Single Photons Source

(University of Basel, January 28, 2021)

A team of researchers led by Professor Richard Warburton, Natasha Tomm and Dr. Alisa Javadi from the University of Basel, together with colleagues from the Ruhr University Bochum, recently developed a single-photon source that significantly surpasses previously known systems in terms of efficiency, thereby representing a new and powerful building block for quantum technologies. To achieve this, the researchers developed a novel micro-cavity – or, to put it more simply, a "funnel" – that captures almost all of the photons when they are created and subsequently directs them into an optical fiber. This in turn raises the efficiency of single photon creation to 57 percent – more than double that of previous single-photon sources – which, as explained by Warburton, "adds up to an overall improvement of a factor of one million for a string of, say, 20 photons."
/web/2021/08-210128-f5

9. Architecture / Design

What's next_Project

(startupticker.ch, December 03, 2020)

Three innovative projects were recently selected to participate in the "What's next_Project" – a 12-months long development program run by the Z-Kubator at the Zurich University of the Arts (ZHdK), which aims to promote arts, education and design projects from the ZHdK that have an entrepreneurial focus. Selected projects include: "Elements", which aims to develop modular headphones with individual components that can easily be exchanged, expanded or renewed; "BATVISION", which visualizes the aural image of bats and explains the concept of echolocation in an immersive way; and "wildi blaatere", which aims to create more equal and sustainable working conditions in the theater sector by prototyping new ideas in an experimental lab. The next chance to apply for the What's next_Project will be in the spring semester 2021.
/web/2020/09-201203-a5

ETH Premises Select Two New Art Projects

(ETH Zurich, December 04, 2020)

ETH Zurich's Art in Construction Commission recently selected two winning projects that reflect on teaching and research in an innovative way, and which will soon be adorning ETH premises in Basel and Zurich. In Basel, where ETH Zurich is constructing a new research building for the Department of Biosystems, Yves Netzhammer will realize his “Evasion of Biological Attraction” project, which will feature an industrial robot consisting of a moving, three-part installation entitled “The Mobile”. The “Language of Color” project by Maya Rochat on the other hand will be implemented in Zurich, and will consist of colorful, organic imagery that “depicts the complex dialogue between natural and artistic elements, plays with creation and destruction, with boundaries and the idea of absolute fluidity.”
/web/2020/09-201204-a7

10. Economy, Social Sciences & Humanities

New "finance.swiss" Information Platform

(admin.ch, December 07, 2020)

The Federal Department of Finance and the Federal Department of Foreign Affairs, together with players in the Swiss financial center, recently launched an information platform called "finance.swiss," which brings together the latest information on the Swiss financial center in one place, primarily for an international audience. The platform was designed as part of the Swiss federal government’s policy for an internationally competitive financial center, and is a key pillar of the Federal Council’s strategy on Switzerland’s communication abroad. As such, it aims to serve as a single point of contact for information on the Swiss financial center, to increase awareness of its strengths and to act as a basis for greater promotional activities abroad.
/web/2020/10-201207-d0

Hack4SocialGood

(Bern University of Applied Sciences, December 14, 2020)

In order to help charitable and social organizations better harness the potential of digitalization, the 3-day "Hack4SocialGood" innovation workshop recently brought together individuals from the social and technical sectors to work on a series of challenges, which were set by several social sector organizations. In the end, the jury crowned the "Asylum Seekers' Profiles Visualization" project, which developed a tool to support social workers in accompanying asylum seekers and refugees, as the winner, while the "Care Giver Portal," which aims to provide legal, financial and social support to caregivers, was awarded the audience award. The event was organized by the Bern University of Applied Sciences, in cooperation with the Open Knowledge Foundation, sozialinfo.ch, Caritas Switzerland and the University of Bern, and with the support of Innosuisse.
/web/2020/10-201214-35

Entrepreneurial Success Despite and Because of ADHD

(University of St.Gallen, January 14, 2021)

With various studies indicating that people with ADHD frequently gravitate towards entrepreneurial activities, a team of University of St.Gallen researchers led by Professor Isabella Hatak, in collaboration with international colleagues, recently surveyed 164 companies from the Netherlands with regard to corporate success, entrepreneurs' ADHD symptoms, as well as their passions for development, starting up a company, and invention, and found that ADHD alone is not the decisive factor when it comes to entrepreneurial success or failure. Instead, as explained by Hatak, the results illustrate that "depending on

their passions, entrepreneurs with ADHD can be as successful as those without," thereby underscoring a strength-based view of psychological disorders.
/web/2021/10-210114-6f

Women's and Children's Health in Conflict Zones

(University of Geneva, January 25, 2021)

A panel of experts and frontline health professionals led by University of Geneva Professor Karl Blanchet recently joined forces to analyze the nature and dynamics of women's and children's health in armed conflicts in order to provide strong data, as well as pragmatic advice, to all concerned. To achieve this, the team deliberately chose ten countries that are very different in terms of conflict dynamics, health situation and cultural context, and subsequently published their findings in a series of five articles in a special issue of the Lancet. The articles in particular focus on the special requirements of providing sexual, reproductive, maternal, newborn, child and adolescent health and nutrition services in conflict settings, while also responding to the need for scientifically validated evidence to guide humanitarian action.
/web/2021/10-210125-af

Exploring a 60-Year-Old Russian Mystery

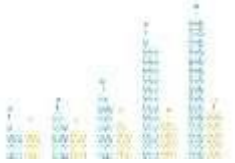
(EPFL, January 28, 2021)

EPFL Professor Johan Gaume, together with ETH Zurich Professor Alexander Puzrin, recently conducted an original scientific study that puts forth a plausible explanation for the mysterious 1959 death of nine hikers in the Ural Mountains in the former Soviet Union, during what came to be known as the tragic "Dyatlov Pass Incident". Specifically, the researchers provide strong quantitative evidence that the so-called "avalanche theory", which posits that an avalanche had taken the group by surprise as they lay sleeping in the tent, is plausible, and argue that the avalanche was most likely caused by the presence of katabatic winds, a specific feature of the terrain, and the team cutting into the slope to pitch their tent. Both scientists are nevertheless cautious about their findings, and make it clear that much about the incident remains a mystery.
/web/2021/10-210128-88

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

Swiss Startup Radar

(startupticker.ch, December 02, 2020)



University of Lausanne Professor Michael Rockinger, together with Stefan Kyora, editor-in-chief of startupticker.ch, recently published the third edition of Swiss Startup Radar, which not only examined the economic importance of Swiss startups, but also placed them in an international context. Although Switzerland is moving in a good direction – Swiss startups have created tens of thousands of value-added jobs, are very innovative in an international comparison, and are responsible for a significant part of foreign direct investment in Switzerland – the report nevertheless noted that Switzerland has a shortage of venture capitalists that invest frequently. This represents an important untapped potential, as venture capital investment not only plays a vital role in the growth phase of companies, but also constitutes a key driver of startup job-creation.
/web/2020/11-201202-a3

Empa Innovation Award

(Empa, December 03, 2020)

In order to honor the efforts of its researchers to further strengthen the bridge between science and industry through applied, market-oriented research, Empa recently presented the "Empa Innovation Award" to the following three outstanding innovation and technology transfer projects: "Nanoglue", which is a novel tissue adhesive technology that promises faster and safer wound healing; "Hello-Mask", which is a transparent protective mask developed by Empa and EPFL, which, while keeping germs at bay, does not obscure the lip movement and facial expressions of the wearer; and "Sympheny", which is an Empa spin-off that offers a scalable SaaS (Software as a Service) platform software platform for planning sustainable energy systems.
/web/2020/11-201203-a9

Female Founders Map

(Impact Hub Zurich, December 09, 2020)

Women are still highly underrepresented in the startup sector, as illustrated by the fact that they only account for about 20% of startup (co)founders in Switzerland, or even 10% when it comes to science and tech-based startups. Although the reasons for these disparities are complex, their underrepresentation not only represents a societal and systemic issue for gender equality, but also a missed opportunity for the economy. In this context, STARTUP CAMPUS Switzerland, the Zurich University of Applied Sciences and Impact Hub Zurich recently launched the "Female Founders map," which aims to provide transparency in the sector and portrays great female role models in the startup ecosystem. In doing so, the project hopes to inspire women to become entrepreneurs themselves, and as a result, to significantly increase the number of female founders in Switzerland.
/web/2020/11-201209-57

Swisscom StartUp Challenge

(Venturelab, December 17, 2020)

Following the reception of applications from a total of 125 startups from 30 different countries, the following five winners of this year's Swisscom StartUp Challenge were recently announced: "Fotokite" provides public safety teams with live on-site and remotely streamed situational awareness solutions; "HEGIAS" developed the world's first automated and browser-based content management system solution for visualizing and communicating with VR in construction and real estate; "qiio" provides plug and play, edge-to-cloud secure cellular IoT solutions optimized for bidirectional connectivity through the cloud; "Robotic Systems Lab" (ETH Zurich) investigates the development of machines and their intelligence to operate in rough and challenging environments; and "ZaiNar" provides real time location for any 5G device to within a meter in 3D.
/web/2020/11-201217-df

SEF High Potential SME Quality Label

(startupticker.ch, December 30, 2020)

Five startups were recently awarded with the "SEF4KMU.High-Potential-KMU" quality label, which will enable them to improve their presence on the market, as well as to increase their acceptance amongst customers and investors. These include: "Dagsmejan Ventures", which has been collaborating with sleep researchers, textile engineers and manufacturing experts to revolutionize the sleepwear market; "ANYbotics", which develops autonomous four-legged robots capable of navigating complex environments; "Zippsafe", which introduced a new locker solution that uses up to 70% less space than traditional sheet metal lockers; "Neon", which developed a new solution that aims to reduce bank- and

credit card fees; and ”Roomz”, which offers a digital room planning solution to provide real-time information on room usage so that employees can book rooms and workstations more flexibly.
/web/2020/11-201230-df

Record Number of New Companies Created in 2020

(Institut für Jungunternehmen, January 01, 2021)

The IFJ recently published its National Analysis of Swiss Incorporations in 2020, which revealed that despite the COVID-19 pandemic, more companies had been created in Switzerland in 2020 than ever before. Specifically, the Swiss Commercial Register recorded a total of 46,842 new company registrations in 2020, representing an increase of 5.3% compared to the previous record year of 2019, which was primarily driven by the major regions of Northwestern Switzerland (+10.5%), Central Switzerland (+10.1%), Eastern Switzerland (+8.4%), Zurich (+7.5%) and Espace Mittelland (+6.0%). However, Ticino, which was hit especially hard by the corona pandemic, recorded a considerable decline in the number of new companies (-10.6%), while Southwestern Switzerland was able to recover during the course of the year and only recorded a slight decline of -0.2%.
/web/2021/11-210101-7b

Record Number of ETH Zurich Spin-Offs Founded in 2020

(ETH Zurich, January 06, 2021)

ETH Zurich continues to witness a steady increase in the number of spin-offs founded per year, with 34 founding teams having taken the leap to independence in 2020. As in previous years, many new spin-offs were founded in the field of ITC, with 11 based on AI, but sustainability also plays an important role, with six companies developing products or services in this area. Furthermore, an increasing number of ETH students are founding a spin-off straight after their Master's studies, which Detlef Günther, Vice President for Research, attributes to the strong start-up ecosystem and internal support at ETH. Although still significantly more men than women take this step, the number of female founders at ETH has risen slightly in recent years and the university remains committed to empowering more women to bring their ideas to the business world.
/web/2021/11-210106-93

Swiss Startups at CES 2021

(startupticker.ch, January 13, 2021)

During the recently held CES 2021 – a global platform for innovators to showcase and launch new consumer solutions – Mictic announced its move to establish a presence in Southern California, while the following three startups revealed new solutions and product advancements: Leman Micro Devices launched its cuff-less and calibration-free "V-Sensor", Biospectal launched the public Beta of "OptiBP" and Typewise launched version 3.0 of its keyboard. In addition, AVAtronics, CREAL, Droople, experify.io, Eyeware, Foxsmart Systems, GlobalM, Klepsydra Technologies, MAGMA Learning, MyElixa, SecuraXis, SO REAL Digital Twins, SwissCapCharger, Swiss Vault, Tinamu Labs, Traverz, CleanMotion, Pixchange app, ARMA Instruments AG, CM Profiling, Treasure Hunters and IMVERSE were all also present at the virtual Swiss Pavillon at CES.
/web/2021/11-210113-ae

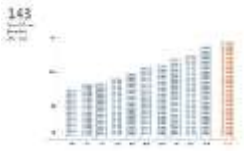
New Startup Jobs Platform: joinup

(InTech, January 19, 2021)

The ETH Entrepreneur Club, in collaboration Swisspreneur, recently launched a new startup jobs platform called "joinup", which not only aims to help startups find qualified personnel with various skill sets, but also to simplify the entry into the startup world for university students and graduates, as explained by project leader Pascal Küng. On joinup.ch, a profile can be created and jobs posted within minutes. Candidates can then not only search for jobs and startups based on various criteria, but they also have the option to fill out their profile with their experience and skills and thus be found by interested startups. The platform is free to use for startups, students and job seekers, and is also supported by the ETH Innovation and Entrepreneurship Lab (ieLab), EPFL, Startup@HSG and the University of Zurich.
/web/2021/11-210119-8a

Seven New Startups by University of Zurich

(University of Zurich, January 26, 2021)



The ranks of University of Zurich researchers, students and alumni include numerous entrepreneurs who use their inventions to bring innovative products and services to the market, as illustrated by the following seven UZH spin-offs that were founded in 2020: "KOVE" aims to reduce the risk of pre-term birth by preventing possible consequences of fetoscopy; "MUVON Therapeutics" develops autologous cell therapies for the regeneration of skeletal muscle tissue; "Tosoo" aims to roll out a mobile technology that monitors, deepens or modulates sleep; "Invasight" develops low-molecular substances that target and block the spread of tumor cells; "Celerato" aims to standardize pathology reports; "SUIND" develops innovative software for drone manufacturers; and "Blockchain Presence" provides a decentralized platform that allows data to be transferred securely and reliably.
/web/2021/11-210126-99

Swiss Venture Capital Report 2021

(startupticker.ch, January 26, 2021)

Startupticker.ch, in collaboration with SECA, recently launched the 2021 edition of the Swiss Venture Capital Report – an annual reference publication for investment in Swiss startups that provides an analysis of the financing rounds, a list of the investments and an overview of the most important exits. Although the cumulative volume of venture capital investment decreased slightly (-7%) due to the COVID-19 pandemic in 2020, there was a higher number of financing rounds (+14%) and startups nevertheless generated more than CHF 2 billion for the second consecutive year. Further highlights include the significant increase of investments between CHF 10 and 100 million (+38%), the positive development of early stage rounds (+43%), as well as the enormous growth in Basel-Stadt.
/web/2021/11-210126-6f

New USI Startup Center

(University of Lugano, January 28, 2021)

The University of Lugano recently opened the "USI Startup Center" on the new Lugano East Campus, which aims to contribute to the growth of the entrepreneurial culture in the academic community, as well as in the regional economy. To achieve this, the center will host a wide variety of networking events to expand the innovation ecosystem in Ticino and to establish valuable relationships, as well as support startups in their early stages with its incubator, which, according to Alcide Barberis, the director of the incubator, receives more than a hundred requests every year. The USI Startup Center is the result of a complete overhaul of the Start-up Promotion Center (CP Start-up), which was created in 2004, thanks to the initiative of the Foundation for the Lugano Faculties of USI, and transferred to the University in 2018.
/web/2021/11-210128-ab

Two Female Entrepreneurs Win Isabelle Musy Award

(startupticker.ch, January 28, 2021)

Clara Moldovan and Margaux Duchamp recently won the 4th edition of the Isabelle Musy Award, which is given out every two years to outstanding female entrepreneurs from the French- and Italian-speaking parts of Switzerland. Clara Moldovan is the CEO and founder of Swisto, which develops and markets high-performance energy storage devices that can replace rechargeable batteries. Swistor's environmentally friendly system can be charged between 10 and 100 times faster than existing batteries, has a lifespan that is 30 times longer, and is compatible with existing semiconductor fabrication processes. Margaux Duchamp is the co-founder and future CEO of ArcoScreen, which is developing a microfluidic system that makes it faster and easier to develop new drugs for major diseases like cancer, Alzheimer's, Parkinson's and cardiovascular illness.
/web/2021/11-210128-f9

12. General Interest

swisscovery: A New National Library Platform

(ETH Zurich, December 07, 2020)

The Swiss Library Service Platform (SLSP), which was initiated by ETH Library Deputy Director Andreas Kirstein in 2014, recently launched a new national library platform called "swisscovery", which gives users access to the full range of scientific resources from 470 libraries in Switzerland. This not only includes more than 40 million books, periodicals, journals and non-book materials, but also over 3 million digital articles. In addition, as the new platform was designed to make research and loans easier and more efficient, users can now see at a glance which libraries have the book they are looking for. A new shared courier service has also been created, which enables users to have books delivered affordably to the library of their choice, where they can later return them as well.
/web/2020/12-201207-75

"Weave" Simplifies Submission of International Research Projects

(Swiss National Science Foundation, December 18, 2020)

The SNSF and European research funders recently signed a multilateral agreement called "Weave," which aims to further simplify the submission of international research projects by enabling collaborative projects under the same framework conditions with all participating countries. This not only saves a great deal of time and effort, but also enables researchers to choose the funder they wish to submit their application to, as well as makes trilateral projects possible. In a first step, Weave will replace the existing Lead Agency agreements with Austria, Belgium (Flanders and Wallonia), Czech Republic, Croatia, Germany, Luxembourg, Poland and Slovenia. Norway and Sweden will be added to this list within the next few years. However, the bilateral Lead Agency agreements with France, Sao Paulo, South Africa and South Tyrol will remain in place without any changes.
/web/2020/12-201218-ef

ETH Zurich 2020 Highlights

(ETH Zurich, December 23, 2020)

As 2020 drew to a close, ETH Zurich took a look back at the highlights that emerged amidst difficult and unsettling times, at ingenious ideas, fascinating science and solidarity in action during – and despite – the coronavirus pandemic. For example, ETH researchers worked with partner institutions to measure seismic activity on Mars, analyzed various possibilities for reducing the CO2 emissions from production in the chemical industry to net zero, built a brand-new chip for ultrafast data transmission using light and developed a method to release drugs into the brain with pinpoint accuracy. Furthermore, the university put science and creativity on display at the World Economic Forum, launched the ETH AI center and organized the second edition of CYBATHLON. Finally, the ETH community also launched a whole host of projects and initiatives in response to the COVID-19 pandemic.
/web/2020/12-201223-78

BRIDGE "Proof of Concept" Projects

(SNSF and Innosuisse, December 28, 2020)

Seven outstanding young researchers were recently selected for the BRIDGE "Proof of Concept" funding scheme, which is jointly conducted by the Swiss National Science Foundation and Innosuisse, and offers new funding opportunities at the intersection of basic research and science-based innovation. These young researchers, who will receive up to CHF 130k in funding to implement their project, include: Salman Faraji (Suspended manipulator for steep gardens); Nahid Hosseini (High-speed polymer-based sensors for surface investigation); Stéphanie Jacot (Rise Up); Ana Montalban-Arques (Selected Clostridiales bacteria as novel treatment for solid tumors); Simon Oschwald (Project Circleg); Zuzana Sediva (Future foam initiative); and Özge Yüzgeç (iSleep).
/web/2020/12-201228-63

SwissGames Showcase 2021

(startupticker.ch, January 11, 2021)

Eleven independent Swiss studios recently joined the SwissGames Showcase mentorship program, which was initiated last year by Pro Helvetia in reaction to event cancellations caused by the pandemic. The selected studios will receive tailored mentorship, as well as access to their coaches' network. Jason Della Rocca will mentor Stray Fawn Studio ("The Wandering Village"), Sycoforge ("Return to Nangrim") and Echtzeit ("Whoop Arcade"); Jamil Moledina will mentor Lukyantsev Company ("Wild Planet") and patch.XR ("Patchworld"); Lélia Peuchamiel will mentor Team KwaKwa ("Soup Raiders") and Violet Saint ("Moroi"); Astrid Mie Refstrup will mentor Caustique Games ("Team:Cars") and Stardust ("Grimoire Groves"); and Ella Romanos will mentor Nifty Production ("Smelogs Playground") and Lakeview Games ("Pool Party").
/web/2021/12-210111-49

13. Calls for Grants/Awards

Swiss Medtech Award 2021

(Swiss Medtech, December 17, 2020)

Applications are now being accepted for the "Swiss Medtech Award", which recognizes outstanding achievements in the Swiss medical technology industry. Participation in the competition is open to companies, research institutions or syndicates from the Swiss medical technology industry that developed new medical products and can demonstrate a benefit to patients; have implemented new solutions

that lead to identifiable cost savings in the healthcare sector; or have contributed to the development of groundbreaking technologies or procedures that will strengthen the Swiss medical industry. Furthermore, the achievements and provision of services must have been performed to a significant extent within Switzerland and candidates must be able to provide supporting documents and/or references as evidence. The deadline for applications is 28 February 2021.
/web/2020/13-201217-fa

SNSF Project Funding

(Swiss National Science Foundation, January 04, 2021)

The Swiss National Science Foundation recently opened applications for its "project funding" scheme, which enables qualified researchers from all disciplines to independently conduct research projects with topics and goals of their own choice. The funding period ranges from one to four years, with grants starting at CHF 50,000 (minimum amount). Applicants can apply for funding of research costs and staff salaries, as well as of scientific cooperation, networking and communication; however, they may not apply for their own salaries. Applications must be submitted by 1 April 2021.
/web/2021/13-210104-0a

CERN Beamline for Schools at DESY

(CERN, January 11, 2021)

CERN recently kicked off the 2021 edition of the "Beamline for Schools" physics competition, which offers high-school students the unique opportunity to carry out an experiment at DESY in Hamburg, Germany (the CERN test-beam area will still be under scheduled maintenance in 2021 and therefore cannot host experiments). The competition is open to teams of five students or more, aged 16 and over, from all around the world, accompanied by at least one adult supervisor or "coach". To participate, teams should think of a simple, creative experiment and submit a written proposal, as well as a short video proposal, by midnight CET of 15 April 2021.
/web/2021/13-210111-15

Innosuisse Launches Two New Funding Initiatives

(Innosuisse, January 11, 2021)

Innosuisse recently launched two new funding initiatives, which aim to strengthen the long-term competitiveness of the Swiss economy, in particular by ensuring the innovative capacity of SMEs. First, the "Swiss Innovation Power" Impulse Program aims to stimulate science-based innovation projects of SMEs in a targeted manner during the ongoing COVID-19 pandemic. The online application platform has been open to applications since 7 January 2021. Second, the "Flagship Initiative" aims to give a boost to systemic innovations that are central to current economic and social challenges in Switzerland. Innosuisse launched the first call for proposals on 14 January 2021, and interested consortia can submit project proposals until 31 March 2021.
/web/2021/13-210111-38

Funding for Young and Experienced Researchers

(BRIDGE Program, January 14, 2021)

The Swiss National Science Foundation and Innosuisse recently launched two new calls for proposals for their joint BRIDGE Program, which offers funding opportunities at the intersection of basic research and science-based innovation, thereby supplementing the funding activities of the two organizations. The "Proof of Concept" call (submission deadline: 8 March 2021) is aimed at young researchers who wish to develop an application or service based on their research results, while the "Discovery" call (letter of intent deadline: 1 March 2021; full proposal deadline: 17 May 2021) is aimed at experienced researchers who wish to explore and implement the innovation potential of research results.
/web/2021/13-210114-80

MassChallenge Switzerland 2021

(MassChallenge Switzerland, January 15, 2021)

MassChallenge Switzerland is inviting high-potential startups from anywhere in the world to apply to their early-stage accelerator, which includes a core, "Industry-Agnostic" program, as well as a designated "Sustainable Food Systems" track. Benefits include world-class mentoring from 600+ experts, access to corporations and investors, CHF 1 million in non-dilutive cash prizes, a tailored program curriculum and free office space. Interested startups can submit their applications until 8 March 2021, and if they use the discount code "SWISSNEX2021," their application fee will be waived. MassChallenge Switzerland has been a leader in helping startups across Europe grow their businesses, with 396 alumni raising USD 318 million in funding, and in 2020, they accelerated 94 early-stage startups, taking no equity or fees.
/web/2021/13-210115-7d

Promoting Women in Robotics

(NCCR Robotics, January 18, 2021)

In order to promote and stimulate the work of woman researchers in the field of robotics, NCCR Robotics has launched several funding programs, including the NCCR Robotics Equal Opportunities Award for "Career Development", which supports women that are pursuing a research career in the field of robotics, as well as for "Scientific Visibility", which supports NCCR Robotics female Master students who wish to present papers/posters at scientific events. NCCR Robotics also supports NCCR members who wish to invite female speakers as keynotes for conferences, and offers the "NCCR Robotics Master Scholarships for Women", which aims to enable excellent female students to come within the NCCR labs and take advantage of their infrastructure/competence to conduct an ambitious Master's project.
/web/2021/13-210118-e1

Upcoming Science and Technology Related Events

Horizon Europe for Switzerland
February 17-18, 2021
https://is.gd/ueky6i
Research, Innovation, Cooperation
Online

Ethics Matters.
February 23, 2021
https://is.gd/sDnvZa
Digital Design, Ethics, Developers
Online

Women in Data Science
March 5, 2021
https://is.gd/c6eVCt
Data Science, Software, Engineering
Online

Swiss Cyber Security Days
March 10-11, 2021
https://is.gd/DMGwMO
Cybersecurity, Network, Technology
Online

SICTIC Investor Day
March 16, 2021
https://is.gd/M3LoDy
Startups, Pitches, Investors
Online

CYSAT Davos 2021
March 17-19, 2021
https://is.gd/WIaMJr
Cybersecurity, Space
Hybrid: Online, Davos Congress

START Summit 2021
March 22-27, 2021
https://is.gd/eG8Miv
Startups, Network, Pitches
Hybrid: Online, St.Gallen, Helsinki

Venture DAY
March 24, 2021
https://is.gd/9vYUAt
Deeptech, Startups, Investors
Online

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