



Science-Switzerland, October-November 2018

News on Swiss science, technology, education and innovation



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1. Policy

State Secretary Mauro Dell'Ambrogio Pays Official Visit to Azerbaijan

(admin.ch, November 01, 2018)

Mauro Dell'Ambrogio, State Secretary for Education, Research and Innovation, paid an official visit to Azerbaijan between 29 and 30 October. A joint declaration on intensifying bilateral cooperation in the fields of education, research and innovation was signed during the meeting. The official visit was a follow up to Federal Councilor Johann N. Schneider-Ammann's economic mission to Azerbaijan in July. While main objective of that mission was to explore business opportunities, topics related to research and particularly vocational education and training in particular were also touched upon. During his visit, State Secretary Mauro Dell'Ambrogio discussed these topics in greater depth with Azerbaijan's Minister of Education, Jeyhun Bayramov. In addition to expanding research collaboration with Switzerland, the topic of vocational education and training is currently attracting a lot of interest in Azerbaijan, as it is regarded as a means of diversifying the local economy.

<http://swissinnovation.org/news/web/2018/01-181101-55>

Switzerland and South Korea Continue to Strengthen Cooperation in Research and Innovation

(admin.ch, November 16, 2018)

Switzerland and South Korea have committed to continue and strengthen their cooperation in research and innovation. A recent meeting of the Joint Scientific Cooperation Committee provided an opportunity to take stock of the bilateral program and set out guidelines for the future. Various actors from Swiss and South Korean ministries, universities and research and innovation promotion agencies belong to this body. The partners reaffirmed their commitment to foster cooperation between the two countries, which still has great potential. For example, the Swiss National Science Foundation (SNSF) is cooperating with the National Research Foundation of Korea. In the area of innovation, Innosuisse has been working together with the partner agency KIAT for several years and in 2019 a new tender for joint projects is planned. Also worthy of mention is the Life Science Symposium, which has been attended by Swiss and Korean players from science, the start-up sector and the private sector.

<http://swissinnovation.org/news/web/2018/01-181116-35>

Meeting of Joint Swiss-EU Committee in Fields of Research and Innovation

(admin.ch, November 16, 2018)

The 23rd meeting of the Joint Committee between Switzerland and the European Union (EU) / Euratom in the areas of research and innovation took recently place in Brussels. It provided an opportunity to discuss the implementation of the existing agreement between Switzerland and the EU on the current EU Framework Program for Research and Innovation 'Horizon 2020', the Euratom Program and the international fusion reactor ITER. It also allowed for an exchange of information on 'Horizon Europe', the next research and innovation framework program starting in 2021.

<http://swissinnovation.org/news/web/2018/01-181116-74>

International Strategy in Education, Research and Innovation

(SERI News, November 29, 2018)

The Federal Council approved the revised draft of Switzerland's International Strategy Paper on Education, Research and Innovation (ERA). This document updates the first version of this strategy, which was produced back in 2010. The revised strategy paper devotes greater attention to specific topics (e.g. vocational education and training, innovation support policy and digitalization) that have received considerable attention in international exchanges in the field of education, research and innovation (e.g. VET, innovation support policy and digitalization). The international component is an inherent part of education, research and innovation (ERI). In adopting this new strategy paper, the Federal Council confirms that international



cooperation and competition are an integral part of Switzerland's policy to support education, research and innovation. This document also serves as a frame of reference for all international activities in SERI's field of competence and clarifies stakeholder responsibilities.

<http://swissinnovation.org/news/web/2018/01-181129-5c>

2. Education

Research Center for Educational Science

(EPFL, October 10, 2018)

Recently, EPFL opened LEARN, a new center that will pool the efforts of the different stakeholders involved in educational research and in developing new teaching tools. "To keep pace with the remarkable advancements in digital technology, we need to update both what we teach and how we teach," says Pierre Vanderghenst, EPFL's Vice President for Education. LEARN will aim to stimulate research and create new synergies in education – a field that has ramifications for our entire society. The center will be headed by Francesco Mondada, a professor at EPFL's Robotic Systems Laboratory and the engineer behind the Thymio teaching robot. LEARN members include the Swiss EdTech Collider, a group of around 70 high-tech startups and the Center for Digital Education, which operate at all levels of education, from primary school through university.



<http://swissinnovation.org/news/web/2018/02-181010-dd>

Platform to Plan and Implement Outdoor Learning Courses

(ETH Zurich, November 12, 2018)

What characterizes a city or a neighborhood? The buildings, their shape and arrangement, but also the roads, the residents, the level of noise, the smells – and a lot more. Some of these characteristics can be captured in plans, photos or videos, but the only way to get a real sense of a place is to be there. On the basis of these kinds of considerations, Christian Sailer from ETH Zurich is a proponent of holding classes outdoors: "Context plays a major role in the episodic memory of someone learning because seeing, listening and smelling activate different centers in our brain", he explains. He developed the Omleth platform, which is designed to support lecturers in the planning and implementation of outdoor learning courses. The name stands for the German phrase meaning "location-related, mobile learning at ETH" (ortsbezogenes, mobiles Lernen an der ETH).

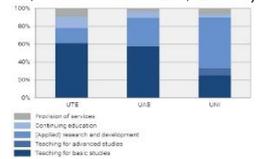


<http://swissinnovation.org/news/web/2018/02-181112-dd>

Personnel at Higher Education Institutions

(admin.ch, November 23, 2018)

Overall, 60'540 FTEs (Full time equivalent positions) are available to higher education institutions. With over 43'300 FTEs, more than two-thirds of personnel resources are deployed in the UNI (Universities; cantonal universities and FIT: 72%). UAS (Universities of applied sciences) personnel accounts for approximately 13'700 FTEs (23% of the total) and UTE (Universities of teacher education) personnel for 3'538 FTEs or 6% of personnel resources in higher education. The deployment of personnel resources varies widely between the different types of higher education institution. Whereas the UTE and UAS devote roughly 60% of personnel resources to teaching in basic tertiary education, this percentage is 25% at the UNI. Instead, at the UNI more than half of personnel resources are devoted to research and development (57%), whereas (applied) research and development at the UAS and UTE accounts for 32% and 17% of FTEs respectively.



<http://swissinnovation.org/news/web/2018/02-181123-dd>

Cooperation Between Switzerland and Singapore in Vocational Education and Training

(SERI News, November 29, 2018)

State Secretary Mauro Dell'Ambrogio paid a visit to Singapore from 19 to 21 November, where he was able to observe first-hand the transformations taking place in Singapore's education system. For the past thirty-five years, Singapore has been introducing reforms, particularly in the area of vocational education and training (VET). Switzerland's dual-track approach is well-known and has been a source of inspiration. Moreover, the numerous exchanges and cooperation initiatives between partners in both countries has paved the way for the Swiss model to be adapted to satisfy local needs. The success of the long-term exchanges between Singapore and Switzerland further prospers also thanks also to the long-standing commitment of Singaporean stakeholders and the willingness of various Swiss entities to share their experiences. Singapore's Minister of Education Ong Ye Kung has been making official visits to Switzerland each year since he took office.



<http://swissinnovation.org/news/web/2018/02-181129-d7>

3. Life Sciences / Health Care

African Elephant Cracks Its Skin to Cool Off

(University of Geneva, October 02, 2018)

An intricate network of minuscule crevices adorns the skin surface of the African bush elephant. By retaining water and mud, these micrometer-wide channels greatly help elephants in regulating their body temperature and protecting their skin against parasites and intense solar radiation. Researchers at the University of Geneva and the SIB Swiss Institute of Bioinformatics report that African elephant skin channels are true fractures of the animal brittle and desquamation-deficient skin outermost layer. The scientists showed that the elephant hyperkeratinised skin grows on a lattice of millimetric elevations, causing its fracture due to local bending mechanical stress.



<http://swissinnovation.org/news/web/2018/03-181002-bc>

Inner Ear Human Hair Cells from Test Tube

(University of Bern, October 02, 2018)

About 5% of the world population suffers from hearing impairment. Hearing ability can be improved with hearing aids or cochlear implants, but to this day there is no causal treatment for hearing impairments. A group of researchers at the University of Bern and at the Bern University Hospital has now made a big step towards establishing new methods that will serve for the developing new therapy of hearing impairment. This was achieved in cooperation with other participants in the international consortium "OTOSTEM". They managed to imitate the development of human "hair cells", which are responsible for sound reception in the inner ear, in-vitro (in the laboratory). As a result, in the future it will be possible to try out new pharmacological treatment directly on human cells.

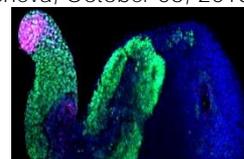


<http://swissinnovation.org/news/web/2018/03-181002-bb>

Stem Cells Organize Themselves into Pseudo-Embryos

(University of Geneva, October 03, 2018)

The definitive architecture of the mammalian body is established shortly after implantation of the embryo in the uterus. The antero-posterior, dorso-ventral and medio-lateral axes of the body become organized under the control of gene networks that coordinate the transcription of DNA in various regions of the embryo. Researchers from the University of Geneva, the University of Cambridge and EPFL now report the ability of mouse stem cells to produce pseudo-embryos that display similar capacities. Established from about 300 embryonic stem cells only, these structures (gastruloids) show developmental features comparable to that of the posterior part of embryos aged from 6-10 days. The study shows that the three main embryonic axes are formed according to a gene expression program similar to that of embryos. Gastruloids thus possess a remarkable potential for studying the early stages of normal or pathological embryonic development in mammals.



<http://swissinnovation.org/news/web/2018/03-181003-f2>

Grape Constituent Protects Against Cancer

(University of Geneva, October 03, 2018)

Lung cancer is the deadliest form of cancer in the world, and 80% of death are related to smoking. In addition to tobacco control, effective chemoprevention strategies are therefore needed. A team of scientists from the University of Geneva studied a well-known natural product, resveratrol, which is found in grapes and in red wine. While its chemopreventive properties against cancers affecting the digestive tract have been documented by previous studies, resveratrol has so far shown no effect on lung cancers. Thanks to nasal administration, the team obtained very promising results in a study conducted in mice.



<http://swissinnovation.org/news/web/2018/03-181003-43>

Healing Genetic Diseases by Using Genome Editing in Mice

(ETH Zurich, October 08, 2018)

A team of researchers from ETH Zurich and the University Children's Hospital Zurich applied a newly developed editing tool to target and correct genetic mutations. Genetic mutations can cause metabolic disorders such as phenylketonuria or urea cycle disorders. With the help of genome editing, researchers healed mice suffering from a genetic metabolic disorder that also affects humans. Researchers achieved correction rates in the liver of adult mice that nobody has managed so far. As the liver of the mouse differs in size and structure from that of humans or pigs, the scope of the trials will definitely be expanded to other organisms.

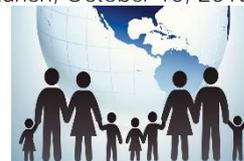


<http://swissinnovation.org/news/web/2018/03-181008-d7>

Larger Families Reduce Cancer Risk

(University of Zurich, October 10, 2018)

Researchers from the University of Zurich and the Adelaide Medical School have analyzed data from 178 countries and found a link between family size and cancer risk. Worldwide the incidence of various types of cancer increases with smaller family size. "And this relationship is independent of income, levels of urbanization and age," explains Professor Maciej Henneberg, academic guest at University of Zurich. The researchers found that not only the size of the family nucleus (i.e. parents and children) but also the size of the household including members of the extended family seem to have a protective effect against cancer. The study now suggests that family members supporting each other in keeping a healthy lifestyle may also provide protection against cancer.



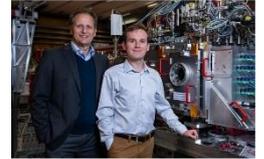
<http://swissinnovation.org/news/web/2018/03-181010-ba>



SwissFEL Makes Protein Structures Visible with X-ray Laser Light

(Paul Scherrer Institute, October 10, 2018)

SwissFEL – the newest large research facility at the Paul Scherrer Institute – is one of only five facilities worldwide where researchers can investigate biological processes in proteins using high-energy X-ray laser light. In a successful pilot experiment on biomolecules, SwissFEL has directed its strong light onto protein crystals and made their structures visible. The X-ray laser's special characteristics enable novel experiments that show how proteins move and change their shape. With this new method, scientists can observe and understand many biological processes from a different perspective, aiding the discovery of new drugs. Researchers from PSI and the Swiss company leadXpro are investigating cell membrane proteins that play an important role in cancers. They hope to discover agents that can improve the treatment of diseases.



<http://swissinnovation.org/news/web/2018/03-181010-c6>

New Mechanism Discovered: How Yeast Cells Detect Genetic Infections

(ETH Zurich, October 11, 2018)

Bacteria have an effective immune system to detect and fend off intruding genetic material. One element of this “innate” immune defense in single-cell organisms is quite well known these days: the CRISPR-Cas system. In contrast, it was not known whether eukaryotes have comparable mechanisms. Now a team of researchers at ETH Zurich, have found what they were looking for in yeast cells. These unicellular fungi feature a hitherto unknown defense mechanism located at the chromosomes' centromere. It determines when and how a chromosome condenses. Foreign genetic material – such as the virus-like DNA or DNA circles that enter a cell from time to time, or chromosomes without a centromere – cannot condense. As a result, no kinetochore can assemble and hence there is no attachment site for spindle fibers. During cell division, non-condensed genetic material is recognized and actively retained in one of the two future daughter cells, which the researchers call the mother cell. In this way, foreign DNA is confined within the mother cell, while the daughter cell contains only characteristic DNA, namely half of all the chromatids as is to be expected.

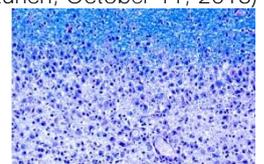


<http://swissinnovation.org/news/web/2018/03-181011-65>

Link between Gut Flora and Multiple Sclerosis

(University of Zurich, October 11, 2018)

Researchers at the University of Zurich have found that gastrointestinal microbiota could play an important role in the pathogenesis of Multiple Sclerosis (MS), the disease in which the body's immune system attacks the protective coating around nerve cells. The team found that immune cells responsible for pathological processes react to a certain protein that is formed in bacteria frequently found in the gastrointestinal flora of MS patients. It is therefore possible that the immune cells are activated in the intestine and migrate to the brain, where they cause an inflammatory cascade. Knowing this, the team hopes to find a new, more targeted approach to find a treatment against MS that does not weaken the entire immune system.



<http://swissinnovation.org/news/web/2018/03-181011-e6>

Long-Term Effects of Maternal High-Fat Diets in Mice

(ETH Zurich, October 12, 2018)

Mothers' eating habits not only affect their children and grandchildren, but also their great-grandchildren. This is the conclusion drawn by a group of researchers from ETH Zurich, Cambridge and Basel. The researchers fed female mice high-fat food before mating, during pregnancy and during lactation. The grandchildren of the mice showed addictive-like behaviors and obesity characteristics. As for the great-grandchildren: while the females showed addictive-like behaviors, the males showed characteristics of obesity. In future





studies, researchers would like to investigate which molecular transmission mechanisms might be responsible for these long-term effects in the next generations.

<http://swissinnovation.org/news/web/2018/03-181012-72>

Supergene to Help Control House Mice Invasion

(University of Zurich, October 16, 2018)

Researchers from the University of Zurich have conducted a long-term study to find out how the t haplotype, the so-called supergene affected the migratory behavior of house mice. They were able to demonstrate that carriers of the t haplotype were more likely to switch between groups or leave the barn completely. The probability of migration of this sort was almost 50 percent higher than with normal animals. Biologists in other research groups are planning to use this supergene to control invasive house mice. They want to manipulate the genetic material of these mice to make them infertile. The idea is that the supergene would help spread this modification within the population as quickly as possible.

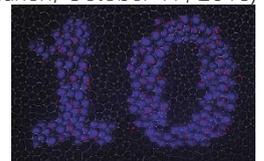


<http://swissinnovation.org/news/web/2018/03-181016-8d>

Regulating Gene Transcription Using Light

(ETH Zurich, October 17, 2018)

Researchers in Basel have discovered how to control the transcription of DNA into RNA in single cells using blue light. Transcription is a fundamental biological process in which a gene is copied to an RNA molecule, called messenger RNA – a transportable copy of the gene functioning as a template for protein synthesis. Transcriptional output often varies considerably between cells, partly because transcription is based on the random encounter of molecules, such as transcription factors and a specific DNA sequence. Using an optogenetic platform, ETH Zurich researchers identified how to control the initiation of transcription and regulate the number of RNA molecules formed, reducing variability between cells. This new technology could also be useful in tissue engineering and stem cell research.



<http://swissinnovation.org/news/web/2018/03-181017-7e>

Novel 3D Printed Heart-Pump Using Embedded Magnet Printing

(ETH Zurich, October 18, 2018)

Researchers at ETH Zurich have developed a method to create products containing magnets using 3D printing. They used an artificial heart pump to demonstrate the operating principle – and won an international prototype competition. The significant part of the project is not the heart pump itself; this is simply an example application of the 3D printing method called “embedded magnet printing”. Artificial heart pumps are not only geometrically complex products, but, more importantly, they contain magnets – and in the field of 3D printing with magnets, research is still in its infancy. The heart pump is therefore one of the first prototypes with magnetic components manufactured using 3D printing. The key is to ensure that the magnets are printed directly in the plastic. Magnetic powder and plastic are mixed before printing and processed into strands known as filaments. These then go through the 3D printer, where they are processed in a similar way to conventional 3D printing.



<http://swissinnovation.org/news/web/2018/03-181018-68>

Destabilizing Biodiversity

(University of Zurich, October 18, 2018)

Ecologists at the University of Zurich and Eawag examined the factors that influence stability in diverse ecosystems and showed that species-rich environments are not always more stable against environmental disruptions. To model the test ecosystems, six species of protozoans were put in sample vials in varying numbers and combinations.





Those samples were recorded under the microscope, and an algorithm assessed how much biomass the systems produced. The team found that the more diverse the species community was, the less the biomass production fluctuated – regardless of temperature. At higher temperatures, however, the protozoans produced less biomass the more species were in the system.

<http://swissinnovation.org/news/web/2018/03-181018-73>

Some Cancers Affect Only Young Women

(University of Geneva, October 19, 2018)

Researchers at the University of Geneva and the University Hospitals of Geneva have discovered the cause of some rare ovarian and pancreatic cancers in young women and solved the mystery of why some non-gynecological cancers are exclusively female. By conducting large-scale analyses of genomic data, the researchers – in collaboration with colleagues from the USA – discovered that on route to the reproductive organs, some embryonic germ cells unexpectedly stop in organs other than the one for which they were intended during embryogenesis. This increases the risk of tumors that may occur 30 years later. The study findings, reported in the *Journal of Pathology*, can improve the classification of these mucinous tumors, hopefully paving the way for more appropriate and personalized cancer treatments in the future.



<http://swissinnovation.org/news/web/2018/03-181019-80>

Cells Change Jobs to Fight Diabetes

(University of Geneva, October 22, 2018)

Diabetes is characterized by persistent high blood sugar levels that occur when certain cells in the pancreas – the insulin-producing β cells – are destroyed or can no longer secrete insulin. Researchers at the University of Geneva have shown how some pancreatic α and δ cells, which usually produce other hormones, can take over from the damaged β cells by starting to produce insulin. By observing how these cells modify their function by partially changing their identity, the researchers discovered a surprising level of cellular plasticity in the pancreas. Furthermore, beyond the pancreas, such processes might characterize many other cell types in the body. These results, published in *Nature Cell Biology*, could lead to entirely new therapeutic strategies that could harness the body's own regenerative capacities.



<http://swissinnovation.org/news/web/2018/03-181022-df>

New Technique Reveals How Limbs are Controlled in Flies

(EPFL, October 22, 2018)

Biology, medicine, and robotics all aim to discover how limbs are controlled by circuits of neurons working together. However, limb activity can only be studied while animals are behaving and moving. It is virtually impossible to get a complete view of the activity of motor and premotor circuits that control limbs during behavior, in either vertebrates or invertebrates. Scientists at EPFL's Brain Mind Institute and Interfaculty Institute of Bioengineering have developed a new method for recording the activity of limb control neural circuits in fruit flies. Using an advanced imaging technique called "two-photon microscopy", researchers observed the firing of fluorescently labeled neurons that become brighter when they are active. This new knowledge might also help in building robots that can move as effectively as animals.



<http://swissinnovation.org/news/web/2018/03-181022-ec>



Nerve-on-a-Chip Platform Makes Neuroprosthetics More Effective

(EPFL, October 23, 2018)

Scientists from EPFL have developed a nerve-on-a-chip platform that can stimulate and record from explanted nerve fibers, just as an implanted neuroprosthetic would. Their platform contains microchannels embedded with electrodes and explanted nerve fibers faithfully replicate the architecture, maturity and functioning of in vivo tissue. The scientists tested their platform on explanted nerve fibers from rats' spinal cords, trying out various strategies for stimulating and inhibiting neural activity. The nerve-on-a-chip platform can be manufactured in a clean room in two days and is able to rapidly record hundreds of nerve responses with a high signal-to-noise ratio. However, what really sets it apart is that it can record the activity of individual nerve cells.



<http://swissinnovation.org/news/web/2018/03-181023-21>

Air Pollution and Noise Increase Risk for Heart Attacks

(University of Basel, October 24, 2018)

Where air pollution is high, the level of transportation noise is usually also elevated. Not only air pollution negatively impacts on health, but also car, train and aircraft noise increase the risk for cardiovascular diseases and diabetes, as previous research has demonstrated. Studies investigating the effect of air pollution without sufficiently taking into account the impact that noise exhibits on health might overestimate the effect of air pollution. These are the results of a comprehensive study conducted by researchers from the University of Basel and the Swiss Tropical and Public Health Institute (Swiss TPH). The study looked at the combined effects of air pollution and transportation noise for heart attack mortality, by considering all deaths that occurred in Switzerland between 2000 and 2008.



<http://swissinnovation.org/news/web/2018/03-181024-59>

LSD Changes Perception

(University of Zurich, October 30, 2018)

LSD changes the communication patterns between regions of the brain, a new study by researchers of the University of Zurich and Yale University shows. The researchers used brain imaging technology to examine the effects of LSD on the brains of healthy study participants. The data suggests that LSD triggers a reduction in the communication between the brain regions that are responsible for planning and decision making. At the same time, LSD increases the connectivity in brain networks associated with sensory functions and movement. Based on patterns of brain signals, the scientists were also able to establish that the changes in brain connectivity caused by LSD are linked to a particular receptor in the brain (serotonin-2A receptor). "When we blocked this receptor using ketanserin, LSD stopped having an effect," explains Katrin Preller, from University of Zurich and currently visiting professor at Yale University.



<http://swissinnovation.org/news/web/2018/03-181030-69>

Smallest Steerable Catheter

(ETH Zurich, October 30, 2018)

Researchers at ETH Zurich and EPFL have developed a catheter with a magnetic head. Rather than being steered manually, it is operated from a computer via an external magnetic field. This enables the front part of the catheter to be bent in any direction with the highest level of precision. "As a result, the new catheter can be steered through more complex blood vessels better than a conventional catheter," says Christophe Chautems from ETH Zurich. Since the magnetic catheter does not require a pull wire, it can be made much thinner. The scientists have thus developed the smallest ever steerable catheter. For surgeons to work with these magnetic catheters, patients must lie on a magnetic navigation system, an apparatus used to produce





directed magnetic fields. Such devices have already been developed by ETH Zurich and an ETH spin-off, and commercial providers also offer these devices.

<http://swissinnovation.org/news/web/2018/03-181030-e2>

Cocaine Adulterant May Cause Brain Damage

(University of Zurich, October 31, 2018)

Researchers at University of Zurich have researched the extent to which a common cutting agent of cocaine, the animal anti-worming agent levamisole, impairs the cognitive performance and alters the brain structure of people who consume it, thereby increasing the well-described negative effects of cocaine on the brain. Participants of a first study, who had consumed cocaine that also contained a high level of levamisole showed even greater impairment in their executive functions than those who consumed cocaine with lower levels of levamisole, even though the amount of cocaine they had taken was the same. In a second, independent study, the same effect was seen: People who consumed cocaine with a high levamisole content clearly displayed a thinner prefrontal cortex – the area of the brain associated with executive functions.



<http://swissinnovation.org/news/web/2018/03-181031-d0>

Breakthrough in Neurotechnology for Treating Paralysis

(EPFL, October 31, 2018)

Three patients with chronic paraplegia were able to walk over ground thanks to precise electrical stimulation of their spinal cords via a wireless implant. In a study, researchers from EPFL, Lausanne University Hospital and University of Lausanne show that, after a few months of training, the patients were able to control previously paralyzed leg muscles even in the absence of electrical stimulation. This latest study, called STIMO (STimulation Movement Overground), establishes a new therapeutic framework to improve recovery from spinal cord injury. All patients involved in the study recovered voluntary control of leg muscles that had been paralyzed for many years. Unlike the findings of two independent studies published recently in the United States on a similar concept, neurological function was shown to persist beyond training sessions even when the electrical stimulation was turned off.



<http://swissinnovation.org/news/web/2018/03-181031-c4>

Zebrafish Larvae Help in Search for Appetite Suppressants

(University of Zurich, November 01, 2018)

Many drugs that take effect in the brain have unwanted side effects. “Brain structures are highly complex, which raises the question of whether it’s possible for a drug to trigger only one very specific behavior,” says Josua Jordi, researcher at University of Zurich. To answer this question, he joined forces with Harvard University researchers to develop a novel testing system for psychoactive substances. Unlike previous biochemical tests, the new testing system instead uses the larvae of zebrafish. The researchers established an automated measuring process so that they could analyze the behavior of several thousand larvae at the same time. By doing this, they can filter out substances with unwanted side effects right from the start. This method has resulted in the discovery of a number of new appetite modulators.



<http://swissinnovation.org/news/web/2018/03-181101-3e>

Small Genetic Differences Turn Plants into Better Teams

(University of Zurich, November 05, 2018)

The mechanisms that are responsible for diverse communities of plants and animals to typically perform better than monocultures have so far been a mystery. But biologists at the University of Zurich have been able to identify the genetic cause by combining modern genetic and ecological approaches. As a test system, they used systematic



crosses of varieties of the common wallcress, which were grown in pots in different combinations. After a few weeks, the researchers found that pots with mixtures of different crosses were indeed more productive on average. The researchers then related the yield gain in mixed communities to the genetic makeup of the crosses. The genetic map they obtained enabled them to identify the parts of the genome that made the combination of plants good mixed teams. They found that even the smallest genetic differences between plants were enough to increase their combined yield.

<http://swissinnovation.org/news/web/2018/03-181105-e0>

Hidden Estrogen Receptors in Breast Epithelium

(EPFL, November 09, 2018)

Estrogens are hormones that play central roles in the development and the physiology of the breast, but also are involved in breast cancer. Like all hormones, estrogens exert their biological effects by binding to dedicated receptors in the target cell. Scientists at EPFL have now uncovered that half of the luminal epithelial breast cells that appear not to express the estrogen receptor actually express it at low levels. They show that different parts of the estrogen receptor play different roles in the luminal breast cells that give rise to cancer. Depending on whether a cell has low or high levels of the estrogen receptor, the hormone-dependent or the hormone-independent activities are more or less important for its function.

<http://swissinnovation.org/news/web/2018/03-181109-fc>



Insect Antibiotic Provides New Way to Eliminate Bacteria

(University of Zurich, November 14, 2018)

The global emergence of multi-drug resistant bacteria is posing a growing threat to human health and medicine. “One of the major challenges is identifying new mechanisms of antibiotic action against dangerous Gram-negative bacteria,” says John A. Robinson. This group of bacteria includes a number of dangerous pathogens, such as *Pseudomonas aeruginosa*, which causes life-threatening lung infections, and pathogenic *Escherichia coli* strains. Researchers from University of Zurich and ETH Zurich have now uncovered how thanatin (an antibiotic produced naturally by the spined soldier bug *Podisus maculiventris*) targets Gram-negative bacteria. The insect’s antibiotic prevents the outer membrane of the bacteria from forming – an unprecedented mechanism in an antibiotic – which is fatal for the bacteria. All Gram-negative bacteria have a double cell membrane, with the outer membrane taking on an important defensive function and helping the bacteria to block the entry of potentially toxic molecules into the cell.

<http://swissinnovation.org/news/web/2018/03-181114-9c>



Atomic Receptor Structure Could Serve as Blueprint for Drug Development

(University of Zurich, November 19, 2018)

Osteoporosis affects about 400,000 people in Switzerland, mostly women after menopause. It is often described as a silent disease, because bone loss usually occurs little by little over the years and without any symptoms. The body gradually absorbs calcium from the bones, which become brittle. This process is controlled via what is called the parathyroid hormone (PTH) and a closely related peptide – a protein fragment. They bind to the PTH-1 receptor, thereby telling the body to either release calcium from the bone or to build new bone. A research team of the University of Zurich has now been able to determine the three-dimensional structure of the PTH-1 receptor. The atomic structure can serve as the blueprint for the future development of drugs. Such receptor-binding compounds may slow down, and perhaps even reverse, osteoporosis to some degree.

<http://swissinnovation.org/news/web/2018/03-181119-39>





Molecule Halting Progress of Genetic Diseases Causing Muscle Paralysis

(University of Geneva, November 19, 2018)

Myotubular myopathy is a severe genetic disease that weakens all the skeletal muscles from birth. 90% of affected babies do not live to two years of age. Although there is no existing treatment for this genetic defect, valuable research in gene therapy is currently underway: Researchers from the University of Geneva – working in collaboration with the University of Strasbourg, France, – have identified a molecule that not only greatly reduces the progression of the disease but also boosts life expectancy in animal models by a factor of seven. Since the molecule – known as tamoxifen – is already used for breast cancer, the researchers hope to soon set up a clinical trial so that patients can be given the medication.

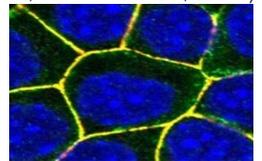


<http://swissinnovation.org/news/web/2018/03-181119-15>

Trojan Horse of Staphylococcus Aureus

(University of Geneva, November 20, 2018)

Staphylococcus aureus causes different types of infections in humans, some of which are lethal. One of its most powerful weapons is α -toxin, which destroys host cells by forming pores in their membranes. Researchers at the University of Geneva have identified the mechanism that allows these pores to be particularly harmful, by being anchored to contacts sites between cells. The study uncovers how different proteins of human cells assemble into a complex to which pores are docked, and then molecularly “locked” to stabilize them. The biologists also demonstrate that blocking the assembly of the complex by removing one or the other of its elements allows pores to be removed from the membrane and cells to survive. Identifying the host’s cellular mechanisms that contribute to the virulence of toxins is essential to develop therapeutic approaches against antibiotic-resistant bacteria.



<http://swissinnovation.org/news/web/2018/03-181120-3e>

Silico Inventory of Surfaceome in Human Cells

(ETH Zurich, November 22, 2018)

On the cell surface, anchored in the cell membrane, a wide array of proteins perform functions, which are vital for the cell. These proteins, collectively known as the surfaceome, are a cell’s antennae to the outside world, sending and receiving signals that enable it to communicate with other cells. To date, the variety of the surfaceome in human cells has hardly been researched. In an initial step to remedy this, researches at ETH Zurich worked together to create an in-silico inventory of these molecules. The computer-generated inventory encompassed about 2,900 different proteins. In other words, out of all the proteins in a human cell, one in seven could appear on the cell surface. The newly developed algorithm achieved a high degree of accuracy in its predictions: the computer was correct in more than 93% of cases.

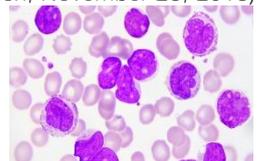


<http://swissinnovation.org/news/web/2018/03-181122-ea>

Stem-Cell Therapy to Improve Fight Against Leukemia

(University of Zurich, November 28, 2018)

Stem-cell therapy offers people suffering from leukemia or bone-marrow cancer the chance of full recovery. This requires eliminating the affected cells using chemo or radiation therapy and then replacing them with the blood stem cells from a healthy donor. The donor cells not only produce new blood cells, but also attack the other cancer cells in the patient’s body and prevent them from suffering a relapse. Researchers at the University of Zurich, in collaboration with the University Hospital Zurich and the University Medical Center at the University of Freiburg in Germany, have demonstrated that the production of a cytokine called GM-CSF is a decisive factor in graft-versus-host pathology. This cytokine, produced by a specific group of white blood cells, helps fight infections in healthy people.

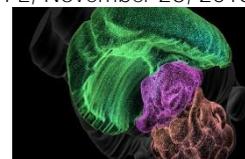


<http://swissinnovation.org/news/web/2018/03-181128-ed>

First-Ever Digital 3D Brain Cell Atlas

(EPFL, November 28, 2018)

The first digital 3D atlas of every cell in the mouse brain provides neuroscientists with previously unavailable information on major cell types, numbers and positions in all 737 brain regions – which will potentially accelerate progress in brain science massively. Released by EPFL's Blue Brain Project, the Blue Brain Cell Atlas integrates data from thousands of whole brain tissue stains into a comprehensive, interactive and dynamic online resource that can continuously be updated with new findings. This groundbreaking digital atlas, supported by the Human Brain Project, can be used for analyzing and further modeling specific brain areas, and is a major step toward a full simulation of the rodent brain.



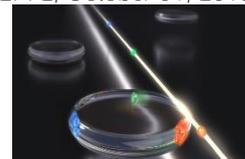
<http://swissinnovation.org/news/web/2018/03-181128-18>

4. Nano / Micro Technology / Material Science

Simpler Mechanism for Sensing with Light Pulses Using Microresonators

(EPFL, October 01, 2018)

Ultrashort optical pulses are becoming more and more relevant in a number of applications including distance measurement, molecular fingerprinting and ultrafast sampling. Researchers at EPFL have found a way to implement an optical sensing system by using spatial multiplexing, a technique originally developed in optical-fiber communication. The method, which produces three independent streams of ultrashort optical pulses using a single continuous-wave laser and a single optical microresonator, is far simpler than existing technologies.



<http://swissinnovation.org/news/web/2018/04-181001-9c>

Eco-Friendly Nanoparticles for Artificial Photosynthesis

(University of Zurich, October 01, 2018)

Quantum dots are true all-rounders. These material structures, which are only a few nanometers in size, display a similar behavior to that of molecules or atoms, and their form, size and number of electrons can be modulated systematically. This means that their electrical and optical characteristics can be customized for a number of target areas, such as new display technologies, biomedical applications as well as photovoltaics and photocatalysis. Researchers at the University of Zurich have now developed a nanoparticle type for novel use in artificial photosynthesis by adding zinc sulfide on the surface of indium-based quantum dots. These quantum dots produce clean hydrogen fuel from water and sunlight – a sustainable source of energy. They introduce new eco-friendly and powerful materials to solar photocatalysis.



<http://swissinnovation.org/news/web/2018/04-181001-dc>

Sandwich Materials

(ETH Zurich, October 01, 2018)

Materials that consist of two thin, stiff cover layers and a low-density core material, like a truss construction of carbon fiber rods, are aptly called sandwich structures. Scientists from ETH Zurich are investigating those materials, since they display some properties that make them ideal for aerospace applications, such as robustness, very light weight, and adaptability. The latter can be reached by changing the arrangement and orientation of the rods inside the core, as the properties highly depend on the core structure. Additional features such as vibration damping





can also be integrated. Applications of the new sandwich structures are currently being investigated by the French aerospace lab Onera.

<http://swissinnovation.org/news/web/2018/04-181001-a9>

Medication You Can Wear

(Empa, October 11, 2018)

Empa researchers are currently developing smart fibers from biodegradable polymers, which can be equipped with drugs like antibiotics or painkillers or could be used to treat skin wounds. The fibers recognize the need for therapy autonomously with the help of a control mechanism: Some polymers are degradable under certain conditions, like an altered pH value of a skin wound. In response to such a stimulus from the body, the fibers should release their drugs into the environment at a calculated degradation rate to accurately dose the active ingredients. Other triggers to release the drug could be slight pressure or a stimulus of light. The team of Empa and EPFL scientists are jointly conducting further research of smart medical fibers until 2020.



<http://swissinnovation.org/news/web/2018/04-181011-91>

Next generation of Watch Springs

(Empa, October 29, 2018)

Applied research is not always initiated by industry – but oftentimes it yields results that can swiftly be implemented by companies. A prime example can be seen on the Empa campus in Thun: Tiny watch springs are on display at the Laboratory for Mechanics of Materials and Nanostructures. These springs, the beating heart of every mechanical clock, are not your usual components. They are not made of the famous Nivarox wires, but rather deposited electrically – or, rather, electrochemically – in the desired form from a cold, aqueous saline solution. By now, the production in the Empa lab has outgrown the first pilot tests. On a regular basis the electroplated springs are delivered to the R&D department at a major Swiss watchmaker, where they are fitted in prototype watch mechanisms. The watches run. However, there is still work to do on their accuracy and long-term stability.

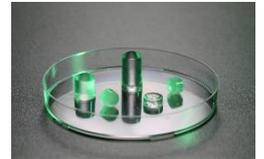


<http://swissinnovation.org/news/web/2018/04-181029-5c>

Biocompatible Hydrogel Adhering Firmly to Cartilage and Meniscus

(EPFL, November 21, 2018)

Some types of body tissue, like cartilage and meniscus, have little or no blood supply and are unable to heal if damaged. One promising approach is to inject a hydrogel loaded with repair cells or drugs into the damaged area in the hope of stimulating tissue regeneration. However, commercial hydrogels do not stay put after being applied to the treatment area because of pressure from the body's movements and the flow of bodily fluids. Doctors therefore use special membranes to keep the hydrogel in place, yet those membranes are attached with sutures that perforate the very tissue the hydrogel is supposed to heal. Researchers at EPFL have created a biocompatible hydrogel that naturally adheres to soft tissues like cartilage and the meniscus. Their hydrogel, which is almost 90% water, can withstand mechanical stresses and extensive deformation and therefore eliminates the need for a separate binding process.



<http://swissinnovation.org/news/web/2018/04-181121-14>



5. Information & Communications Technology

Recording Device for Cell History

(ETH Zurich, October 03, 2018)

Different “events” such as infections by viruses, as well as the exposure to environmental toxins or other forms of stress, change the activity of genes thereby leaving molecular traces inside the cell. These changes happen mainly at the level of messenger RNA (mRNA). These are molecules that encode genetic information when genes become activated and read, a process known as transcription. Researchers can accurately investigate the activity of a gene by measuring the mRNA molecules present in a cell. However, the traces of gene transcription disappear rapidly: mRNA is highly unstable, and cells often degrade it after a short time. ETH Zurich researchers have now developed a molecular recording system that writes transcriptional events into DNA where they can be permanently stored and later accessed to by sequencing.



<http://swissinnovation.org/news/web/2018/05-181003-38>

Security Gaps Uncovered in the 5G Mobile Communication Standard

(ETH Zurich, October 10, 2018)

ETH Zurich researchers undertook a comprehensive security analysis of the upcoming fifth generation (5G) mobile communication standard. Their conclusion: data protection has improved compared with the previous standards 3G and 4G. However, security gaps are still present. In order to guarantee security, the device and network must be able to authenticate each other, and the confidentiality of the data exchange and the privacy of the user concerning identity and location must be guaranteed. This is implemented through a protocol called Authentication and Key Agreement (AKA). The researchers used the security protocol verification tool Tamarin – developed by ETH Zurich’s Information Security Group – to identify security gaps in the 5G AKA protocol. They are now working with 3rd Generation Partnership Project (3GPP) to improve the protocol before the 5G launch.



<http://swissinnovation.org/news/web/2018/05-181010-b5>

Modulator for Efficient and Low-Cost Data Transmission

(ETH Zurich, November 21, 2018)

The high oscillation frequencies of light waves make them ideally suited to fast data transmission. They can be sent through optical fibers and easily carry hundreds of billions of bits (Gigabits) per second. The “last mile” from a central fiber optic cable to the internet socket at home, however, is the most difficult and expensive. Some alternatives, for instance 4/5G mobile telephony, are cheaper, but they cannot provide all users simultaneously with the extremely high transmission rates required by today’s data-hungry applications such as streaming TV. Researchers at ETH Zurich, with support by colleagues at the University of Washington in Seattle, developed a novel light modulator that will make it possible in the future to cover the last mile efficiently and at a low cost with high-frequency microwaves (so called millimeter waves) and hence high data transmission rates.



<http://swissinnovation.org/news/web/2018/05-181121-9b>



6. Energy / Environment

Call for Soil Protection

(University of Neuchâtel, October 03, 2018)

In his doctoral thesis presented at the University of Neuchâtel, ethnobiologist Nicolas Derungs noted that soil fertility in Switzerland continues to degrade, and one square meter of soil per second is permanently destroyed by urbanization. Soil losses remain higher than the rate of natural formation of soils, despite the introduction of two national research programs (NRP 22 and NRP 68) and policies to slow down land degradation.



This study identifies two main reasons for this failure: first, the soil remains a poorly publicized natural environment garnering little public support; second, soil degradation has been studied for decades, but purely technical solutions have been proposed. Derungs called for broader public and political debate and the mobilization of new spokespersons like farmers, amateur gardeners, artists, philosophers, or sociologists to protect soil.

<http://swissinnovation.org/news/web/2018/06-181003-20>

Swiss Lakes Used as Model System to Improve Paleoclimate Reconstruction

(University of Basel, October 09, 2018)

For years, scientists have been trying to determine the climate of the past in order to make better predictions about future climatic conditions. Now, there has been a breakthrough in the methodology of climate reconstruction based on microbial molecular fossils. The remains of bacteria found in lake sediments are important for reconstructing past environmental conditions. Particularly, cell fragments known as membrane lipids allow climate geologists to infer historic temperatures. In a study carried out in cooperation with the Royal Netherlands Institute for Sea Research, ETH Zurich, University of Applied Sciences and Arts of Southern Switzerland, and Eawag, researchers at the University of Basel analyzed sediment samples collected from 36 Swiss lakes. Their findings, reported in PNAS, are applicable to lakes worldwide.



<http://swissinnovation.org/news/web/2018/06-181009-86>

#SnowInAntarctica

(EPFL, October 11, 2018)

Researchers in environmental engineering will spend four months at Australia's Davis research station on the Antarctic coast. They will set up a weather station and take samples to better understand the unique phenomena related to snowfall and to snowflake sublimation by polar winds. Throughout the experience, they will post regular updates on EPFL Out There, a blog devoted entirely to EPFL research expeditions: #SnowInAntarctica. The EPFL scientists will work alongside over 100 other researchers at the station, which is one of the biggest in Antarctica. The expedition will indirectly help measure the effects of climate change in this region by examining the behavior of the snowfall that creates icecaps.



<http://swissinnovation.org/news/web/2018/06-181011-11>

Cattle Disease Map of Uganda

(EPFL, October 15, 2018)

Theileriosis is a tick-borne cattle disease. It kills thousands of cattle each year in Africa. According to the Food and Agriculture Organization of the United Nations, the disease causes financial losses estimated at 170 million dollars per year. This loss leads to food insecurity for many families and is partly responsible for rural depopulation. Using an environmental genomics approach, EPFL researchers have developed a map of Uganda





showing cattle farmers where the riskiest areas are. The research is part of a research program carried out from start to finish by EPFL as part of NextGen, a European research project that began in 2010.

<http://swissinnovation.org/news/web/2018/06-181015-d9>

Unique Forest Biodiversity Experiment

(University of Zurich, October 19, 2018)

In 2009, BEF-China (BEF stands for Biodiversity-Ecosystem Functioning) began as a unique forest biodiversity experiment in collaboration between institutions in China, Germany and Switzerland. The large-scale project investigated the importance of tree species richness for the good functioning of forest ecosystems. After eight years, such species-rich forest plots stored an average of 32 tons of carbon per hectare in aboveground biomass. By contrast, monocultures averaged only 12 tons of carbon per hectare, less than half as much. During photosynthesis, the plants absorb carbon dioxide from the atmosphere and convert the carbon to biomass. When a forest stores more carbon, this helps reduce greenhouse gases and at the same time also indicates high forest productivity. "These findings have great ecological and economic significance," says Prof. Bernhard Schmid of the University of Zurich, senior author in the more than 60-strong writing team of the current publication in Science.



<http://swissinnovation.org/news/web/2018/06-181019-5b>

New Handwashing System when Water Is Scarce

(ETH Zurich, October 22, 2018)

Most water used for washing hands is barely contaminated, yet usually goes down the drain. Every year, according to WHO figures, around four million people die from diarrhoeal diseases or respiratory infections – largely due to poor hygiene, which could be significantly alleviated by regular handwashing. Environmental engineers at ETH Zurich are investigating how to facilitate this where water is scarce or contaminated. As part of the Blue Diversion Autarky project, they have developed a grid-free treatment system allowing graywater – relatively clean wastewater from showering, bathing or handwashing – to be repeatedly recycled. This saves water and helps to prevent infectious diseases in developing countries. The team is exploring additional potential applications – for example, in passenger train toilets, to save both water and money.



<http://swissinnovation.org/news/web/2018/06-181022-f8>

New Alliance for Sustainability in Finance Between California and Switzerland

(University of Zurich, October 29, 2018)

Private wealth management and investment strategies are crucial in supporting and promoting sustainable projects. The Sustainable Development Goals (SDGs) and Paris Climate Change agreement will cost at least \$90-100 trillion over the next 15 years, leaving an estimated \$2.5 trillion funding gap. These ambitious but imperative goals can only be achieved through a joint effort by academia, political leaders, the non-profit sector, technology holders and the financial markets. The Green Economy and Finance Initiative, an alliance between the University of Zurich, R20, and the USC Schwarzenegger Institute, aims to answer that need and lead the world in implementing green finance practices. "The alliance [...] boosts green economy, impact investment and sustainable finance worldwide by combining political leadership, practical support, evidence-based standards and training. California and Switzerland can set a new goal for advanced economies," said Christian Schwarzenegger from University of Zurich.



<http://swissinnovation.org/news/web/2018/06-181029-25>



Computer Model to Reconstruct History of Glaciation

(ETH Zurich, November 06, 2018)

Despite the fact that explorers and scientists have been researching the glacial history of the Alps for almost 300 years, no one has previously succeeded in unequivocally identifying which climate developments led to large-scale glaciation. To gain a better understanding, researchers at ETH Zurich simulated glacier development in the Alps over the last 120,000 years on the CSCS supercomputer “Piz Daint”. They conducted simulations with three different sets of paleo-climate data, as well as two different precipitation scenarios. Only one of the climate data sets delivered results that match the geological evidence left behind by the glaciers in rock and sediment. The results of this simulation indicate that Alpine glaciers advanced and retreated more often than previously thought.



<http://swissinnovation.org/news/web/2018/06-181106-c8>

Exploiting Epigenetic Variation for Plant Breeding

(University of Zurich, November 08, 2018)

The sequence of genes passed on to daughter cells or offspring is not the only factor that determines the traits of cells and organisms. Chemical changes in the genetic material that do not alter the underlying DNA sequence also play a role in controlling which genes are active or inactive. Plant biologists at the University of Zurich have now demonstrated that naturally occurring epigenetic variation in mouse-ear cress (*Arabidopsis thaliana*) is subject to selection. They also showed that newly selected traits, which are important for seed dispersal, are passed on for at least two to three generations even without selection. “Epigenetic variation thus contributes to the ability of plants to quickly adapt to changes in the environment without sequence changes in the genome,” explains Ueli Grossniklaus from University of Zurich.



<http://swissinnovation.org/news/web/2018/06-181108-7a>

Climate Scenarios Warn About Continued Warming

(ETH Zurich, November 13, 2018)

Switzerland is becoming drier, hotter and less snowy, and will struggle with heavier rainfall in the future – these are the conclusions reached by climate researchers from MeteoSwiss and ETH Zurich. They recently presented the Climate Scenarios CH2018 produced on behalf of the Federal Council. These form the basis for the climate change adaptation strategy of the federal government. The scenarios confirm and expand on the picture of climate change understood thus far. They show four main changes that will shape the climate in Switzerland in the mid-century without increased global climate mitigation: Dry summers, more hot days, heavy precipitation and snow-scarce winters. The Climate Scenarios CH2018 are based on the latest climate models and enable the most accurate glimpse into Switzerland’s future climate. The researchers calculated the Swiss climate for the next 100 years.



<http://swissinnovation.org/news/web/2018/06-181113-6a>

First Global Vegetation Database

(Zurich University of Applied Sciences, November 19, 2018)

In a study conducted by an international research team, of which researchers from Zurich University of Applied Sciences, Swiss Federal Research Institute for Forest, Snow and Landscape, and the University of Zurich were part of, the first global vegetation database with over 1.1 million complete vegetation surveys for all mainland ecosystems was presented. While more and more regional and national vegetation databases have





emerged in recent years, a superordinate database was missing. This new, comprehensive database is designed to grow steadily and help predict the impact of global climate change, land-use change or invasive species. In addition, numerous questions of biodiversity can be researched globally for the first time thanks to the database.

<http://swissinnovation.org/news/web/2018/06-181119-05>

More Improvement of Performant Forestry

(University of Bern, November 22, 2018)

Different forests have something in common: They fulfill their main purpose but could also perform many other services much better. In order to see how forestry can be improved an international research group led by the University of Bern examined how different forest features affected 14 ecosystem services in Central European forests. The researchers looked at many attributes: such as the number of tree and shrub species the forest contained, how variable its structure was and how old the trees were. They then identified which of these attributes promote specific services. The study shows that forests with old trees, many different shrub species, and a heterogeneous structure, including gaps, are best able to perform many different, but not all possible, services.

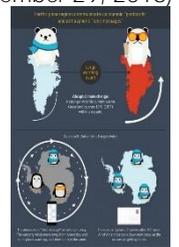


<http://swissinnovation.org/news/web/2018/06-181122-35>

Sudden Climate Change Explained

(University of Bern, November 29, 2018)

A study conducted by an international team of researchers, including researchers from University of Bern, describes how an ocean current repeatedly strengthening and weakening again 60,000 to 12,000 years ago led to an extremely sudden change in the climate. The current is known as the Atlantic Meridional Overturning Circulation (AMOC) and warms Greenland and Europe with the warm water that it sends into the North Atlantic with the Gulf Stream. The research findings show how these extreme events, also known as "Dansgaard-Oeschger Events", affect Antarctica at the other side of the world. "Our study is the first to show in detail how the climate works over periods that extend far beyond those of meteorological observations", explains Michael Sigl from University of Bern.



<http://swissinnovation.org/news/web/2018/06-181129-7b>

7. Engineering / Robotics / Space

Novel Approach to Detect Alien Life

(EPFL, October 02, 2018)

An EPFL scientist has developed a novel approach that boosts the chances of finding extraterrestrial intelligence in our galaxy. His method uses probability theory to calculate the possibility of detecting an extraterrestrial signal. The idea is that an advanced civilization on another planet could be generating electromagnetic signals, and scientists on Earth might be able to pick up those signals using the latest high-performance radio telescopes. But there is still a way to go. Especially since our search methods can't detect alien civilizations that may be in primordial stages or that are highly advanced but haven't followed the same technological trajectory as we did.



<http://swissinnovation.org/news/web/2018/07-181002-42>



Discovery of Rare Star Pristine 221

(EPFL, October 08, 2018)

EPFL astrophysicists actively participated in the discovery of a very rare star, which is particularly old and metal-poor. Spectroscopic analysis and chemical abundance measurements led to the identification of this very special star. In searching for the oldest stars, scientists look for stars with much more pristine atmospheres than our Sun. The more pristine the atmosphere, the earlier the generation in which this star was born. Studying stars of different generations allows scientists to understand the formation history of the Galaxy. As a messenger from the distant past, the recently discovered star will allow scientists to learn more about the young Universe, right after the Big Bang.

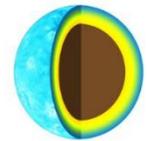


<http://swissinnovation.org/news/web/2018/07-181008-60>

Composition and Structure of Exoplanets

(University of Zurich, October 09, 2018)

Researchers at University of Zurich analyzed the composition and structure of far-away exoplanets using statistical tools. They found that planets with a radius of up to 1.4 times that of Earth can be earth-like, i.e. they have a composition similar to Earth. Planets with radii above this threshold have a higher share of silicates or other light materials. Most of the planets with a radius above 1.6 radii of the Earth must have a layer of hydrogen-helium gas or water in addition to their rocky core, while those larger than 2.6 Earth radii cannot be water worlds and therefore might be surrounded by an atmosphere. Planets with radii larger than 4 Earth radii are expected to be very gaseous and consist of at least 10% hydrogen and helium, similarly to Uranus and Neptune.



<http://swissinnovation.org/news/web/2018/07-181009-a0>

Ultra-Light Virtual-Reality Glove

(ETH Zurich, October 15, 2018)

Engineers and software developers around the world are seeking to create technology that lets users touch, grasp and manipulate virtual objects, while feeling like they are actually touching something in the real world. Scientists at ETH Zurich and EPFL have just made a major step toward this goal with their new haptic glove, which is not only lightweight but also provides feedback that is extremely realistic. For now, the glove is powered by a very thin electrical cable, but thanks to the low voltage and power required, a very small battery could eventually be used instead. That, together with the glove's low form factor translates into an unprecedented level of precision and freedom of movement.



<http://swissinnovation.org/news/web/2018/07-181015-ba>

Exploring Mercury Thanks to Instruments from Bern

(University of Bern, October 17, 2018)

The BepiColombo space probe will begin its journey to Mercury in October 2018. The probe itself consists of two spacecraft: The Mercury Planetary Orbiter (MPO), which was constructed by the European Space Agency and the Mercury Magnetospheric Orbiter (MMO), which was constructed by the Japan Aerospace Exploration Agency. Both spacecraft will fly to Mercury as a coupled system but will be put onto separate orbits upon arrival. The MMO will investigate the magnetospheric interaction between the planet and the solar wind, while the MPO will be put onto a lower orbit which is optimal for carrying out remote sensing of the planet's surface. On board are instruments, designed and built at the Physics Institute of the University of Bern.



<http://swissinnovation.org/news/web/2018/07-181017-ab>



Space Farming Thanks to Strigolactone

(University of Zurich, October 17, 2018)

With scarce nutrients and weak gravity, cultivating crops on the Moon or on other planets seems unimaginable. Plant biologists from the University of Zurich and the Lucerne University of Applied Sciences and Arts have shown, that hormones of the strigolactone family support mycorrhization, that is the symbiosis between fungi and plant roots, especially in soil that is low in nutrients. Further, they demonstrated, that plants that secreted high levels of strigolactone and fungi which were treated with a synthetic strigolactone hormone were able to thrive in the low-nutrient soil despite the microgravity conditions. The above findings may pave the way for the successful cultivation in space of the types of plants that are now grown on Earth.

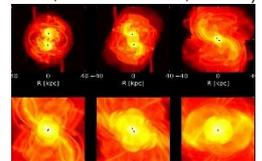


<http://swissinnovation.org/news/web/2018/07-181017-64>

Gravitational Waves Could Shed Light on Dark Matter

(University of Zurich, October 22, 2018)

The Laser Interferometer Space Antenna (LISA) will enable astrophysicists to observe gravitational waves emitted by black holes as they collide with or capture other black holes. Scientists from the University of Zurich, together with colleagues from Greece and Canada, have now found that LISA will not only be able to measure these previously unstudied waves, but could also help to unveil secrets about another mysterious part of the universe: dark matter. Calculating the interplay of dark matter, stars and the central black holes of dwarf galaxies, the research team discovered a strong link between the merger rates of these black holes and the amount of dark matter at the center of dwarf galaxies. Measuring gravitational waves emitted by merging black holes can thus provide hints about the properties of the hypothetical dark matter particle.



<http://swissinnovation.org/news/web/2018/07-181022-95>

FlyCroTugs – Flying, Micro, Tugging Robots

(EPFL, October 25, 2018)

A closed door is just one of many obstacles that no longer pose a barrier to the small flying robots developed jointly by Stanford University and EPFL. Equipped with advanced gripping technology, inspired by gecko and insect feet, and able to interact with the world around them, these robots can work together to lasso a door handle and tug the door open. These FlyCroTugs – flying, micro, tugging robots – are micro air vehicles that the researchers modified so that they can anchor themselves to various surfaces using gecko adhesives and microspines. Thanks to these mechanisms, FlyCroTugs can pull objects up to 40 times their weight, such as door handles or, in a rescue scenario, cameras and water bottles. Similar vehicles produced by other researchers can tug objects only about twice their weight.

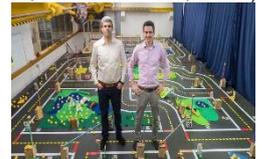


<http://swissinnovation.org/news/web/2018/07-181025-9b>

Artificial Intelligence Driving Olympics

(ETH Zurich, November 01, 2018)

Researchers from ETH Zurich have launched a competition for autonomous driving. The playing field for the competition is Duckietown. In this model town, small self-driving taxis equipped with a minicomputer, a camera, and a few LEDs transport ducklings from A to B. The platform was created at the Massachusetts Institute of Technology and developed further at ETH Zurich. The participants in the “Artificial Intelligence Driving Olympics”, abbreviated as “AI-DO”, have to teach these little robot taxis to stay in their lane, recognize objects and to avoid them or to interact with them as part of the complete taxi fleet in Duckietown. The research question to be investigated in the competition: Can artificial intelligence (AI) soon make an active contribution



to steering autonomous vehicles in the streets? Today, machine learning helps cars to do things like detect objects. But it does not actively make decisions.

<http://swissinnovation.org/news/web/2018/07-181101-83>

Successful NASA InSight Mars Mission

Scientists involved in NASA's InSight Mars mission can breathe a sigh of relief and celebrate, the InSight mission has reached another milestone: On November 26 at 20:53 Swiss time, after spending over six months flying through space, the spacecraft entered the thin Martian atmosphere, deployed a large parachute as it commenced its descent and then fired its retroboosters to slow its descent further allowing it to make a soft landing on the Elysium Planitia plain. The entire landing manoeuvre took just six minutes. Researchers at ETH Zurich are involved in the InSight mission in a number of ways: They delivered the highly sensitive electronics for the SEIS seismometer, which is now being prepared for deployment to measure marsquakes. Together with seismologists from the Swiss Seismological Service, they will run a Marsquake service charged with the analysis and characterization of the data from SEIS.

<http://swissinnovation.org/news/web/2018/07-181127-ef>

(ETH Zurich, November 27, 2018)



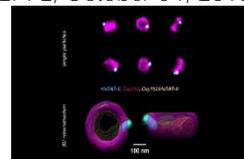
8. Physics / Chemistry / Maths

Super-Resolution Microscopy Overcomes Current Noise and Color Limits

Super-resolution microscopy is a technique that can "see" beyond the diffraction limit of light. The technique has garnered increasing interest recently, especially since its developers won the Nobel Prize in Chemistry in 2014. A new technique developed by EPFL overcomes the noise and color limitations of super-resolution microscopy by creating three-dimensional reconstructions from single-color, two-dimensional images of protein complexes. The method works with images taken with large field-of-view super-resolution microscopy, with each image containing hundreds of two-dimensional projections of a labeled structure in parallel. Each 2D view represents a slightly different orientation of the structure, so that with a dataset of thousands of views, the method can computationally reconstruct and align the 2D images into a 3D volume. By combining information from a large number of single images, the noise is reduced, and the effective resolution of the 3D reconstruction is enhanced.

<http://swissinnovation.org/news/web/2018/08-181004-df>

(EPFL, October 04, 2018)

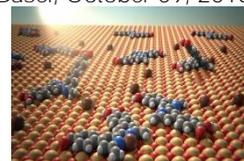


Achieving Desired Configuration of Dye-Sensitized Solar Cells

Dye-sensitized solar cells have been considered a sustainable alternative to conventional solar cells for many years. The way in which the dye, which absorbs sunlight, is anchored to the semiconductor plays a crucial role in the effectiveness of these solar cells. Scientists at the University of Basel have found a way to change the spatial arrangement of bipyridine molecules on a surface. These potential components of dye-sensitized solar cells form complexes with metals and thereby alter their chemical conformation.

<http://swissinnovation.org/news/web/2018/08-181009-55>

(University of Basel, October 09, 2018)





Ultra-Hot Laser Bursts Clouds for Better Communication

(University of Geneva, October 17, 2018)

Although satellite radio communication is powerful, it can no longer keep up with the daily demand for the flow of information. Its long wavelengths limit the amount of information transmitted, while the frequency bands available are scarce and increasingly expensive. Furthermore, the ease with which radio frequencies can be captured poses ever more acute security problems - which is why research is turning to lasers. However, this new technology, currently in the testing phase, faces a major problem: clouds. Due to their density, clouds stop the laser beams and scramble the transfer of information. Now, researchers at the University of Geneva have devised an ultra-hot laser that creates a temporary hole in the cloud, which lets the laser beam containing the information pass through. This creation represents an important step towards the commercial use of satellite laser communication.

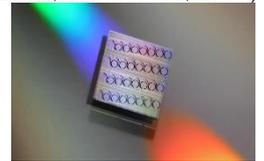


<http://swissinnovation.org/news/web/2018/08-181017-77>

Power-Efficient Generation of Ultrashort Pulses on Chip

(EPFL, October 19, 2018)

An EPFL research team has developed a novel, CMOS-compatible fabrication process to create photonic integrated waveguides based on Silicon nitride (SiN) with light propagation loss below 1dB per meter, exceeding the state of the art by a factor of more than a hundred. Using these waveguides to build SiN integrated microresonators with Q factor exceeding 15 million (corresponding to a power enhancement of 10,000 times inside the microresonator), soliton microcombs are observed, with a record-low device input power below 10 mW. This power level, which can be achieved by a normal laser pointer, bridges the gap between nonlinear optics and silicon photonics, allowing the generation of ultrashort pulses on a silicon chip. Such devices pave the way for compact soliton microcomb chips in portable devices for metrology and spectroscopy, with much reduced cost and system complexity.



<http://swissinnovation.org/news/web/2018/08-181019-86>

9. Architecture / Design

3D-Knitted Shells Save on Construction Materials and Time

(ETH Zurich, October 29, 2018)

Researchers at ETH Zurich have used a new technology to create a five-ton concrete structure for an exhibition in Mexico City. The heart of the four-meter-tall curved concrete shell is knitted. The structure's formwork is a textile supported by a steel cable-net. The prototype KnitCandela marks the first application that this technology is being used on an architectural scale. Following a digitally generated pattern, an industrial knitting machine produced the shuttering of the formwork for the shell structure: in 36 hours, it knitted a fully shaped, double-layered 3D textile consisting of four long strips. The lower layer forms the visible ceiling and the upper layer contains sleeves for the cables of the formwork system and pockets for simple balloons, which, after the entire structure is coated in concrete, become hollow spaces that help save on materials and on weight.



<http://swissinnovation.org/news/web/2018/09-181029-83>



Connected Urban Planners Can Better Serve City Residents

(EPFL, November 29, 2018)

Today's urbanites are ultra-connected and want to make their voices heard on key issues affecting their cities and neighborhoods. Digital platforms are the most convenient and efficient way to do this – but most cities lack the requisite technological capabilities. That means residents' input is seldom incorporated into planning decisions. At least that's the main finding of an architecture thesis carried out at EPFL. The study compared Geneva with Singapore, an Asian metropolis recognized as the world's preeminent smart city. How can city officials improve things? The thesis includes a list of digital platforms that they could use to better listen to and incorporate residents' ideas. The researcher came up with the list after testing around 50 such platforms worldwide, which she grouped by type of urban project they are meant to address.



<http://swissinnovation.org/news/web/2018/09-181129-93>

10. Economy, Social Sciences & Humanities

Giraffe Babies Inherit Spot Patterns from Their Mothers

(University of Zurich, October 02, 2018)

Researchers from University of Zurich and Penn State University analyzed survival records and photos of spots of Masai giraffes. Giraffes have a uniformly dark grey skin color, but their spots are highly variable in color and shape. Spot patterns do not change as an animal ages, which allows researchers to identify individuals based on their unique patterns. The researchers found that some features of a giraffe's spot pattern are passed on from mother to calf. They also found that newborn giraffes with larger and irregularly shaped spots had a better chance of surviving the first few months of life. This increased survival rate likely indicates that these young animals have better camouflage, but it could also be related to other survival-enhancing factors, such as temperature regulation or visual communication.



<http://swissinnovation.org/news/web/2018/10-181002-48>

Even Small Gifts Boost Business

(University of Zurich, October 04, 2018)

In many industries and companies there are guidelines on the size and value of presents that employees are allowed to accept. Such limits are based on the assumption that small gifts are unproblematic but more valuable gifts lead to conflicts of interest for the recipients. In a controlled field experiment, researchers from the universities of Zurich and Lausanne investigated whether small presents in business relationships had no influence on the behavior of the recipient. A seemingly insignificant token (six tubes of toothpaste worth a total of around 10 francs) led to orders that were on average almost twice as high. This effect only occurred, however, if there was an existing business relationship, meaning the giver and recipient already knew each other. If a gift was given at the first encounter, it was more likely to have the opposite effect.



<http://swissinnovation.org/news/web/2018/10-181004-33>



Interactive Visualizations of Italo Calvino's Work

(University of Geneva, October 10, 2018)

The project «Atlante Calvino, literature and visualization» explores new methods of literary analysis by combining writing and image. It is led by an international and multidisciplinary group of researchers, in which a literary team from the University of Geneva collaborates with the graphic designers and computer scientists of the Politecnico di Milano, specialized in Digital Humanities and the visual representation of complex problems. The first phase has allowed for the production of four interactive visualizations of Calvino's work: a table of all his writings organized by decade, a second one presenting the entirety of his stories and their editorial history, a scatter plot listing the thousands of people he quotes and finally a timeline showing the dates of writing and those, often different, of publication. Ultimately, all these findings will be published on a web platform.



<http://swissinnovation.org/news/web/2018/10-181010-86>

Using Mobile Data to Model the Drinking Habits of Swiss Youth

(EPFL, October 16, 2018)

Researchers at EPFL characterized the drinking habits of young people through a study based on factual information. The researchers developed two apps that the study participants installed on their smartphones. Participants used the first to photograph and record all the beverages (alcoholic and non-alcoholic) they drank during a weekend night, plus the type of drink, volume, number and where they drank them. The second app activated sensors that continuously collected data on each participant's location and activity level. The researchers determined which factors were most significant in estimating behavior and developed a model that can estimate when someone is likely to drink with over 75% accuracy. The findings are published in IEEE Transactions on Mobile Computing.



<http://swissinnovation.org/news/web/2018/10-181016-83>

Loss of First Baby Tooth a Positive Experience for Children

(University of Zurich, October 24, 2018)

An interdisciplinary research team at the University of Zurich, in cooperation with the City of Zurich's School Dental Services, has examined the feelings that children experience when they lose their first baby tooth. The scientists surveyed parents of children who had already lost at least one of their milk teeth. Of the nearly 1,300 responses received for the study, around 80% of parents reported positive feelings, while only 20% told of negative emotions. The researchers found that previous visits to dentists played a role when it comes to children's feelings. Moreover, the study also found that sociodemographic factors are related to children's feelings: For example, children were more likely to have positive feelings such as pride or joy if the parents had a higher level of education and came from non-Western countries.



<http://swissinnovation.org/news/web/2018/10-181024-e2>

Swiss-Wide Survey on Spread of Extremism

(Zurich University of Applied Sciences, November 06, 2018)

The Zurich University of Applied Sciences, together with the Haute École de Travail Social Fribourg HETS-FR, has conducted a Swiss-wide survey on the spread of right-wing extremism, left-wing extremism and Islamist extremism. In 2017, more than 8,000 young people between the age of 17 and 18 were interviewed in ten cantons. The researchers found that approval of the ideological goals of extremism is more pronounced among young people in Switzerland than advocacy of violence. In addition, consent to extremism



varies according to gender, school type and social status: male adolescents, vocational students or socially disadvantaged adolescents are more likely to be affected.

<http://swissinnovation.org/news/web/2018/10-181106-27>

Analysis of Trading Activity with Swiss Blue Chip

(University of St.Gallen, November 23, 2018)

The competition among European Multilateral Trading Facilities is steadily increasing partly driven by new regulation. SIX launched a research cooperation between University of St. Gallen and BMLL Technologies. The focus has been set on the implementation of performance indicators, which help assess the quality of order books, of the resulting equity trading, respectively, as well as on its application to trading with Swiss Blue Chips.



The research found that for the 30 largest securities which constitute the Swiss Leader Index (SLI), SIX relative spread averaged 6 basis points. Further, it was found that for SMI top 20 most liquid stocks SIX's best prices 90% of the trading period were more persistently available than on the competing platforms. Further, even within volatile markets the relative spread at SIX varies around its low level significantly more stable than the larger relative spread of the competing platforms. The same holds for the best price persistency. Trading with Swiss Blue Chips at SIX imply significant lower spreads with simultaneously lower spread risks.

<http://swissinnovation.org/news/web/2018/10-181123-d8>

11. Startups / Technology Transfer / IPR / Patents

Analysis of Athletes' Progress Through Wearable Sensors

(EPFL, November 16, 2018)

In recent years, the market for wearable sports sensors has taken off. They generate data on athletes' progress and potential areas of improvement, as well as providing motion analysis. Yet amateurs and pros don't require the same level of precision in measuring, assessing and comparing their performance. That is where Gait Up, an EPFL spin-off, comes in: while mass-market sensors generally have a margin of error of 10–20%, Gait Up's technology slashes that range less than 3%. The startup's device, consisting of two extremely light cases (one for each foot) delivers highly precise data thanks to algorithms that were thoroughly vetted at EPFL and at University of Lausanne. The device works so well that it is being used by Sub2hrs, a group of experts from a wide range of fields whose goal is to see a marathon run in under two hours within the next five years.



<http://swissinnovation.org/news/web/2018/11-181116-ed>

High-Precision Navigation

(ETH Zurich, November 29, 2018)

Fixposition is an ETH spin-off specializing in real-time navigation systems for use in self-driving vehicles, robots or industrial drones. Using a combination of satellite-based positioning systems such as GPS with computer vision technologies, the young entrepreneurs have managed to achieve an unparalleled degree of precision. Founded in August 2017, the start-up produces high-precision navigation systems that can be fitted into autonomous devices such as drones, robots or driverless vehicles. In September, the founders of Fixposition, Lukas Meier and Zhenzhong Su, visited Shanghai, Beijing, Shenzhen, Hong Kong and to the recent World Economic Forum conference in Tianjin during a strenuous two-week tour. The ETH spin-off was



chosen as one of ten companies making up the Swiss national start-up team and took part in the trip to China organized by Venturelab, a funding body that supports young entrepreneurs.

<http://swissinnovation.org/news/web/2018/11-181129-fb>

12. General Interest

Improvement of Empirical Research

(University of Zurich, October 02, 2018)

Three years ago, an investigation conducted by the Open Science Collaboration made headlines. It showed that the findings of only a little more than a third of the 100 psychology experiments that it examined were reproducible, i.e. were able to stand up to scrutiny when they were retested. Talk about a reproducibility crisis in science has been spreading at least since then. The crisis also concerns many other disciplines whose insights are based on experiments and statistics (from economics to biomedicine). According to Leonhard Held, biostatistician at University of Zurich, lax methodological rigor is a recurring issue in empirical research. He believes that one reason for this is that researchers sometimes know too little about the scientific principles of statistics. To advance and improve the quality of empirical research conducted at University of Zurich, he has founded the Center for Reproducible Science.



<http://swissinnovation.org/news/web/2018/12-181002-66>

Federal Council Appoints Joël Mesot as ETH Zurich President

(admin.ch, October 24, 2018)

On 24 October the Federal Council appointed Professor Joël Mesot as the new president of the Federal Institute of Technology (ETH) Zurich. This choice was proposed by the Federal Department of Economic Affairs, Education and Research (EAER) and received the unanimous support of the ETH Board. Joël Mesot has been director of the Paul Scherrer Institute (PSI) since 2008 and currently holds professorships at the two federal institutes of technology in Zurich and Lausanne. Professor Mesot takes up his new position on 1 January 2019, taking over from Professor Lino Guzzella, who as ETH Zurich's president since 2015 has continued to boost the institute's reputation internationally. Joël Mesot is a distinguished scientist who has also demonstrated impressive abilities in the management of modern science and research institutions.

<http://swissinnovation.org/news/web/2018/12-181024-d7>

Six Projects from ETH Zurich Selected for EU's Quantum Research Program

(ETH Zurich, October 29, 2018)

Among the sub-projects that have been selected to be part of the Quantum Flagship program, six projects involve researchers from ETH Zurich. These are projects from the areas of quantum computing, quantum simulations and quantum sensors. The six projects will be supported with a total of CHF 6.5 million. Andreas Wallraff is very pleased with the number of successful entries from ETH Zurich researchers: "Together with our partners at ETH Zurich and in the wider Zurich region, we expect to make a major contribution to developments in quantum computing. For years, Swiss researchers and SMEs have been making significant, innovative contributions to this rapidly developing new IT field."



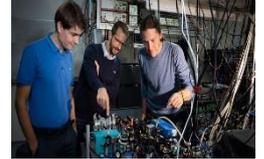
<http://swissinnovation.org/news/web/2018/12-181029-45>



Basel Physicists Participate in Quantum Technologies Flagship Program

(University of Basel, October 29, 2018)

About 140 international consortia of university research groups and industry partners applied for the first three-year funding period of the Quantum Technology Flagship program - of which only 20 were successful. Three research groups from the University of Basel are involved in the area of quantum optics and quantum sensing. The MACQSIMAL project is developing quantum sensors based on miniaturized atomic vapor cells. The ASTERIQS consortium also deals with sensors. The research alliance looks at the quantum properties of ultra-pure diamonds, which are used as precise measurement systems for quantum sensors. The Quantum Internet Alliance (QIA) project aims to develop a quantum internet that can be used to network quantum computers to powerful clusters, and for secure communication over large distances.



<http://swissinnovation.org/news/web/2018/12-181029-ae>

Geneva Recognized as Key Hub for Quantum Physics

(University of Geneva, October 29, 2018)

Twenty projects were selected by the European Commission (EC) for the first phase of the ten-year flagship initiative, including three from the University of Geneva. It is a fitting reward for the university. "This is a great recognition for our university," says Robert Thew. "Historically, University of Geneva was the first institution to conduct quantum communications outside the protected environment of the laboratory, when, for instance, it used optical fibers under Lake Geneva. As a result, our university has been recognized as a world leader in the area for over two decades, and these three new projects will help maintain our reputation."



<http://swissinnovation.org/news/web/2018/12-181029-ad>

European Quantum Technologies Flagship Project macQsimal

(CSEM, October 29, 2018)

"Establishing European leadership in the quantum sensing industry" - This is in essence the ambition of macQsimal, a new project selected by the European Commission for their recently launched Quantum Technologies Flagship initiative. Coordinated by CSEM, this consortium of 14 industrial and academic partners will create new commercial opportunities by leveraging quantum effects to achieve unprecedented sensitivity, accuracy and resolution of devices for sensing and metrology applications. The first quantum revolution resulted in groundbreaking technologies such as transistors and lasers, without which current computers, mobile phones and the internet would have been unimaginable. Today, the ability to manipulate fundamental quantum properties in systems and materials is paving the way for a second quantum revolution. A global race has begun to exploit the enormous potential of quantum technologies (QT) and spearhead transformative advances in fields such as health, security, transport, energy and environmental science.



<http://swissinnovation.org/news/web/2018/12-181029-eb>

Switzerland Leads 5th Consecutive Edition of IMD World Talent Ranking

(IMD, November 25, 2018)

The 2018 edition of one of the world's foremost reports on the quality of international workforces has been released. It assesses the extent to which countries develop, attract and retain talent to sustain the pool that enterprises employ to create long-term value. Switzerland in first and Denmark in second, firmly lead the IMD World Talent Ranking 2018 for the fifth year in a row, followed by Norway, Austria and the Netherlands. "Since 2014, the Talent Ranking assesses how the 63 economies we study develop, attract and retain highly-skilled





professionals. Cultivating a skilled and educated workforce is crucial to strengthening competitiveness and achieving long-term prosperity, particularly in the current dynamic landscape where artificial intelligence, robotics and other new technologies constantly redefine the challenges that governments, businesses and society in general will have to face in the future,” said Arturo Bris, Director of the IMD World Competitiveness Center.

<http://swissinnovation.org/news/web/2018/12-181125-1b>

Precision Surgery

Recently, the platform for cooperation in medicine, Hochschulmedizin Zürich, unveiled its new flagship project for 2018. Surgent (Surgeon Enhancing Technologies) aims to set new standards in precision surgery. Under the auspices of the project, new technologies to improve surgical skills, initially in spinal and brain surgery, will be developed and clinically tested. Researchers from different disciplines from ETH Zurich, the University of Zurich and the University’s hospitals will collaborate on the project. The first step is to survey and document the individual anatomy and tissue of patients by recording images. Secondly, further models and simulations will be developed to enable optimal and patient-specific operation planning, as well as to make outcome prediction possible. The third aim of Surgent is to use augmented reality (AR) to efficiently and effectively support navigation during an operation.

(ETH Zurich, November 29, 2018)



<http://swissinnovation.org/news/web/2018/12-181129-a6>

13. Calls for Grants/Awards

Call: Drive Digitalization Forward in Switzerland!

Switzerland is set to remain one of the leading countries in the development and application of digital technologies. In order to achieve this, the Federal Council is pledging a total of CHF 62 million as part of its 2019-2020 action plan. Innosuisse is implementing two of the recommended measures: The "Manufacturing technologies" impulse program and the promotion of digitalization in energy and mobility via the SCCER. The "Manufacturing technologies" impulse program funds innovation projects at the interface between research and technology transfers that Swiss companies conduct together with research institutions in the digitally-oriented "Industry 4.0 and Modern manufacturing technologies" segment. Additional funding for 2019 and 2020 will amount to CHF 24 million. The program is primarily aimed at consortia comprised of companies and research institutions which are active on a digital basis in the "Industry 4.0 and modern manufacturing technologies" segment. Deadlines are January 21 and May 20, 2019.

(Innosuisse, November 27, 2018)

<http://swissinnovation.org/news/web/2018/13-181127-ab>

Call: Mapping Excellent Swiss Design

Swiss design embodies innovation, ability, values and identity. The team behind the Design Prize Switzerland is committed to the consideration of design as an economic factor with a high social, social and sustainable relevance. The Design Prize Switzerland should not only be considered as an award; it is an institution that aims to point out the

(designpreis.ch, November 30, 2018)





importance of Swiss design. The competition is aimed at Swiss design professionals, brands, companies and institutions working in Switzerland or abroad. Foreign designers who study, work or work for Swiss companies in Switzerland are also eligible. The project submission deadline is February 6, 2019.

<http://swissinnovation.org/news/web/2018/13-181130-1e>

Call: Swiss Industry Award 4.0

(Swiss Industry Award 4.0, November 30, 2018)

The awarding of the Swiss Industry 4.0 Award® annually honors a company, an organization or a project that has made a notable contribution to the development of the automated economy in Switzerland in the practical implementation of the digitization concepts of the so-called Industry 4.0. The award is a symbol of the innovative strength of Swiss companies and, at the same time, an incentive to promote innovation. The winner's prize is endowed with CHF 10'000.- Possible topics include: Digital services in industrial operation, Business Models in Industry 4.0, Information and communication technology in the Smart Factory, Innovative technologies and their application, Big Data Analytics in Industry 4.0, Industrial Data Platforms and Industrial Internet and Smart Maintenance. Submission of all materials or corresponding download links to the materials have to be sent by e-mail to projekt@industry40.ch by 31 July 2019.

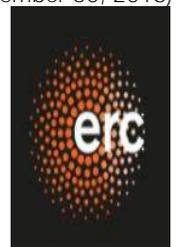


<http://swissinnovation.org/news/web/2018/13-181130-c7>

Call: European Research Council Consolidator Grant

(European Research Council, November 30, 2018)

Are you a scientist who wants to consolidate your independence by establishing a research team and continuing to develop a success career in Europe? The European Research Council (ERC) Consolidator Grant could be for you. You can also apply if you have recently created an independent, excellent research team and want to strengthen it. Researchers of any nationality with 7-12 years of experience since completion of PhD, a scientific track record showing great promise and an excellent research proposal, can apply. Applications can be made in any field of research. The ERC's grants operate on a 'bottom-up' basis without predetermined priorities. The deadline for the next ERC Consolidator Grant is February 7, 2019.



<http://swissinnovation.org/news/web/2018/13-181130-1c>

Upcoming Science and Technology Related Event

Blockchain Forum

January 21, 2019

<https://www.blockchain-forum.net/>

Regulation, Stable Coins, Crypto Asset Custody
Zurich

World IA Day

February 23, 2019

<https://www.worldiaday.org/>

Information Architecture, Design
Zurich

Future Health Basel

January 28, 2019

<http://www.nzz-futurehealth.com>

Healthcare, Life Science
Basel

Engineering Industry Day

March 20, 2019

<https://journeeindustrie.epfl.ch>

Innovation, Industry Exhibition
Lausanne



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

State Secretariat for Education, Research and Innovation SERI
swissnex China

Innosuisse

Swiss Federal Office of Energy SFOE



Switzerland.

Aging & Cognition 2019

April 24-26, 2019

<http://eucas.org/ac2019/>

Cognitive Neuroscience, Healthy Aging
Zurich

Swiss Biotech Day

May 7, 2019

<http://swissbiotechday.ch/>

Finance, Production, Licensing
Basel

World Immune Regulation Meeting

April 6-9, 2019

<http://www.wirm.ch/>

Immune Activation, Autoimmunity
Davos

Conference of Science Journalists

July 1-5, 2019

<https://www.wcsj2019.eu/>

Good, Fair, Critical Reporting
Lausanne

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](http://swissnex.ch/) in collaboration with the [swissnex Network](http://swissnex.ch/).

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