Schweizerische Eidgenossenschaft
Confédération suisse
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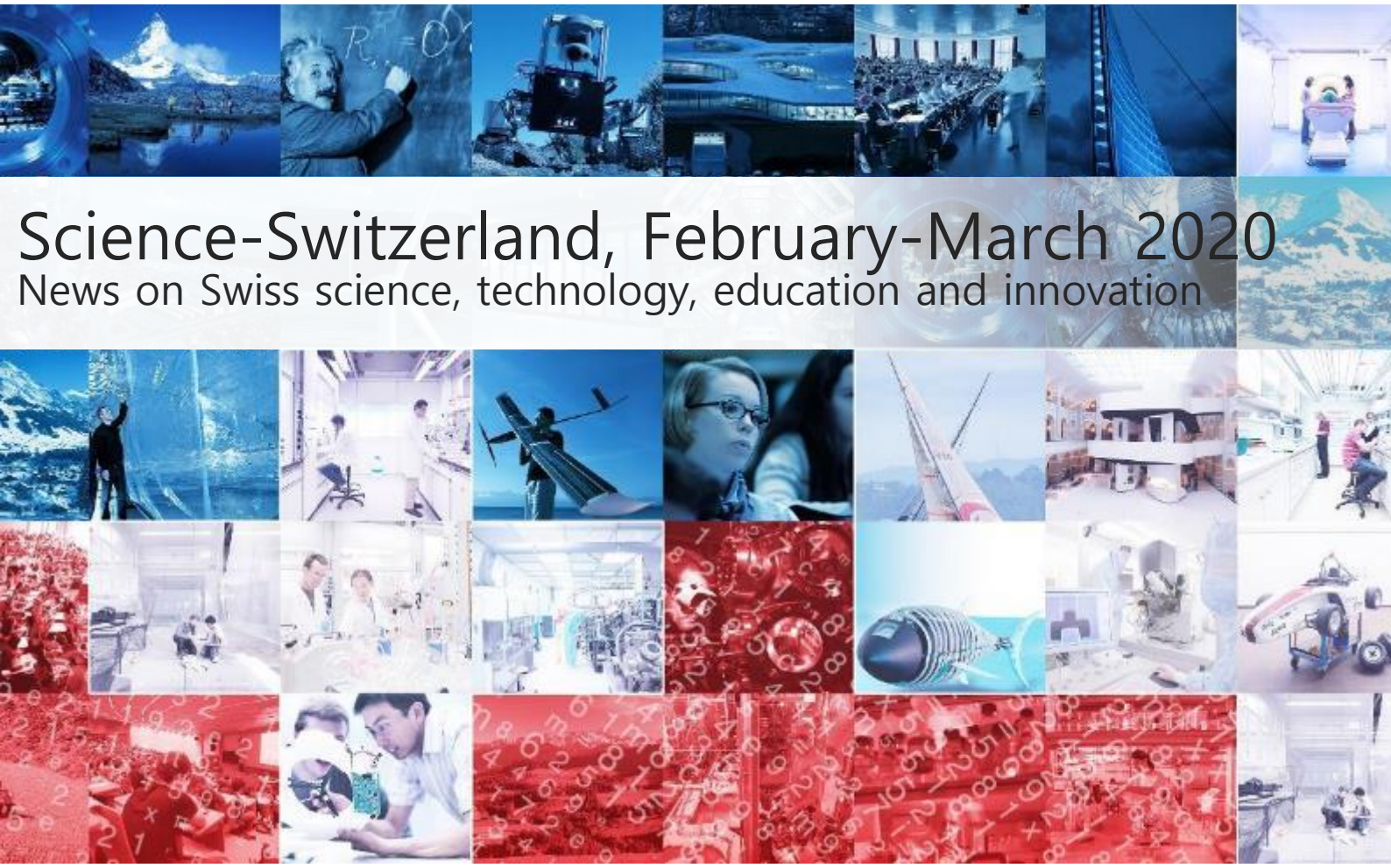
State Secretariat for Education, Research and Innovation SERI
swissnex China
Innosuisse
Swiss Federal Office of Energy SFOE

Switzerland.



Science-Switzerland, February-March 2020

News on Swiss science, technology, education and innovation

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Evaluation confirms Value of swissnex Network

(admin.ch, February 21, 2020)

The specialized knowledge company Oxford Research has evaluated the swissnex network at the request of the State Secretariat for Education, Research and Innovation SERI. The evaluation describes swissnex as a customer-oriented, flexible and dynamic organization that offers significant added value to its publicly funded and private partners. Without the support of swissnex, most universities, researchers or start-ups would not be able to achieve their internationalization goals to the same extent. Among the recommendations made by the evaluation are a greater swissnex presence in Switzerland, a stronger focus on long-term projects and a more targeted exchange between the individual swissnex locations.
/web/2020/00-200221-ff

1. Policy

CHF 28 Billion to further strengthen Education, Research and Innovation

(admin.ch, February 26, 2020)

On 26 February, the Federal Council adopted the Dispatch on the Promotion of Education, Research and Innovation (ERI) for the period 2021-2024 for the attention of Parliament. It is requesting almost CHF 28 billion over the next four years. The aim is to ensure that Switzerland remains an international leader in the field of education, research and innovation. One of the main challenges is digital transformation.
/web/2020/00-200226-c9

Coronavirus: Federal Council Bans Large-Scale Events

(admin.ch, February 28, 2020)

An extraordinary meeting of the Federal Council was held on 28th of February. In view of the current situation and the spread of the coronavirus, the Federal Council has categorized the situation in Switzerland as 'special' in terms of the Epidemics Act. Large-scale events involving more than 1000 people are to be banned. The Federal Council's top priority is to protect the population. The ban comes into immediate effect and will apply at least until 15 March. The cantons are responsible for enforcing the ban. In the case of public or private events at which fewer than 1000 people would gather, event organizers must carry out a risk assessment in conjunction with the competent cantonal authorities to decide whether or not the event can be held.
/web/2020/01-200228-7e

Federal Council declares 'Extraordinary Situation'

(admin.ch, March 16, 2020)

At an extraordinary meeting on the 16th of March, the Federal Council took the decision to introduce more stringent measures to protect the public. It has declared that an 'extraordinary situation' now exists in Switzerland in terms of the Epidemics Act. All shops, restaurants, bars and entertainment and leisure facilities will remain closed until 19 April. Not affected by the new ruling are food stores and healthcare institutions. As of midnight, it is also introducing checks on the borders to Germany, Austria and France. The Federal Council has also authorized the deployment of up to 8000 members of the armed forces to assist the cantons at hospitals and with logistics and security.
/web/2020/00-200316-8d

ETH Board welcomes the ERI Dispatch

(admin.ch, March 05, 2020)

The ETH Board supports the Dispatch on the Promotion of Education, Research and Innovation (ERI Dispatch) 2021–2024 that was approved by the Federal Council on 26 February 2020. It welcomes the fact that the Confederation continues to give high priority to the ERI field. The funding proposed for the ETH Domain enables the latter to carry out its numerous tasks in the areas of teaching, research, and knowledge and technology transfer to a high standard on behalf of Switzerland. The ETH Board is in no doubt that Switzerland must be able to participate fully in the program as of 2021. Staying on the sidelines would have serious consequences for Switzerland's attractiveness and reputation as a research location.
/web/2020/01-200305-b2

2. Education

Landscape Architecture in High Demand

(ETH Zurich, March 06, 2020)

Beginning this autumn, ETH Zurich will offer a Master's program in Landscape Architecture – a first for a Swiss university. According to Christoph Girot and Teresa Galí- Izard, the demand for landscape architects is greater than ever. Because the question reflects a longstanding, fundamental attitude in Switzerland. Many people thought we didn't need landscape design since we have mountains, and nature everything should be fine. But what if suddenly everything isn't fine anymore? There are numerous problems that we have not yet trained any specialists. This includes Climate change and it's problems that can't be solved through conventional ways of thinking.
/web/2020/02-200306-21

Transdisciplinary – The New Online Course

(University of Basel, March 11, 2020)

The global fight against antibiotic resistance, strategies to deal with water shortages in the Swiss Alps, and supporting Nepalese migrant workers in India – these topics all have one thing in common: researchers working on a complex interdisciplinary societal problem in cooperation with local, national and/or international stakeholders. Successful collaboration in challenging conditions is something that has to be learned. This is why a new open online course, developed by the University of Basel in collaboration with the Swiss Academies of Arts and Sciences, will begin at the end of March. The six-week course focuses on interdisciplinary research and is freely accessible on the FutureLearn platform.
/web/2020/02-200311-70

3. Life Science

Designer Corps for sustainable Agriculture

(University of Zurich, February 05, 2020)

Genetic engineering and environmental protection: For many, these concepts don't really seem to be compatible. But according to Philipp Aerni, an agricultural economist at UZH, this unlikely pairing has great potential for the sustainable agriculture of the future. He believes that if agriculture is to be environmentally

friendly and able to meet future food demands, it will need to be based on gene editing technology. Ueli Grossniklaus, botanist at UZH, believes that CrisprCas9 holds great potential for the sustainable agriculture of the future due to its ability to quickly and precisely breed resistant crops. He sees the tight regulations on gene editing technology in Switzerland and the EU as a main hurdle to scientific innovation – as well as something that plays into the hands of big seed companies.
/web/2020/03-200205-40

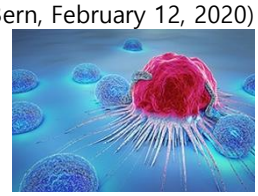
Eye-Tracking Data improves Prosthetic Hands

(SNSF, February 11, 2020)

With its 34 muscles and 20 joint the hand is a precious limb. It enables movement of great precision and complexity which are essential for interacting with the environment and with others on a daily basis. Hand amputation thus has severe physical and psychological repercussions on a person's life. Myoelectric prosthetic hands, which work by recording electrical muscle signals on the skin, allow amputees to regain some lost function. But dexterity is often limited and the variability of the electrical signals from the forearm alone makes the prosthetics sometimes unreliable. Henning Müller, professor of business informatics, is investigating how combining data from myoelectric signals with other sources of information could lead to better prosthetics. Müller has now made available to the scientific community a dataset that includes eye tracking and computer vision as well as other information.
/web/2020/03-200211-26

Algorithms for Identifying New "Cancer Genes"

(University of Bern, February 12, 2020)



Since it is estimated the number of cancer cases worldwide will double by 2040, the search for genes that cause cancer becomes even more important. A team of researchers from the University of Bern and Inselspital, University Hospital Bern, has now developed algorithms that massively simplify the hunt for "cancer genes" in a poorly understood part of our genome. The team led by Rory Johnson focused on searching for cancer lncRNAs using maps of tumor mutations from the International Cancer Genome Consortium. The researchers developed statistical methods to identify cancer lncRNAs and are convinced that the resulting gene dataset proves a unique resource to better understand the properties of this poorly-understood class of lncRNA genes.
/web/2020/03-200212-aa

Repairing Damaged Heart Muscle

(admin.ch, February 18, 2020)

If the heart muscle is damaged, repairing the constantly active organ is a challenge. Empa researchers are developing a novel tissue adhesive inspired by nature, which is able to repair lesions in muscle tissue. They have taken advantage of the incredible ability of marine mussels to adhere to any kind of surface. The researchers have already investigated how well the novel hydrogel actually adheres in lab experiments that are usually used to define technical standards for so-called bursting strength. The tissue adhesive can resist pressure equivalent to human blood pressure.
/web/2020/03-200218-09

New Fatty Liver Protein found in Hepatocellular Carcinoma

(University of Geneva, February 19, 2020)

Researchers from the university of Geneva pave the way for better diagnosis, and potentially better treatment of obesity-related liver diseases. The scientists have discovered a protein involved in the progression of a "fatty liver" towards cancer. This protein, S100A11, could not only allow early detection of the risk of developing liver cancer, but also open the way to new targeted therapies. The discrete symptoms of liver inflammation and cancer play an important role in their dangerousness, but the presence of S100A11 in the blood raises now the possibility of an early detection by simple blood sampling.
/web/2020/03-200219-1b

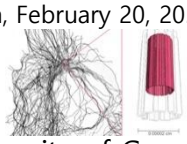
Blue Brain Project: Performance Modelling for Brain Tissue Simulations

(EPFL, February 19, 2020)

Blue Brain scientists from EPFL have now for the first time applied advanced analytical and quantitative performance modelling techniques to the field of cellular-level brain tissue simulations. This has allowed a deep insight into which types of models require which type of hardware and what we should do to improve their efficiency. This work provides a long necessary formal framework that enables a quantitative discussion between in silico modelers, high performance software researchers and hardware architects
/web/2020/03-200219-84

Nano Scaffold at the Center of our Cellular Skeleton

(university of Geneva, February 20, 2020)



When cells stop dividing, the centrioles, cylindrical structures composed of microtubules at the base of a centrosome, migrate to the plasma membrane and allow the formation of primary and mobile cilia, which are used respectively for the transfer of information and the genesis of movement. Researchers from the University of Geneva have discovered a new nano-structure that lies at the center of our cellular skeleton. This discovery will allow to better understand how the cell maintains its architecture as well as the pathologies associated with dysfunctions of this structure.
/web/2020/03-200220-51

Better Diagnosis of rare Diabetes

(University of Geneva, February 21, 2020)

A study carried out by scientists from the University of Geneva (UNIGE), the University Hospitals of Geneva (HUG), and the Lithuanian University of Health Sciences in Kaunas with more than 1,200 young diabetics allowed to accurately identify the proportion of monogenic diabetes in the whole pediatric diabetes population. Consequently, treatments were adjusted according to the genetic characteristics of the disease in order to improve patients' quality of life. Even in adults, such a test would be useful, as monogenic diabetes is often falsely identified as type 2 diabetes, with important consequences in terms of management, comfort of life and costs for the health care system.
/web/2020/03-200221-97

Fast, Sensitive Blood Test for Home use

(ETH Zurich, February 26, 2020)

Nowadays, more than two- thirds of all medical diagnoses require a blood test. These tests are using relatively bulky devices housed in hospitals or doctors. But with ETH Pioneer Fellow Alexander Tanno's invention, it will be possible to have sensitive blood tests that patients can perform wherever it suits them. There is already a prototype, measuring two centimeters by two centimeters, the clear plastic block is equipped with three electrodes and encloses a sample on a paper strip. Another use for such tests would be to check that each person is receiving the correct dose of medication.
/web/2020/03-200226-7b

Reorganization of the Genome during Development

(University of Basel, February 26, 2020)

The spatial arrangement of genetic material within the cell nucleus plays an important role in the development of an organism. A research team from the University of Basel, in collaboration with scientists from Harvard University, has developed a method to trace the chromosomes in individual cells. Using this method, they have now been able to demonstrate that chromosomes reorganize during embryonic development. The advantage of this method is that the cells and tissue remain completely intact. The reorganization of the chromosomes accompanies cell maturation and represents a milestone in the development of a complex organism. Because the correct chromosomal architecture is crucial to prevent developmental disorders.
/web/2020/03-200226-39

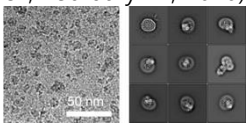
Tying up Molecules

(University of Geneva, February 27, 2020)

Since the 1970s, scientists have been trying to knot molecules together to create new, custom-made mechanical properties, which will give rise to new materials. The first successes took place twenty years later but the process remains laborious. Researchers from the University of Geneva (UNIGE), Switzerland, have now developed a simple and effective technique for tying knots in molecules, and have for the first time observed the changes in properties that result from these interlockings.
/web/2020/03-200227-a8

Enzymes build Sugar Trees

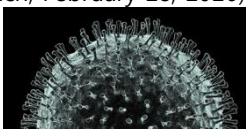
(ETH Zurich, February 27, 2020)



Researchers have used cryo- electron microscopy to elucidate for the first time the structure and function of a very small enzyme embedded in cell membranes. This enzyme builds complex sugar trees that are subsequently attached to other membrane proteins. In addition to being extremely diverse, these sugar trees serve as a way to identify the respective organism, a cell type or its stage of maturity. These insights will be especially valuable in antibody engineering, which is currently of great interest to the pharmaceutical industry. They will also benefit the production of customized glycans in general, which are important for therapeutic proteins such as antibodies.
/web/2020/03-200227-b1

Calculating the Beginnings of the Coronavirus Epidemic

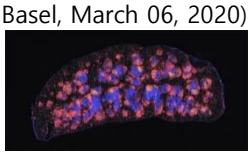
(ETH Zurich, February 28, 2020)



Since the current coronavirus epidemic started, scientists and authorities have determined the genetic fingerprint of virus samples from numerous affected countries. More than 100 of these gene sequences, which are present in coronaviruses in the form of RNA, are available in public databases. Tanja Stadler, Professor of Computational Biology at the Department of Biosystems Science and Engineering at ETH Zurich in Basel and an expert in questions of molecular epidemiology, has now studied this data. Using a statistical model her group developed to analyze the genetic genealogy of pathogens, she gained new insights into the beginnings of the epidemic in China.
/web/2020/03-200228-70

Specialized Helper Cells contribute to Immunological Memory

(University of Basel, March 06, 2020)



Helper T cells play an important role in the immune response against pathogens. The role of a particular subset of these immune cells was previously unclear. Researchers at the University of Basel's Department of Biomedicine showed that T follicular helper cells live much longer than previously thought and contribute to long-term immunity. This better understanding of Tfh cells opens up new prospects for creating long-term acquired immunity and maybe the development of improved vaccination strategies.
/web/2020/03-200306-14

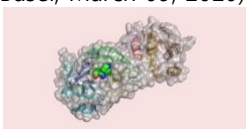
Producing Human Tissue in Space

(University of Zurich, March 09, 2020)

On 6 March, the International Space Station resupply mission Space X CRS-20 took off from Cape Canaveral (USA). On board: 250 test tubes from the University of Zurich containing adult human stem cells. These stem cells will develop into bone, cartilage and other organs during the month-long stay in space. Professor Oliver Ullrich and Dr. Cora Thiel, the two research leaders at the UZH Space Hub, are testing their innovative concept of human tissue production in weightlessness for the benefit of transplantation medicine and precision medicine and as an alternative to animal experiments.
/web/2020/03-200309-99

Virtual Screening for Active Substances against Coronavirus

(University of Basel, March 09, 2020)



The University of Basel is part of the global search for a drug to fight the coronavirus. Over the past few weeks, the research group in the Department of Pharmaceutical Sciences has been working with computer-aided methods to identify possible new drugs to combat the current coronavirus outbreak and similar epidemics in the future. In the process, the researchers have tested more than 680 substances on one of the virus's key proteins: its central protease. This "virtual screening" has already identified several interesting substances that have the potential to inhibit the virus's critical enzyme – and thus its further multiplication. In light of the current crisis, the group took an unusual decision by immediately making the test results publicly available in the form of an open-source preprint. The Basel researchers hope that a larger number of research groups worldwide will test their proposals on the virus and initiate further trials.
/web/2020/03-200309-c4

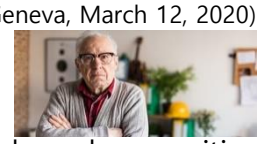
Predicting Circulatory Failure in Intensive Care Patients

(ETH Zurich, March 09, 2020)

Researchers at ETH Zurich and Bern University Hospital have developed a method for predicting circulatory failure in patients in intensive care units – enabling clinicians to intervene at an early stage. Their approach uses machine learning methods to evaluate an extensive body of patient data. To further improve the quality of the predictions, the researchers plan to incorporate patient data from other large hospitals into future analyses. In addition, they will make the anonymized dataset, the algorithms and the models available to other scientists.
/web/2020/03-200309-fa

Personality Traits that protect Brain Structures against Neuro-Degeneration

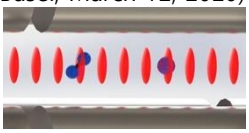
(University of Geneva, March 12, 2020)



While some risk factors causing Alzheimer's diseases are known, such as hypertension or diabetes, the potential role of non-biological factors begins to be discovered. Scientists from the University of Geneva (UNIGE) and the University Hospitals of Geneva (HUG), Switzerland, demonstrated, through brain imaging and psycho-cognitive evaluations conducted over several years on a community-based cohort of elderly people, that certain personality traits protect brain structures against neuro-degeneration. Among them, people who are less agreeable but with a natural curiosity and little conformism show better preservation of the brain regions that tend to lose volume, both in normal aging and in Alzheimer's disease.
/web/2020/03-200312-c3

Perturbation-Free Studies of Single Molecules

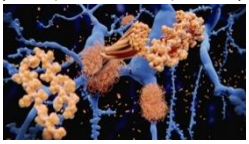
(University of Basel, March 12, 2020)



Researchers of the University of Basel have developed a new method with which individual isolated molecules can be studied precisely – without destroying the molecule or even influencing its quantum state. This method, which is a new type of force spectroscopy, introduces several new concepts: First, it relies on single molecules instead of large ensembles. Second, it represents a completely non-invasive technique as detection is accomplished indirectly (via a neighboring atom) and without a direct excitation of spectroscopic transitions. Therefore, the quantum state of the molecule is left intact, so that the measurement can be repeated continuously. This highly sensitive technique for probing molecules is widely applicable and paves the way for a range of new applications in the fields of quantum science, spectroscopy and chemistry.
/web/2020/03-200312-20

Unmasking Structure of Amyloid Fibrils with Gold Nanoparticles

(EPFL, March 12, 2020)



Amyloid fibrils are associated with Alzheimer's disease and other neurodegenerative disorders. There have been many efforts to visualize them in as much detail as possible in order to gain insights about their structure. EPFL researchers labelled amyloid fibrils with gold nanoparticles and used cryogenic transmission electron microscopy, for imaging. Nanoparticles are powerful and highly needed tools for rapid imaging and profiling of amyloid morphological polymorphism in different types of samples

under cryo-conditions. With this method, the researchers were able to obtain images of fibrils and unmask their diversity with unprecedented clarity. These advances pave the way for elucidating the structural basis of amyloid strains and toxicity.
/web/2020/03-200312-c7

Breakthrough in Malaria Research

(University of Bern, March 13, 2020)

Researchers from the University of Bern and the Umeå University in Sweden have systematically investigated the genome of the malaria parasite Plasmodium for the first time throughout its life cycle in a large-scale experiment. The scientists used a malaria mouse model established at the Institute of Cell Biology at the University of Bern. Each of the 1300 parasite genes was replaced by an individual genetic code to analyze how the removal of the individual genes affects the parasite. The use of individual codes allows to study many parasites simultaneously and thus drastically shortens the time of their analysis. The researchers were able to identify hundreds of targets that are urgently needed in drug and vaccine development to eradicate the disease.
/web/2020/03-200313-aa

Uncovering the Hornwort Genomes for Crop Improvement

(University of Zurich, March 16, 2020)

An international team led by the University of Zurich and the Boyce Thompson Institute has now sequenced three hornwort genomes, providing insights into the genetics underlying the unique biology of the group, an extant representative of the earliest land plants. Hornworts live in symbiosis with fungi and cyanobacteria providing phosphorus and nitrogen to the plant. The researchers identified 40 genes that may promote the hornworts' source of nitrogen, which comes from an interdependent relationship with cyanobacteria. If this capability of hornworts can be transferred to crop plants, many tons of nitrogen fertilizer could be saved. The researchers are already working on a project to understand the genetic mechanism underlying the symbiotic plant-cyanobacteria interaction.
/web/2020/03-200316-a2

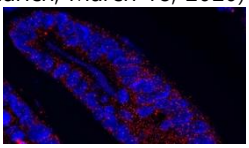
Getting Groundbreaking MedTech to Market

(EPFL, March 16, 2020)

New medical technologies hold immense promise for treating a range of conditions. Despite the pace of innovation in the medtech field, however, most discoveries never make it out of the laboratory. An EPFL research team has developed an experimental protocol for testing, optimizing and validating soft, personalized implants. They use a biomimetic platform developed in the lab, where they apply mechanical stimuli to the implant and the surrounding tissue to mimic the dynamic in vivo environment and to validate the device's biocompatibility and therapeutic efficacy. With this method, it is possible to test implants more quickly, realistically and cheaply without the need for surgical procedures. The method should help facilitate the transition from lab to market.
/web/2020/03-200316-b7

Loss of Protein Disturbs Intestinal Homeostasis and Can Drive Cancer

(University of Zurich, March 18, 2020)



Colorectal carcinoma (CRC), the most common form of intestinal cancer, is the second leading cause of cancer related death worldwide. While some patients have a genetic predisposition to the disease, the majority of cases are sporadic and largely influenced by the ever-increasing "Western lifestyle", which includes obesity, poor diet and physical inactivity. Now an international team of researchers from the University of Zurich, the University Hospital Zurich, Heidelberg and Glasgow has identified a novel function for the cell death regulating protein MCL1: It is essential in protecting the intestine against cancer development – independent of bacterial-driven inflammation. These findings have implications for the use of MCL1 inhibitors, currently being tested for cancer treatment.
/web/2020/03-200318-b7

ETH makes Laboratory Equipment available for Coronavirus Tests

(ETH Zurich, March 24, 2020)

Coronavirus testing is an essential part of identifying infected people and curbing the spread of the pandemic. To speed up the testing process, the Department of Environmental Systems Science at ETH Zurich has made its laboratory equipment (which is currently not being used due to the restrictions placed on research activity) available to the canton of Thurgau.
/web/2020/03-200324-c4

4. Nano / Micro Technology / Material Science

Creating Custom Light Using 2D Materials

(University of Geneva, February 18, 2020)

Finding new semi-conductor materials that emit light is essential for developing a wide range of electronic devices. However, light emission in a semi-conductor only occurs when certain conditions are met. Now, researchers from the University of Geneva (UNIGE), in collaboration with the University of Manchester, have discovered an entire class of two-dimensional materials that are the thickness of one or a few atoms. When combined together, these atomically thin crystals are capable of forming structures that emit customizable light in the desired color. This research, marks an important step towards the future industrialization of two-dimensional materials.
/web/2020/04-200218-be

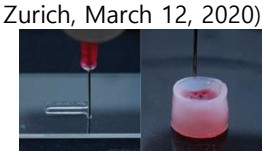
Increasing Luminosity in Glass Slides for Fluorescence Microscopy

(EPFL, February 26, 2020)

EPFL scientists have developed a new type of microscope slide that can boost the amount of light in fluorescence microscopy by a factor of up to 25. Fluorescence microscopy is widely used to diagnose cancer and autoimmune diseases, identify allergies or sequence DNA. The design has unique optical properties and it allows the detection of minute amount of light. This could be especially useful for making early-stage diagnosis, quickly identifying specific types of cancer and rapidly archiving pathology samples. In an ideal case, the slides could be used to detect the presence of one molecule, where 25 molecules would be needed on conventional slides.
/web/2020/04-200226-ad

Universal Carrier Ink for 3D Printers

(ETH Zurich, March 12, 2020)



Previously, researchers working in the field of precision biomaterials were held back by the fact that they had to develop new inks for the 3D printer for each application. But now, researchers at ETH have invented a universal carrier ink that dramatically simplifies the development of new applications. They have produced a gel from cellulose fibers and biodegradable nanoparticles that liquifies when pressed through the nozzle of a 3D printer, but then quickly returns to its original shape. Due to its suitability for use in a wide range of applications, calling their ink carrier for 3D printing "universal" is certainly no overstatement.
/web/2020/04-200312-70

Silver Technology Masks against Corona Virus

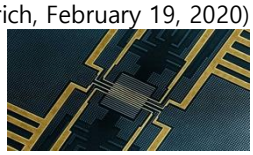
(startupticker.ch, March 18, 2020)

The Swiss company HeiQ has leveraged its more than 15 years in textile products to launch HeiQ Viroblock NPJ03, an antiviral and antimicrobial textile treatment designed with a unique combination of vesicle and silver technologies to inhibit the growth and persistence of bacteria and viruses. According to a HeiQ press release, the treatment has proven to be effective against human coronavirus in face mask testing, significantly enhancing the antiviral log reduction from 2.90 of untreated face masks to 4.48, over 99.99% reduction of virus infectivity. While the Chinese protective masks producer, Suzhou Bolisi is the lead adopter of HeiQ Viroblock NPJ03, the American legwear manufacturer Kayser-Roth is planning to add the technology to their new product, Ghluv hands protector, and Lufeng from China is evaluating the technology on other types of fabric used for garments. Treated masks will be available on the market as early as this April.
/web/2020/04-200318-c5

5. Information & Communications Technology

Novel Magnetic Memory (MRAM) is as Fast as DRAM while Retaining Information after Shut Down

(ETH Zurich, February 19, 2020)



Researchers at the ETH Zurich have developed a new magnetic random access memory (MRAM) capable of subnanosecond (less than 0.3 nanoseconds) switching with the spread of the cumulative switching time smaller than 0.2 nanoseconds. The method of the researchers therefore affords data storage in magnetic tunnel junctions virtually error-free and in less than a nanosecond, while retaining the data stored even after the computer has been turned off. The researches have also collaborated with the research center IMEC, which enabled the test of the new technology directly on an industry- compatible wafer. In principle, the technology would, therefore, be immediately ready for use in a new generation of MRAM.
/web/2020/05-200219-f5

Tracing the Virus with Nextstrain

(University of Basel, March 20, 2020)

Richard Neher is so highly sought-after today is the result of an innovative idea that he and his colleague Trevor Bedford from the Fred Hutchinson Cancer Research Center in Seattle had some years ago. They wanted to be able to follow

in real-time how a pathogen spreads and, to this end, developed the web application Nextstrain. The website has been online since 2015 and has already been used to address diverse epidemiological questions. However, a breakthrough only has come with the coronavirus crisis. In recent weeks the platform has been literally overrun, the website has been accessed over 400,000 times. Using Nextstrain, it is possible to trace in real time how the virus changes, that is, which mutations appear as it spreads. The smallest genetic changes provide information about the origin of the virus and the path it takes. (https://nextstrain.org/ncov/2020-03-20)
/web/2020/05-200320-0f

Grow cleverer with AI

(University of Zurich, March 25, 2020)

Artificial intelligence (AI) can already do an impressive number of things: Diagnose diseases, recognize faces, predict climate change, assess whether criminals will reoffend, translate at lightning speed and provide tailor-made purchase offers. Adaptive algorithms and computer programs are developing at an incredible rate. These smart technologies are enhancing our skills and changing the way we work and live. Digital assistants such as Siri and Alexa are already a reality. They're not all that clever yet – but that can change. In the future, metabots with sophisticated AI applications might organize our entire digital existence and support us in our everyday tasks. Such advances possible thanks to artificial neural networks that imitate the way our brains work. These ingenious networks are making our digital systems ever smarter and more powerful.
/web/2020/05-200325-88

6. Energy / Environment

Repairing: For a Sustainable IT Lifestyle

(University of Zurich, February 05, 2020)

The University of Zurich is researching how our digital lifestyle can become more sustainable. Computers, smartphones and other intelligent devices have their own ecological footprint. Manufacturing them, in particular, requires huge amounts of energy, and they end up being thrown away at ever shorter intervals. This throw-away mentality is fueled by the producers, who continually develop new software in order to make the old devices seem out of date much quicker than is actually necessary. This is also ecologically problematic because less than one third of the materials inside IT devices can be recycled and reused. At the very least, a 'right to repair' regulation, and an adaptation of consumer habits is required. The researchers are continuing their research in using digitalization to reduce the global environmental footprint.
/web/2020/06-200205-64

Blockchain Enabled Local Electricity Market

(Smart Energy International, February 11, 2020)

Water and Electricity Works Walenstadt has announced the successful completion of the country's first blockchain-enabled local electricity market. It was financed by the Swiss Federal Office of Energy to demonstrate how a blockchain-enabled prosumer energy model can be used to optimize grid operations and to provide value to both the utility and the customer. The one-year project included 37 households in Walenstadt trading locally produced solar energy within their own neighborhood. Participants used a blockchain portal on which they could set their own purchase and sales price limits

for solar power. The community purchase of locally generated solar energy almost doubled and consumers perceive the electricity market as green, local, and fair.
/web/2020/06-200211-93

EMPA in Charge to build Battery Cell Competencies in Europe

(Electrive, February 11, 2020)

Experts from seven European countries are now working on solutions for next-generation lithium-ion batteries in the SeNSE research project within the European Battery Alliance. The Swedish company Northvolt is to play a decisive role in the four-year project. Five research institutes and six industrial companies are involved in SeNSE. The Swiss Federal Laboratories for Materials Testing and Research (Empa, Switzerland) is in charge. The EU is funding the project, which will run until spring 2024, with ten million euros as part of its Horizon 2020 research funding program. In terms of content, the participants are working on the development of next-generation lithium-ion batteries – the so-called "Generation 3b". In contrast to current traction batteries, these are expected to have a higher energy density, improved cell chemistry and improved battery management.
/web/2020/06-200211-eb

Simulating Impact of Climate Change and Extreme Weather on Energy Systems

(EPFL, February 18, 2020)

In a future overshadowed by climate change, severe droughts and storms, bitter cold, intense sunlight and thicker cloud cover are going to become commonplace. Just half a century from now, these extreme conditions will affect energy demand and push our supply systems to their limits. Because today's renewable energy systems are designed with current weather patterns in mind, they will no longer meet demand for power as our climate evolves. Researchers at EPFL have developed a stochastic-robust optimization simulation method to consider both standard variations and extreme weather events.
/web/2020/06-200218-f4

Electric Cars Projected to Have Lowest Climate Impact in Switzerland

(PSI.ch, February 18, 2020)

In Switzerland, road travel causes around one-third of all greenhouse gas emissions – more than industry and also more than the residential sector. For this reason, a PSI study has examined the overall climate impact of various vehicle engines in use today and also projected it to the year 2040. In calculating the climate footprint, carbon dioxide emissions during operation are not the only thing that counts. There are also the emissions arising from the production of the car and its components as well as from its disposal. In addition, the emissions from road construction and from the production of the respective fuel must be included. In the area of passenger cars, we should rely on battery-powered electric motors to protect the climate. Summing up all factors, this has the lowest climate impact.
/web/2020/06-200218-b3

Too Big Carbon Footprint

(University of Zurich, February 20, 2020)

The facts are undeniable: Our carbon footprint is too big. Each one of us produces on average nine metric tons of CO2 per year – a sustainable level would be two tonnes. An ecological overhaul of

business and society is the task of a lifetime. But it's achievable, says sustainability researcher Kai Niebert, professor of science and sustainability education at UZH. We need a political culture that explicitly and decisively favors sustainability and thus enables us to live in a way that does not harm the environment.
/web/2020/06-200220-27

World Biodiversity Forum Held in Davos

(University of Zurich, February 20, 2020)

Biologists in Switzerland reported a dramatic loss of 90 percent of local insect populations. At the global level, one million animal and plant species – above all amphibians and corals, but also insects and mammals – are threatened with extinction due to overuse and exploitation of their natural habitats.While the threat posed by climate change is well recognized, the loss of species diversity is less so. The neglected issue takes center stage, however, at the World Biodiversity Forum. The Forum took place in Davos from February 23- 28. Around 500 researchers from around the world will met in the Swiss Alps to discuss biodiversity protection strategies.
/web/2020/06-200220-7e

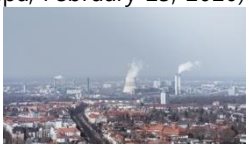
Assessing Switzerland's Solar Power Potential

(Tech Explorist, February 22, 2020)

Until now, however, the overall photovoltaic (PV) potential of Swiss rooftops could not be estimated accurately owing to a lack of data about buildings. To fill that gap, scientists at EPFL's Solar Energy and Building Physics Laboratory (LESO-PB) have built up a strategy combining machine learning algorithms with geological data frameworks and physical models to appraise PV potential. Furthermore, for the first time, they assessed hourly profiles of PV potential. The outcomes show that solar photovoltaic panels could be fitted to 55% of Switzerland's total rooftop areas. Even if panels were only installed on mainly south-facing rooftops, this could cover more than 40% of Switzerland's electricity demand.
/web/2020/06-200222-5e

Tracking CO2 from Space

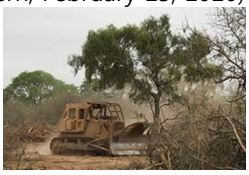
(Empa, February 25, 2020)



CO2 concentrations in the air continue to rise rapidly, and a rapid reduction in man-made emissions is becoming increasingly important. In order to assess the effectiveness of political measures, timely and reliable emission levels are needed. However, current methods are costly. The European Space Agency ESA is therefore working on the development of new satellites which will be able to determine CO2 emissions in the future - with the help of Empa. The Empa suggested combined measuring device that detects CO2, but also additionally nitrogen dioxide (NO2). This suggestion is based on simulations carried out on the fastest high-performance computer in Europe, the "Piz Daint" at the Swiss computer center CSCS in Lugano. They were able to show that a combination of CO2 and NO2 measurements provides better and more reliable results than using only a CO2 measuring device.
/web/2020/06-200225-3f

Investments by Super-Rich Drive Deforestation

(University of Bern, February 25, 2020)



Wealthy individuals are increasingly investing in agriculture. Their investments boost production of plant-based raw materials for human consumption, industrial uses, and animal fodder. The resulting capital flows directly contribute to deforestation in the global South, especially in the tropics. That is the conclusion of a new study by the University of Bern's Centre for Development and Environment (CDE). The results indicate that growing concentration of wealth in a few private hands has played a crucial role in the expansion of cropland and deforestation in the global South. According to the research a 1% increase in the wealth of the super-rich led to a 2.4–10% increase in the area under flex crops during the period studied - driving deforestation.
/web/2020/06-200225-2f

Mathematical Model to Improve Cold Starts

(Empa, February 27, 2020)

In 2019, more than 17,000 hybrids and plug-in hybrids were bought in Switzerland – an increase of 60 percent from 2018. These cars can drive short distances through the city electrically, only needing the combustion engine on the outskirts of the city to accelerate onto a motorway or country road. The problem is that the engine makes a cold start at high revs and engine load, pushing hot combustion gases through the cold catalytic converter and emitting toxic pollutants. Using a specially developed mathematical model, a team of Empa researchers is investigating how quickly catalytic converters can be preheated so that they clean exhaust gases well, and what the best method would be. Their computation method is also useful for optimizing the cooling technology of electric cars.
/web/2020/06-200227-58

More Efficient, Longer-lasting Solid Oxide Fuel Cells

(EPFL, February 28, 2020)

Researchers at EPFL have developed a novel way to increase fuel-cell efficiency and lifespan, using a recirculation fan driven by a steam turbine that runs on steam-lubricated bearings. Solid oxide fuel cells (SOFCs) are devices that produce both electricity and heat by oxidizing a fuel such as natural gas or biogas. This energy-efficient, zero-emission technology could meet domestic and commercial power, heating and hot water needs. While uptake is high in Japan, SOFCs have yet to catch on in Europe, since steep production costs pose a barrier to manufacturing the cells at scale. The EPFL team's research, published in Applied Energy, has resulted in a new design that is safe, self-sufficient, hard-wearing and achieves impressive efficiency gains of up to 10%.
/web/2020/06-200228-9d

Hydrogen Trucks to conquer Swiss Alps

(Reuters, February 28, 2020)

Hyundai's hydrogen-powered 18-ton trucks are set to hit the roads in Switzerland next month as the South Korean automaker looks to establish a case for its zero-emissions technology in a low carbon world. Hyundai's H2 Xcient trucks have a 190 kilowatt fuel cell and seven high-pressure tanks holding nearly 35 kg of hydrogen, giving them a range of more than 400 km - far further than heavy goods vehicles powered by electric batteries on the market now. In Switzerland, HHM, the leasing unit set up by Hyundai and Swiss startup H2 energy, has partnered with Hydrospider, a joint venture of H2 Energy with industrial

gas maker Linde (LIN.N) and Swiss power utility Alpiq ALP.SG. Hydrospider is about to start producing hydrogen for 40-50 Hyundai trucks at a 2 megawatt (MW) electrolysis plant at Goesgen. Switzerland's green hydrogen is far more expensive than diesel now but Hyundai hopes that as governments clamp down on carbon emissions and the cost of producing the clean fuel drops, the numbers could start to add up. McKinsey & Co said in study in January that the cost of hydrogen made with renewable energy could drop to 2 euros/kg by 2030 from 3-4.5 euros now - achieving cost parity with diesel for heavy vehicles
/web/2020/06-200228-23

Using Satellites to Identify Ocean Plastic

(University of Zurich, March 03, 2020)

Each year between 4.8 and 13 million tons of plastic waste end up in the oceans, causing birds to ingest plastic debris and choke, and other marine animals to get caught in old fishing nets. Plastic polymers also react with seawater, releasing toxins and heavy metals that form a layer on the plastic's surface. Things are likely to get worse, since global plastic production increased by more than 600 percent between 1975 and 2015. Initiatives like the Ocean Cleanup project are removing this waste before it degrades. Researchers at the University of Zurich have investigated how remote sensing technology could also help detect and measure plastic patches to organize cleanups. Other useful measures include: tougher regulation, preventing plastic waste from entering the ocean, and developing alternative eco-friendly materials.
/web/2020/06-200303-7b

Redesigned Microlino and Microletta Electrics

(The Verge, March 04, 2020)

Switzerland's Micro Mobility Systems revealed an electric microcar and three-wheeled e-trike for Europe. The Microlino is a complete redesign of the original concept revealed in 2015, and demonstrated for the first time in public. It'll also have the same price of €12,000 (about $13,350) when it begins shipping in 2021. It is also the first time we're seeing the three-wheeled Microletta electric motorbike that goes 80km/h but doesn't require a motorcycle license. The company claims to have amassed over 17,000 preorders for the model with improved quality, safety, and handling, with an assist from fans and customers.
/web/2020/06-200304-61

Energy Self-Sufficient Households by 2050

(ETH Zurich, March 04, 2020)

Reducing reliance on fossil fuels is a major focus of efforts to mitigate climate change. Photovoltaic technologies that convert sunlight into electricity offer a promising alternative that could also increase individual households' energy self-sufficiency. As reported in PLOS ONE, researchers from ETH Zurich investigated whether it would be technically and economically feasible for households to produce enough energy to meet their own consumption needs, including the charging of electric vehicles, using photovoltaics alone in the temperate Swiss climate by 2050. The researchers explored a range of different building types and energy demands. Their analysis suggests that total self-sufficiency is feasible by 2050 for single- and multi-family buildings in Switzerland across a range of scenarios. These findings may apply to other highly industrialized countries with temperate climates.
/web/2020/06-200304-be

Strategies to Make Hot Weather More Bearable

(admin.ch, March 06, 2020)

The warmest winter on record is coming to an end. The average temperature was 3.4 degrees Celsius above the average for the years 1981 to 2010, the European climate change service Copernicus Climate Change Service (C3S) reported in March. The coming summer months may also break new temperature records. Empa and ETH Zurich researchers have developed a climate simulation program that can make detailed predictions about which pavement and which type of vegetation could help make summers more bearable, especially in cities. Using Zurich's Münsterplatz as an example, they have calculated that temperatures would be significantly lower if the square was not paved but covered with earth and grass. The team plans to refine their simulation to help city planners make detailed predictions on how to tackle climate change.
/web/2020/06-200306-e3

Home Charging with Terra AC Wallbox

(Electrive, March 09, 2020)

ABB, the Swiss company has expanded their range with the Terra AC Wallbox for charging electric cars at home. The new wall box offers up to 22 kW and is scheduled to be available worldwide from May 2020. The home EV charging unit should be compatible with "electrical systems of houses and buildings around the world". Customers will also be able to use their own energy, such as solar power from the photovoltaic system, for charging with the ABB wall box. To this end, the Terra AC is equipped with an energy meter that can be integrated into intelligent building energy management systems and enables advanced load management functions.
/web/2020/06-200309-2e

Understanding Microbes as Partners of Life

(ETH Zurich, March 11, 2020)

Life is symbiosis – this is becoming increasingly clear. Whether bacteria, plant, animal or human, all organisms are colonized by microbes. Within these organisms, microbes form fascinating, mutually beneficial communities. However, the majority of these partnerships have barely been researched. Now, two researchers from ETH Zurich have been awarded USD 1.5 million each from the Gordon and Betty Moore Foundation to explore the diverse symbiotic relationships between bacteria and other aquatic organisms.
/web/2020/06-200311-e2

Preventing Food Waste due to Accelerated Ripening

(Empa, March 11, 2020)

If different types of vegetables and fruits are stored together, they influence each other's ripening process. This is due to ethylene, which is emitted by some plant-based foodstuff and accelerates ripening. To counteract the accelerated ripening process, ethylene must be kept away from fruits and vegetables. For this purpose, Empa / ETH Zurich researchers have developed an idea to degrade ethylene released by fruits and vegetables. The concept is based on a delignified wood structure enriched with a catalyst that is dispersed at an atomic level. Moreover, the technology developed at Empa avoids a potential contamination of the foodstuff with platinum nano/micro particles by fixing the catalyst on the surface of the porous wood structure.
/web/2020/06-200311-58

Energy Storage with Batteries from EVs

(Electrive, March 12, 2020)

The Swiss energy group Alpiq and Mercedes-Benz Energy have concluded a supply agreement for the stationary use of batteries from electric vehicles. The storage unit has a capacity of 1.5 MW and a gross capacity of 1.4 MWh, which is also possible to scale up. Mercedes-Benz Energy will supply storage systems based on electric car batteries for this purpose, while Alpiq contributes the energy management system and is responsible for planning, installation and sales. Alpiq already uses large stationary battery storage systems and controls them by means of artificial intelligence to ensure "optimum operation and economical use"
/web/2020/06-200312-b0

Second Life for Solar Modules and EV Batteries

(PV magazine, March 19, 2020)

A study led by Bern University of Applied Sciences is moving into the demonstration phase, with projects in Germany, Switzerland, and Belgium. With partners from all over Europe, the Swiss researchers are developing models for how solar modules and batteries from electric cars can still be used in a sustainable way after their lifecycle has ended. The scientists also see benefit in used car batteries, even if they have only 20 to 30 percent of their original storage capacity. Although no longer suitable for use in electric vehicles, they could have a second life as stationary storage in residential buildings. The project, funded by the EU as part of the "Horizon" research program, officially runs until 2022.
/web/2020/06-200319-28

New App as Digital Fuel Card

(Petrolplaza, March 27, 2020)

The mobile payment solution from Hectronic is the perfect tool for a flying start towards the digital petrol station of tomorrow. Benefits are faster fueling processes for the customers while conveniently monitoring all authorizations and transactions. Apart from individual energy solutions in the areas of heating, cooling and electricity for 42 municipalities in the Zurich area Energie 360° operates 13 public CNG petrol stations, two company petrol stations and a large network of electric charging stations. Almost all Energie 360° standalone petrol stations have been equipped with the Hectronic fuel terminals HecStar and HecFleet.
/web/2020/06-200327-5c

7. Engineering / Robotics / Space

50-year-old Theory in Mechanics Finally Confirmed

(EPFL, February 21, 2020)

Some theories are used even though they have never been experimentally validated. One example is the so-called narrow groove theory in mechanics, which explains the workings of air-lubricated bearings that support rotating parts in mechanical systems. Since there is no contact between the different parts, those bearings don't cause wear and tear and could possibly be used in energy systems of the future. Better understanding the theory behind it is therefore crucial for the continuation of the

research. Researchers at EPFL have now confirmed this theory, which was originally proposed in 1965 but has never been fully tested.
/web/2020/07-200221-61

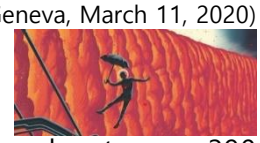
Mars' Seismicity

(ETH Zurich, February 24, 2020)

Fifteen months after the successful landing of NASA's InSight mission on Mars, first scientific analyses at ETH Zurich and other partners reveal that the planet is seismically active. Mars displays one marsquake per day on average. The data allows researchers to understand how seismic waves travel through the planet - a process that unveils its internal characteristics. Interpreting marsquake data is very challenging, however. For most quakes, it is only possible to identify the distance, but not the direction from which the waves are arriving. The ETH team had delivered the control electronics of the mission's seismometer SEIS. It is also responsible, in collaboration with the Swiss Seismological Service at ETH Zurich, for the so-called Marsquake Service, which interprets the data transmitted from Mars on a daily basis.
/web/2020/07-200224-76

Iron Rain on Giant Exoplanet

(University of Geneva, March 11, 2020)



An international team of astronomers, led by the University of Geneva, has discovered a planet where it rains iron. Using a brand-new instrument conceived by the University of Geneva and installed at the Very Large Telescope of the European Southern Observatory in Chile, the team discovered this extraordinary exoplanet some 390 light years away. It receives thousands of times more radiation from its parent star than the Earth receives from the Sun. Therefore, it has an ultra-hot day side with temperatures rising above 2,400 degrees Celsius - high enough to vaporize metals. This iron vapor is then carried to the 1,000-degree cooler night side by strong winds. Given the much lower temperatures, it condenses into droplets and produces an iron rain on this side of the planet.
/web/2020/07-200311-98

A Significant Step Towards Robotic Skin

(ETH Zurich, March 16, 2020)

Robotics researchers at ETH Zurich have developed a tactile sensor. It measures force distribution at high resolution and with great accuracy, enabling robot arms to grasp sensitive or fragile objects. The sensor's extremely simple design makes it inexpensive to produce. It consists of an elastic silicone skin with colored plastic microbeads and a regular camera affixed to the underside. If integrated into wearables, cyclists could measure how much force they are applying to the bike through the pedals, or runners could measure the force that goes into their shoes when jogging. Such sensors can also provide important information to developing tactile feedback, for example for virtual reality games.
/web/2020/07-200316-18

Drone Can Play Dodgeball

(University of Zurich, March 19, 2020)

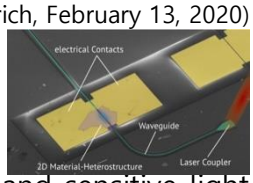
Drones can do many things, but avoiding obstacles is not their strongest suit yet – especially when they move quickly. This can be a problem when drones are used in unpredictable environments, or when there are many of them flying in the same area. In order to solve this problem, researchers at the University of Zurich have

equipped a quadcopter (a drone with four propellers) with special cameras and algorithms that reduced its reaction time down to a few milliseconds – enough to avoid a ball thrown at it from a short distance.
/web/2020/07-200319-f3

8. Physics / Chemistry / Math

Fast Light Detector for Telecoms or LEDs

(ETH Zurich, February 13, 2020)



Today, a great amount of data is transmitted through fiber optic cables. These consist mainly of modulators and light detectors. Those two building blocks for telecommunications have been constantly improved over the past years. However, researchers at ETH Zurich together with colleagues from Japan have now succeeded to make another big step forward: They developed an extremely fast and sensitive light detector. The technology is based on the interplay between nano-photonic optical waveguides and novel two-dimensional materials (two-dimensional because electrons only move in a plane rather than in three spatial dimensions). This technology opens up a variety of applications. It could for example be used to build LEDs or lasers in the future.
/web/2020/08-200213-ae

Chemical Diversity of 300'000 Substances

(ETH Zurich, February 14, 2020)

An international team of researchers has conducted a global review of all registered industrial chemicals: some 350,000 different substances are produced and traded around the world – well in excess of the 100,000 reached in previous estimates. This chemical diversity is now three times greater than 20 years ago, and for about a third of these substances, there is a lack of publicly accessible information. Nowadays, globalization and worldwide trade ensure that – unlike national registers – chemicals do not stop at national borders.
/web/2020/08-200214-1f

CERN Technology Behind World's First Proton Treatment of Cardiac Pathology

(Cern.ch, February 14, 2020)

The CNAO (Centro Nazionale di Adroterapia Oncologica) hadrontherapy centre in Pavia, Italy, hit the headlines in January, when for the first time in the world, a patient with ventricular arrhythmia was treated with proton beams. CERN and CNAO have a long-standing collaboration, which dates back to the design phase of the treatment center. In the early 1990s CERN hosted and contributed to the Proton-Ion Medical Machine Study (PIMMS), which aimed to combine efforts and expertise in order to optimize a design for a cancer therapy synchrotron. The PIMMS concept was made publicly available and evolved into the final CNAO accelerator, with seminal contributions from INFN. CERN continues to collaborate with CNAO by sharing its expertise in accelerator and magnet technologies.
/web/2020/08-200214-51

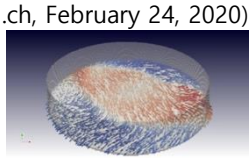
First Measurements at CERN of Certain Quantum Effects in Antimatter

(Cern.ch, February 22, 2020)

The ALPHA collaboration at CERN has reported the first measurements of certain quantum effects in antihydrogen, the antimatter counterpart of hydrogen. These quantum effects are already known to exist in matter. Finding any difference between matter and antimatter would shake the foundations of the standard model of particle physics. In the ALPHA experiment, antihydrogen is created by binding antiprotons with positrons. In an ultra-high vacuum, laser light is then shone onto the trapped antihydrogen atoms to measure their spectral response. Such experiments pave the way for unprecedentedly high-precision comparisons between matter and antimatter.
/web/2020/08-200222-3e

Short Film of Magnetic Nano-Vortex

(PSI.ch, February 24, 2020)



For the first time, researchers at the Paul Scherrer Institute PSI have recorded a "3D film" of magnetic processes on the nanometer scale. This reveals a variety of dynamics inside the material, including the motion of swirling boundaries between different magnetic domains. The insights were gained with a method newly developed at the Swiss Light Source SLS. It could help to make magnetic data storage devices more compact and efficient.
/web/2020/08-200224-23

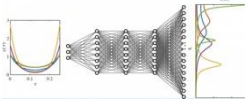
Tracking down the Mystery of Matter

(PSI.ch, February 28, 2020)

Researchers at the Paul Scherrer Institute PSI have measured a property of the neutron more precisely than ever before. In the process they found out that the elementary particle has a significantly smaller electric dipole moment than was previously assumed. With that, it has also become less likely that this dipole moment can help to explain the origin of all matter in the universe. The researchers achieved this result using the ultracold neutron source at PSI.
/web/2020/08-200228-99

Growing Importance of Machine Learning for Physics Research

(EPFL, March 03, 2020)



In order to understand experimental results, scientists often compare them to predictions made by theoretical models. For physicists, these methods sometimes require them to work in what they call imaginary time, where they have to translate their results before they can compare them to laboratory data. This translation process is referred to as "analytic continuation". The main challenge in the process is that there is an unlimited number of solutions to a given problem. An EPFL student has now applied machine learning to the problem of analytic continuation to find more reliable answers and get quicker results. This study has been published in the Physical Review Letters – which is highly unusual for an undergraduate project.
/web/2020/08-200303-20

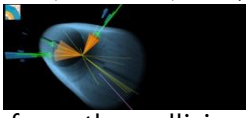
Longest Microwave Quantum Link

(ETH Zurich, March 05, 2020)

Physicists at ETH Zurich have created the longest microwave quantum link known to date. This 5-meter-long link connects two quantum chips in such a way that they are able to exchange superposition states between them: Microwave photons are emitted by superconducting oscillators in one chip and received by the other. In between, they fly through a heavily cooled waveguide. This so-called quantum link could one day be used to connect several smaller quantum computers to build a cluster. The advantage of a cluster over one single large device is the logistic of the cooling. In order to keep the quantum states stable, the quantum chips need to be held at almost -273 degrees Celsius. This is why quantum computers will probably increasingly rely on quantum clusters and quantum links. Having reached the 5-meter-milestone, the team at ETH is already working on a longer quantum link – 30 meters.
/web/2020/08-200305-0b

Artificial Neural Networks Search for Exotic Particles

(CERN.ch, March 06, 2020)



Researchers at CERN's CMS Collaboration have developed an artificial neural network that can identify exotic particles. Those are expected to be generated by the proton-proton collisions inside the Large Hadron Collider (LHC). Before decaying, the particles inside the LHC experiments can travel measurable distances from the collision point. But most of these so-called long-lived particles are undetectable. They could, however, decay to detectable particles. This is where the new tool comes into play. The CMS neural network can automatically learn from real collision data and eventually spot the odd events by itself - which marks a step forward in the use of artificial intelligence in the field of high-energy particle physics.
/web/2020/08-200306-30

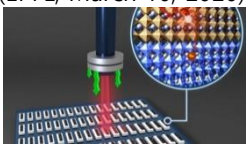
Mystery of Expanding Universe: Solved?

(University of Geneva, March 10, 2020)

A theoretical physicist from the University of Geneva suggests the speed of the expansion of the universe might not be totally homogeneous throughout the universe. This would solve a long-standing scientific conundrum: At what speed is the universe expanding? Until now, there were two conflicting methods of calculation, one based on the cosmic microwave background, the other on supernovae. The new hypothesis now suggests a vast "bubble" that is 250 million light years in diameter and englobes the Earth, our solar system, the entire Milky Way and the few thousand galaxies closest to us. This bubble is thought to have an average matter density that is 50% lower than in the rest of the universe. The expansion rates - calculated with the two methods mentioned before – would then be consistent.
/web/2020/08-200310-c8

New Generation of Hard Drives

(EPFL, March 10, 2020)



Nowadays, the demand for high capacity hard drives has increased more than ever. Computer users handle databases, video files, using software which requires a large amount of memory. Researchers at EPFL succeeded at tuning one ferromagnet at room temperature with visible light, a proof of concept that

establishes the foundations of a new generation of hard drives that will be physically smaller, faster, and cheaper, requiring less energy compared to today's commercial hard drives. They are now looking for investors who would be interested in carrying on the patent application, and for industrial partners to implement this original idea and proof of principle into a product.
/web/2020/08-200310-cd

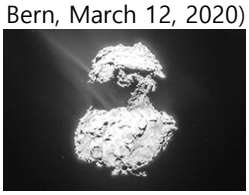
New LHCb Analysis at CERN

(CERN.ch, March 10, 2020)

At a seminar today at CERN, the LHCb collaboration presented a new analysis of data from a specific transformation, or decay, that a particle called B0 meson can undergo. The analysis is based on twice as many B0 decays as previous LHCb analyses, which had disclosed some tension with the standard model of particle physics. The tension is still present in the new analysis, but more data are needed to identify its nature. Researchers are very much looking forward to the next round of results using the full LHCb data, which will roughly double the number of events again.
/web/2020/08-200310-bf

Nitrogen Found on Comet's Surface

(University of Bern, March 12, 2020)



One way to determine the composition of asteroids and comets is to study the sunlight reflected by them. We talk about a comet's spectrum, which has certain absorption features. The surface of the comet, known as Chury, was monitored for nearly one year. To identify which compounds are responsible for the absorption features, researchers from France together with colleagues from the University of Bern carried out laboratory experiments in which they created cometary analogues and simulated conditions similar to those in space. They detected nitrogen, in the form of ammonium salts. These results contribute to a better understanding of the evolution of nitrogen in interstellar space and its role in prebiotic chemistry.
/web/2020/08-200312-5d

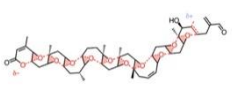
Analysis of Chemical Compounds Directly in Particulate Matter

(PSI.ch, March 12, 2020)

Researchers at the Paul Scherrer Institute (PSI) have developed a new method to analyze particulate matter more precisely than ever before. With its help, they disproved an established doctrine: that molecules in aerosols undergo no further chemical transformations because they are enclosed in other suspended particulate matter. In the smog chamber at PSI, they analyzed chemical compounds directly in aerosols and observed how molecules dissociated and thus released, for example, gaseous formic acid into the atmosphere. These findings will help improve the understanding of global processes involved in cloud formation and air pollution and to refine the corresponding models. The results of this investigation are published in the journal Science Advances.
/web/2020/08-200312-ef

Access to Forbidden Rings through Chemistry

(University of Geneva, March 18, 2020)



Cyclic molecules are everywhere, and everything around us stems from the way they are assembled: not just taste, color and smell but also (for example) pharmaceutical drugs. Nature by itself forms molecular rings of different sizes and

chains of rings of varying lengths that scientists are able to reproduce artificially. Chemists from the University of Geneva (UNIGE) have now devised a new technique for creating these chains of molecular rings that do not use standard chemical interactions but contact with large molecular surfaces that are electron-poor and do not exist in nature. Unlike with standard procedures, this new technique works by autocatalysis – the rarest, but also the most ambitious, type of transformation that exists in chemistry.
/web/2020/08-200318-ae

Nanoscale Device can See through Walls

(EPFL, March 25, 2020)

Researchers at EPFL have developed a nanodevice that operates more than 10 times faster than today's fastest transistors, and about 100 times faster than the transistors on computers. This new device enables the generation of high-power terahertz waves. These waves, which are notoriously difficult to produce, are useful in a rich variety of applications ranging from imaging and sensing to high-speed wireless communications. The high-power picosecond operation of these device also hold immense promise to some advanced medical treatment techniques such as cancer therapy.
/web/2020/08-200325-3c

9. Economy, Social Sciences & Humanities

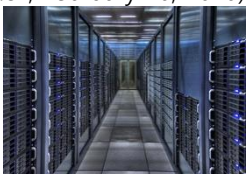
Better Data to Maintain Better Health

(ETH Zurich, February 12, 2020)

The healthcare system places more emphasis on treating diseases than on preserving health. The Life Science Zurich (LSZ) Business Network, a non-profit association, invited around 400 international experts representing science, business and society to discuss this challenge at "The Cause of Health" conference. To maintain health, it is necessary to develop sound digital applications and obtain data when people are in good health, not only when ill. Data on lifestyle and environmental conditions are crucial, with genetic information also playing an important part. Digital healthcare solutions are becoming more widespread, and data collection is improving. Researchers at the University of Zurich and ETH Zurich are producing data sets that provide useful health information, and have just launched the "Cause of Health Cohort" (Swiss COHCOH).
/web/2020/10-200212-c7

Using Particle Physics to Prevent Financial Fraud

(Cern.ch, February 20, 2020)



Every day, commodity markets trade millions of food ingredients and more, so detecting fraud can be challenging. A new collaboration agreement between CERN, the Commodity Risk Management Expertise Center (CORMEC) and Wageningen University & Research (WUR) will now use advanced data analytics from particle physics to diagnose manipulation in commodity and financial markets. This should enable regulators to create safer and more stable environments for trading, leading to improved regulation and market integrity. The research may also lead to new diagnostic tools for predicting financial instability, which will improve risk management. The three-year knowledge-transfer project is named HighLo (High Energy Physics Tools in Limit Order Book Analysis) and is supported by the Province of Limburg in the Netherlands. The first results are expected at the end of 2020.
/web/2020/10-200220-41

Students offer Pharmacies their Support

(ETH Zurich, March 19, 2020)

Like all healthcare professions, pharmacies are under extreme stress right now. For many people, they are an important source of advice on how to take their medications at home or for an initial assessment of their symptoms. They are also able to prepare certain medications themselves. Because the coronavirus outbreak has made solidarity more important than ever, pharmacy students are getting involved and offering pharmacies a helping hand. The new "pharmadelivery" platform enables pharmacies to connect quickly with students who are eager to help.
/web/2020/10-200319-f0

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

Empa coordinates European Battery Research Project

(admin.ch, February 11, 2020)

On February the 10th, 2020, the European battery research project SeNSE was officially launched. Over the next four years, five research institutes and six industrial companies from seven European countries will work together to find solutions for the next generation of lithium-ion batteries. Also on board as a partner is the Swedish company Northvolt, which intends to set up two large-scale production facilities (gigafactories) for vehicle batteries in Europe in the next few years. The research project is coordinated by Empa researcher Corsin Battaglia and his team. The EU is supporting SeNSE with 10 million euros.
/web/2020/11-200211-40

10 Swiss Medtech Startups to Watch in 2020

(Venturelab.ch, February 18, 2020)

Swiss Medtech startups are considered among the most promising and innovative companies in the world. Millions of patients and doctors worldwide continue to benefit from Medtech's innovations developed by swiss startups. These 10 Swiss Medtech startups are creating technologies aimed at fighting cancer or cardiovascular diseases, reducing the cost of brain scans, restoring the erectile function, improving the fertility rate or decreasing the risk of preterm birth.
/web/2020/11-200218-eb

Three EPFL Spin-Offs among Europe's top 50 "Super Scale-Ups"

(EPFL, February 19, 2020)

The 50 winning firms are chosen out of a pool of over 400 and given center stage every year at the Tech Tour Growth Summit, an international conference bringing together fast-growing tech firms and their investors. These "super scale-ups" – which now include Flyability, Kandou and Nexthink, three EPFL spin-offs – could one day generate millions of dollars in revenues and even become unicorns, that exclusive group of privately-held startups valued at over one billion dollars. With four companies in this year's Tech Tour Growth 50, Switzerland comes in third place, behind the UK and Germany. The 2020 Tech Tour Growth Summit should have been held in Lausanne and Geneva on 26–27 March. But due to the Coronavirus the Tech Tour Growth is postponed to a later date!
/web/2020/11-200219-0e

Swoxid proposes a Reusable Antiviral Mask

(Startupticker.ch, March 23, 2020)

EPFL-spin-off Swoxid developed photoactive and nanoporous ceramic filters that may be sterilized upon UV-lamp illumination multiple times. With these filters face masks could be reused up to 1000-times. Swoxid is now looking for partners to accelerate the industrial production efforts to combat the CoronaVirus outbreak and to end the threat of face mask shortages.
/web/2020/11-200323-c9

11. General Interest

Illegal Imports of Medicinal Products

(admin.ch, March 05, 2020)

Number of confiscated shipments more than doubled. In 2019, Swissmedic – working together with the Swiss Federal Customs Administration (FCA) – seized 7,781 illegal imports of medicinal products. Thanks to a fast-track ('simplified') administrative procedure that has now been introduced definitively, the number of confiscations doubled compared with the previous year even though the volume of imports remained the same. Counterfeit and illegally imported medicinal products are a major health hazard. In addition to administrative measures, criminal administrative proceedings are sometimes initiated when medicinal products have been imported illegally, e.g. in the event of repeat orders.
/web/2020/12-200305-24

12. Calls for Grants/Awards

Nicola Aceto receives Friedrich Miescher Award

(University of Basel, February 19, 2020)

Nicola Aceto works as a Swiss National Science Foundation (SNSF) Professor of Oncology and group leader at the Department of Biomedicine at the University of Basel. Using genetics, cell biology and biochemistry tools, he was the first to identify and characterize circulating tumor cell clusters that are at the root of metastatic dissemination and metastasis. Now, Professor Nicola Aceto of the University of Basel is awarded the prestigious Friedrich Miescher Award 2020 for his research on circulating tumor cell clusters. He shares the award with Professor Greta Guarda, a group leader at the Institute for Research in Biomedicine in Bellinzona. The award is worth 20,000 CHF and donated by the FMI.
/web/2020/13-200219-05

Special Call for Research into Coronaviruses

(SNSF, February 27, 2020)

The WHO declared the recent outbreak of coronavirus disease (COVID-19) a "public health emergency of international concern". There is an immediate need for research to gain a better understanding of the newly identified virus and its possible future evolution, as well as to contain the spread, develop diagnostics and improve the public health response and patient care. The SNSF has therefore decided to allocate several million Swiss francs of dedicated funding to research on coronaviruses.
/web/2020/13-200227-f6

Call for Proposals for Young Researchers in Biomedical Ethics

(SAMS, March 05, 2020)

In 2020, the SAMS is providing a total of CHF 250'000.– from the Käthe-Zingg-Schwichtenberg Fund (KZS Fund) to support junior researchers in biomedical ethics who wish to carry out an independent research project with a Seed Grant. The submission deadline is 30 April 2020. Contributions for 2020 from the KZS Fund are provided to junior researchers aiming at an academic career in biomedical, clinical or public health ethics. Up to CHF 50'000.– can be awarded per Seed Grant to explore innovative research ideas, to realize a small, independent pilot project or to prepare a project proposal to be submitted to a larger funding agency. Details on the call and procedure for submission can be found on the website.
/web/2020/13-200305-74

Mercator Awards 2020

(University of Zurich, March 17, 2020)

Every year, the Mercator Award is given to junior researchers from the University of Zurich, in recognition of their outstanding academic achievements. This year's Mercator Award for Medicine and Sciences is shared by two doctoral candidates at the Department of Geography, in recognition of their PhD theses on the CrowdWater project. The goal of the project is to improve water management and hydrological forecasting. The Mercator Award in Arts and Social Sciences goes to a PhD student in ethnography. She investigated the situation of people with physical disabilities in a Ugandan refugee settlement. The Mercator Award for Law and Economics goes to a lawyer who looks into trade practices and commercial practice in his research project.
/web/2020/13-200317-df

Swiss Energy Startups receive Prestigious Award

(startupticker.ch, March 20, 2020)

The 4th edition of the Startup Energy Transition (SET) Award has announced the Top 100 innovative startups across all sectors of the clean energy field. Eleven Swiss startups made it in the ranks. The German Energy Agency (dena), in cooperation with the World Energy Council, organize the award which offers young companies a platform to showcase their inventions. 570 applications from 90 countries applied and these 11 Swiss startups were chosen: Category renewable energies and materials: Dhp technology, Insolight, Pexapark, RENERGON, Twingtec. Category digital Energy systems: Adaptricity, Gilytics, Zaphiro. Category smart mobility: Ponera Group. Category quality access: MPower, Power-Blox.
/web/2020/13-200320-80

3 ERC Grants of Total 7.5 Million Euros for UZH

(University of Zurich, March 31, 2020)

The European Research Council awards its Advanced Grants to support excellent scientists at the career stage at which they are already established research leaders with a recognized track record of research achievements in the last 10 years. The funding amounts to a maximum of 2.5 million euros over five years. Over 1,881 projects from all over Europe were submitted to the European Research Council this year, 185 of which

were awarded grants. At the University of Zurich, three projects in the field of political science, experimental immunology and molecular biology were awarded ERC Advanced Grants. The UZH will thus receive a total amount of 7.5 million euros.
/web/2020/13-200331-6c

Upcoming Science and Technology Related Events

[digital edition] Venture Summit | West
May 5-7, 2020
https://is.gd/5B5dJV
Startups, Tech, Networking

Swiss Medtech Day
June 9, 2019
https://is.gd/oFqyX5
Medical, Pharma, Health Care
Bern

Conference on Environmental Sciences and Renewable Energy
June 5-6, 2020
https://is.gd/lqjmyq
Renewable, Energy, Power & Energy
Zürich

[webinar] Future Waste: Smart & Sustainable Plastics and Organics
April 22, 2020
https://is.gd/xQDY4M
Sustainability, Recycling, Energy, Startups
Switzerland/ China / South Korea

The **Science-Switzerland** newsletter is a bimonthly electronic publication keeping you updated on all the latest news on Swiss science, technology, education, innovation and the arts. It is an official publication in English from a single source, with executive summaries of top-highlights on education, of new discoveries in science, and of the latest top-of-the-line technologies and innovational strengths of Switzerland. The Science-Switzerland Newsletter is produced by swissnex China in collaboration with the swissnex Network.

Science-Switzerland Back Numbers: www.swissinnovation.org/Science-Switzerland