



# Science-Switzerland, April-May 2018

News on Swiss science, technology, education and innovation



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## 1. Policy

### CHF 11.4 Billion for Environmental Protection

(admin.ch, April 26, 2018)

In 2016, environmental protection expenditure was CHF 11.4 billion, i.e. 1.7% of the gross domestic production (GDP). It has risen 5% since 2008. Two-thirds were allocated to waste and wastewater management. Overall expenditure on these two domains fell by 5% while expenditure for other environmental activities rose by 34%. These initial estimates come from the environmental accounting compiled by the Federal Statistical Office (FSO).

<http://swissinnovation.org/news/web/2018/01-180426-55>

### State Secretary Mauro Dell'Ambrogio on Exploratory Mission to Iran

(admin.ch, May 07, 2018)

In the wake of the signing of a road map for achieving closer bilateral relations between Switzerland and Iran in 2016, Mauro Dell'Ambrogio, State Secretary for Education, Research and Innovation, lead a scientific exploratory mission to Iran from 5 to 9 May. Several visits to universities in Tehran and Isfahan enabled participating Swiss researchers to explore cooperation opportunities with Iranian partners. The programme also included official meetings at the Ministry of Health and Medical Education and the Ministry of Science, Research and Technology where the participants signed joint statements. Relations between Switzerland and Iran in the field of research are good, but modest in terms of quantity. Cooperation between Swiss and Iranian researchers takes place mainly in the context of direct contacts between individual researchers and universities. In recent years, several Swiss universities have signed cooperation agreements with Iranian institutions.

<http://swissinnovation.org/news/web/2018/01-180507-f7>

## 2. Education

### 400 of Europe's University Leaders Met in Switzerland

(University of Zurich, April 04, 2018)

The European University Association's Annual Conference was hosted by the University of Zurich for the first time. The EUA is the largest and strongest association of European universities, with 850 members. Around 400 presidents, rectors, and other university leaders came together to spend three days debating the current and future role of universities in society. The title of this year's conference was "Engaged and responsible universities shaping Europe". The ten presentations and discussion events focused on the role and the significance of universities in society and the contributions they can make to tackling current challenges. Examples are social inequality, demographic change, digitalization and automation, and migration. Other aspects are increasing populism undermining people's trust in science, and political conflicts that test democracy and Central European values.



<http://swissinnovation.org/news/web/2018/02-180404-84>

## Children's University to Promote Science

(University of Basel, April 09, 2018)

In April the Children's University of the University of Basel started in the Center for Teaching and Research in Basel and in the Cinema Oris in Liestal. Five exciting lectures awaited the 8 to 12-year-old girls and boys and were open to them without preconditions. The Children's University 2018 offers a varied lecture program with a total of five 30-minute lectures. Professors at the University of Basel speak in understandable language about topics they have been thinking about and researching for years. The Children's University is not about the transfer of knowledge, which is taught to the children already at school. The children's university wants to arouse children's curiosity about scientific research and their enthusiasm for science, as well as their willingness to learn.



<http://swissinnovation.org/news/web/2018/02-180409-5b>

## ETH Zurich Receives 10 ERC Advanced Grants

(ETH Zurich, April 10, 2018)

Ten professors from ETH Zurich have secured prestigious ERC Advanced Grants. Three of them are receiving it for the second time. From ETH Zurich's perspective, it is not only the result of the current round of funding that is impressive, but also the high success rate: of the 18 applications submitted, 12 reached the second evaluation stage, and more than half were ultimately successful. To put ETH Zurich's outstanding achievement into context: only 269 applications out of a total of 2167 received an ERC Advanced Grant. This exceptional result is close to the 2009 record, when ETH Zurich researchers won 11 Advanced Grants. This ranks ETH Zurich as the third most successful institution in this research competition after the French CRNS (15 grants) and Oxford University (14 grants).

<http://swissinnovation.org/news/web/2018/02-180410-10>

## ETH Zurich School for Continuing Education

(ETH Zurich, April 13, 2018)

ETH Zurich is launching the School for Continuing Education. The 17 MAS, 8 DAS and 20 CAS courses currently offered will be integrated into four categories and further improved. Additionally, around 20 new continuing education programmes are being developed and will be added to the course catalogue within the 1-2 years. "Our aim is clear: we want to offer an attractive, high-quality programme. In order to do so, we're creating new structures and improving collaboration within ETH. The new school and the targeted expansion of the course catalogue are also intended to improve the visibility of ETH's continuing education programme," explains Paolo Ermanni, Vice-Rector for Continuing Education at ETH Zurich.



<http://swissinnovation.org/news/web/2018/02-180413-b3>

## Revised State Examination for the Federal Vocational Baccalaureate

(SERI News, April 18, 2018)

The State Examination for the Federal Vocational Baccalaureate (SE-FVB) allows learners to obtain the federal vocational baccalaureate without having to attend a recognized preparatory course. This is particularly beneficial for those who work and rely on flexible forms of learning. The SE-FVB offers them a further means of obtaining the qualification needed to enroll in a Swiss university of applied sciences and subsequently obtain a higher education qualification. The SE-FVB will be upgraded from 2019: the examination requirements will be aligned with those set out in the Federal Vocational Baccalaureate Ordinance (FVBO) and corresponding Core Syllabus for Preparatory Courses for the Federal Vocational Baccalaureate (Core-FVB). Instead of lesson plans, guidelines and sample tests will be provided. In addition, the exam will now be organized and conducted by SERI.



<http://swissinnovation.org/news/web/2018/02-180418-1c>



## Seven Marie Curie Fellowships for the University of Bern

(University of Bern, April 30, 2018)

Each year, the European Commission awards Marie Skłodowska-Curie Individual Fellowships to post-doctoral researchers. The individual fellowships are awarded under Marie Skłodowska-Curie Actions (MSCA) as part of the EU Framework Programme for Research and Innovation, Horizon 2020. The aim of the funding programme is to improve the quality of research training and career development for young researchers by supporting a project at a foreign university. At the end of January 2018, the European Commission announced that it was awarding a total of 1348 MSCA Individual Fellowships. Seven went to researchers at the University of Bern. The University of Bern's success rate is up on the previous year – and at 26%, it is considerably higher than the Swiss average (17%). Europe-wide, the rate is even slightly lower still at 15%.



<http://swissinnovation.org/news/web/2018/02-180430-3e>

## Enrollment at Switzerland's Top Tech Universities Shoots Up

(swissinfo.ch, May 05, 2018)

ETH Zurich and EPFL are attracting a record number of students, particularly in the fields of information technology and engineering sciences. The two institutes enrolled 31,293 students and doctoral candidates in 2017 according to the ETH Zurich annual report. That represents an additional 1,000 students compared to 2016 and 10,000 more than the previous decade. The top-tier universities are widely credited for their contribution to Switzerland's global competitiveness. Last year they concluded more than 500 new cooperation agreements with the private sector, according to the report. The schools were also the birthplace of 600 spin-offs and on average, one patent application was filed every 48 hours in 2017.



<http://swissinnovation.org/news/web/2018/02-180505-67>

## 3. Life Sciences / Health Care

### Antibodies Effective Against Flu Viruses

(University of Zurich, April 03, 2018)

University of Zurich researchers studied different kinds of antibodies and found that a subtype called IgA1 was the most effective against the flu virus. Its special tail blocks the part of the virus that allows it to attach to the cells it wants to infect. This suggests IgA1 works through two types of immune activity. Firstly, through acquired immunity, which is associated with antibodies that specifically recognize pathogens. Secondly, through innate immunity via the sialic acids at the other end of the molecule, which is more a broad-ranging attack. IgA antibodies thus attach themselves to flu viruses in two places at once. Since IgAs are hard to work with, the researchers believe research should focus on antibodies that are easier to produce. Their idea is to graft the tail of the IgA1 onto an IgG-type antibody.



<http://swissinnovation.org/news/web/2018/03-180403-18>

### New Therapeutic Vaccine Technology Developed

(University of Zurich, April 04, 2018)

Scientists from the Universities of Bern, Zurich and Oxford as well as the Latvian Biomedical Research & Study Centre have developed a therapeutic vaccine technology based upon enhanced virus like nanoparticle conjugates. This new enhanced vaccine platform has been engineered to incorporate a universal T-cell epitope for adaptive immune activation and repetitive antigen presentation in a nanoparticle. This technology





enables the advances in biologic medicines to be translated for use in companion animals. The team of scientists developed breakthrough therapies for insect-bite hypersensitivity in horses and atopic dermatitis in dogs by displaying either equine IL-5 or canine IL-31 on the immunologically optimized virus-like particles. Thus, they were able to generate vaccines that induced clinically effective levels of neutralizing target specific anti-cytokine antibodies, which resulted in dramatically improved disease symptoms in immunized animals.  
<http://swissinnovation.org/news/web/2018/03-180404-ce>

## Using a By-product of the Beer-making Process to Lower the Sugar Content of Food

(EPFL, April 05, 2018)

EPFL spin-off Embion Technologies has developed a soluble fiber powder made from barley residue. This by-product of the beer-making process can be used to reduce the sucrose content of a wide range of foods. The soluble fiber powder contains mainly beta-glucan, an oligosaccharide that helps lower cholesterol and blood sugar levels and reduce the risk of cardiovascular diseases. Several major food producers have already expressed interest in this product. Moreover, the startup's technique makes it possible to extract other compounds from barley residue as well. Let it be for food, cosmetics or pharmaceutical products.

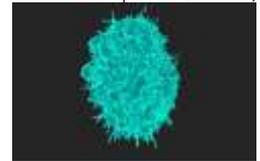


<http://swissinnovation.org/news/web/2018/03-180405-ba>

## Gene Surgery for Immune Cells

(University of Basel, April 05, 2018)

Therapies of T-cells, a certain type of lymphocytes, are a promising tool in the fight against cancer. A method developed by researchers from the University and University Hospital of Basel could now prove to be a first step toward genetically reprogramming human T-cells. It enables the quick and efficient modification of genes in living T-cells of mice. For this, RNA molecules and a Cas9 proteins (known from the CRISPR-Cas9 technique) are inserted into living T-cells. Two days later, the cells are transferred back into recipient mice, where they appear to be fully functional, they multiply, and behave as expected during an infection. On top of that, the Basel scientists also succeeded in using the method to repair a mutation that causes severe autoimmune diseases in mice.



<http://swissinnovation.org/news/web/2018/03-180405-db>

## Protective Role of Oestrogens on Type 2 Diabetes

(University of Geneva, April 05, 2018)

Pre-menopausal women are less likely than men to develop type 2 diabetes. After menopause, the trend reverses, highlighting the protective role of oestrogens. Oestrogen administration to post-menopausal female mice led scientists from University of Geneva and Geneva University Hospitals to identify an increased tolerance to glucose, which is correlated to a lower risk of diabetes. The effect on glucagon, and especially on GLP1 (an intestinal, pancreatic hormone increasing insulin production) was not expected. These results confirmed the sensitivity to oestrogen of pancreatic alpha cells, which then secrete less hyperglycemic glucagon, but more GLP1. Also released by the intestine during the absorption of meal, the hormone stimulates the secretion of insulin, inhibits the secretion of glucagon and induces the feeling of satiety. The role of GLP1 represents a major explanation of the protection of women regarding diabetes onset before menopause.



<http://swissinnovation.org/news/web/2018/03-180405-12>

## Ebola Mutation Rate was Overestimated

(ETH Zurich, April 05, 2018)

When Ebola developed into an epidemic in West Africa in the year 2014, scientific evidence based on pathogen samples and computer simulations had suggested that the virus would change on average every 9.5 days, an exceptionally high mutation rate compared to the previously known rate for Ebola. In later studies,



however, researchers evaluating larger numbers of samples could not confirm the high rate. Scientists from ETH Zurich's Department of Biosystems Science and Engineering have now shown that the wrongly estimated mutation rates were a result of the limited number of virus samples available at the time, in combination with the computer models used. More advanced models should be able to make precise estimates even with very little genetic data in the future.

<http://swissinnovation.org/news/web/2018/03-180405-cd>

## Marker Substance Makes NMDA Receptors on Surface of Nerve Cells Visible

(ETH Zurich, April 12, 2018)

Researchers from ETH Zurich, University Hospital Zurich and the University of Münster developed a marker substance that makes NMDA receptors on the surface of nerve cells visible via positron emission tomography (PET). NMDA receptors are promising pharmaceutical targets for the treatment of various brain diseases such as Alzheimer's, Parkinson's, multiple sclerosis, schizophrenia and depression. The marker substance ('PET tracer') should help in the research of such diseases. Thus far, the substance has only been tested on rats in the laboratory. However, the researchers aim to soon use this PET tracer in clinical studies in order to investigate the role of NMDA receptors in brain diseases and also to determine the therapeutic potential of new NMDA candidate drugs. The PET tracer could be particularly useful in future for determining the correct dosage of drugs that influence the activity of NMDA receptors.

<http://swissinnovation.org/news/web/2018/03-180412-0b>

## Cultivating Cartilage from Stem Cells

(University of Basel, April 16, 2018)

Stable joint cartilage can be produced from adult stem cells originating from bone marrow. This is made possible by inducing specific molecular processes occurring during embryonic cartilage formation, as researchers from Basel report. Certain mesenchymal stem/stromal cells from the bone marrow of adults are considered extremely promising for skeletal tissue regeneration. These adult stem cells usually develop into cartilage tissue which later naturally remodels into bone tissue. Even if the stem cells are induced to differentiate into cartilage cells, they spontaneously mature into a so-called "hypertrophic" state, ultimately leading to the formation of bone tissue. Prof. Dr. Ivan Martin's research group at the Department of Biomedicine has now been able to demonstrate that by forcing certain molecular events occurring during the embryonic development of articular cartilage it is possible to generate stable cartilage tissue from adult human mesenchymal stem cells. This can be achieved by inhibiting the signaling pathway of a specific protein (Bone Morphogenetic Protein, BMP).



<http://swissinnovation.org/news/web/2018/03-180416-d8>

## New Way to Cancer Drugs

(startupticker.ch, April 19, 2018)

New immune oncology drug molecules are expected to result from the partnership of LeadXpro and InterAx, which have both developed new approaches for drug discovery. LeadXpro capitalizes on our knowledge and experience in membrane protein structural biology and on the facilities of the Paul Scherrer Institute, with access to the 3rd generation synchrotron SLS and the Free Electron Laser SwissFEL. Core expertise beyond X-ray includes single particle electron microscopy and electron diffraction. InterAx has built a unique drug discovery platform for identification of functionally optimized drugs with improved efficacy and reduced side effects for the largest class of human receptors: The G protein-coupled receptors. The discovery platform consists of three core assets: Virtual screening, state-of-the-art cell-based signaling assays including IP-protected protein-based biosensors, and mathematical modelling for identification of most informative drug screening assays and prediction of in vivo effects.



<http://swissinnovation.org/news/web/2018/03-180419-be>



## Cultural Context of End-of-Life Decisions

(University of Zurich, April 20, 2018)

Today, almost two thirds of deaths in Switzerland are foreseeable due to old age or terminal illness. The behavior of people in Switzerland facing death varies according to their linguistic region. Researchers from the universities of Zurich and Geneva have now demonstrated how cultural context influences medical practice when it comes to end-of-life decisions. The involvement of patients in the decision-making process was found to be significantly lower in Ticino than in the rest of the country. The researchers suspect that the reason for this difference is a more family-based culture in Ticino. Interesting to note, that French-speaking Switzerland resembles German-speaking Switzerland more than it resembles France, which is in line with the increased role of patient autonomy in Switzerland.

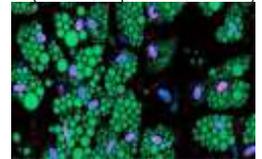


<http://swissinnovation.org/news/web/2018/03-180420-e2>

## EPFL Part of International Effort to Create Human Cell Atlas

(EPFL, April 20, 2018)

The Chan Zuckerberg Initiative (CZI) and DAF, an advised fund of Silicon Valley Community Foundation, have awarded a research grant to the lab of Professor Bart Deplancke at EPFL's Institute of Bioengineering supporting the development of a web-based platform to analyze the transcriptome of single cells. With the grant, the genetics platform becomes part of the network of open computational tools for the Chan Zuckerberg's project Human Cell Atlas (HCA). The HCA is an international effort to map every type of cell in the healthy human body as a resource for studies of both health and disease. It aims to revolutionize the understanding of human anatomy and cell biology and shall provide scientists with a fundamental source to better understand how healthy cells work, and what goes wrong when disease strikes.



<http://swissinnovation.org/news/web/2018/03-180420-c4>

## Entire Music Album Stored on DNA

(ETH Zurich, April 20, 2018)

Robert Grass from ETH Zurich and Reinhard Heckel from Rice University, translated the entire music album Mezzanine by Massive Attack's digital audio into genetic code. To keep data volumes manageable, the researchers worked on the project using a music file which they had compressed to 15 megabytes using the Opus coding format. A US company is now in the process of producing 920,000 short DNA strands, which taken together contain all of Mezzanine's information. TurboBeads, an ETH spin-off, will then pour these molecules into 5,000 tiny (nanometre-sized) glass spheres, each of which contains part of the information. The DNA can be removed from the glass beads at any time, allowing the use of DNA sequencing to read the stored music file and play it back on a computer.

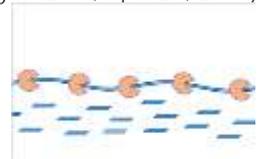


<http://swissinnovation.org/news/web/2018/03-180420-48>

## New Functions of Small RNAs

(University of Bern, April 23, 2018)

Researchers keep discovering new functions of small RNAs. For instance, they can be used as a defense mechanism against viruses or self-replicating genome invaders. These tiny pieces of RNA are often produced by a cleavage of long precursors by so called Dicer proteins. Researchers from the University of Bern have found that some Dicers acquired a unique and as yet unknown feature that allow them to cleave the RNA precursors in a very specific way, resulting in small RNAs that work much more efficiently. The research could lead to new insights into the regulation of cellular communication and might open up as yet uncharted opportunities for future protein engineering.



<http://swissinnovation.org/news/web/2018/03-180423-fd>



## Special Bed for Children Suffering from Sleep-Related Rhythmic Movement Disorder

(ETH Zurich, April 25, 2018)

A special bed developed at ETH Zurich – the Somnomat – was used in a study with children suffering from sleep-related rhythmic movement disorder (RMD), which takes different forms: Some patients move their heads violently back and forth, others go on all fours at night and hit their heads against the bed post or the wall. For Rachel van Sluijs and her colleagues Quincy Rondei and Elisabeth Wilhelm, the two-week study meant little sleep. Each of the children spent three consecutive nights in the sleep laboratory. First, they slept in a normal bed to get used to their surroundings. The second and third night they spent in the Somnomat: one night with and one night without rocking movement. Rachel van Sluijs is optimistic that the data will advance the development of the Somnomat as well as research into sleep-related RMD.



<http://swissinnovation.org/news/web/2018/03-180425-f5>

## «Egotistical» People Don't Use Brain Area Enabling Us to Imagine Distant Future

(University of Geneva, April 25, 2018)

With the help of neuro-imaging, scientists from University of Geneva found that «egotistical» people do not use the area of the brain enabling us to imagine the distant future. In «altruistic» individuals, on the other hand, the same area is alive with activity. The absence of heightened activity indicates the absence of projection and the fact that the individual does not feel concerned by what will happen after his or her death. These outcomes demonstrate the importance of being able to think about the distant future to adapt one's behavior to the future constraints of the world. “We could imagine a psychological training that would work on this brain area using projection exercises,” suggests Tobias Brosch. “In particular, we could use virtual reality, which would make the tomorrow's world visible to everyone, bringing human beings closer to the consequences of their actions.”

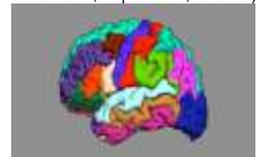


<http://swissinnovation.org/news/web/2018/03-180425-4f>

## Psychosis to Appear in Cortical Folding

(University of Basel, April 25, 2018)

Researchers from University of Basel in collaboration with the Psychiatric University Clinics Basel, Western University and Lawson Health Research Institute (Ontario) examined the question of whether changes in the anatomical structure of brain networks can already be detected in people with an increased risk of psychosis. The researchers focused on cortical folding, known as gyrification: they examined how the folds in various regions of the brain interact with each other, and whether this interaction is impaired in high-risk patients. In comparison to the healthy control group, the folding in individual regions of the brain in patients with an initial psychotic episode and those with a later psychosis transition showed reduced integration and increased segregation. The researchers also showed that using the cortical connectivity to predict which high-risk patients would suffer from psychosis and which would not, enabled predictions to be made with more than 80% accuracy.



<http://swissinnovation.org/news/web/2018/03-180425-88>

## Statistical Methods and Software to Analyze Data from Human Cell Atlas

(University of Zurich, April 26, 2018)

The aim of the Human Cell Atlas (HCA) project is to create a shared, open reference atlas defining all cells in the healthy human body. Mark Robinson from University of Zurich received a grant from the Chan Zuckerberg Initiative (CZI) supporting it. Robinson focuses on analyzing large single-cell datasets, either from single-cell RNA sequencing or single-cell cytometry. His team develops statistical methods and software tools to prepare and interpret high-throughput data sets in a robust way and create benchmarks that others can use





in their work. For the CZI project, they are specifically developing tools to unravel cell-type-specific changes in cell state, e.g. the activation status of immune cells. “For example, our methods will discover and annotate biologically interesting cell types or uncover molecular features that can be used to predict whether a patient will respond to therapy,” adds Robinson.

<http://swissinnovation.org/news/web/2018/03-180426-6b>

## How Embryonic Cells Find Their Identity

(University of Basel, April 26, 2018)

A research group from University of Basel has investigated more closely how a single embryonic cell develops into a heart, nerve or blood cell. In their study, the team isolated around 40,000 cells and 25 different cell types that form in zebrafish over a period of nine hours. To investigate the maturation of these cells, they analyzed the RNA, a copy of the genetic material. The results show that the genetic program that a cell follows on the way to maturity is by no means set in stone. So far, it was assumed that developing cells follow a predetermined path. The study now suggests that signals from the environment can have such a strong influence on the cells, that they leave the initial trajectory and change their path, thus taking on a new identity.

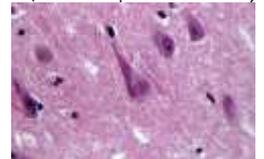


<http://swissinnovation.org/news/web/2018/03-180426-21>

## Alzheimer's: Breaking the “Code of Tau”

(EPFL, April 30, 2018)

Tau protein is one of the major targets in Alzheimer’s disease. It has become one of the most actively pursued therapeutic targets in both academic and commercial research. But one of the major challenges is the ability to isolate and study the numerous post-translational modifications (PTMs) that Tau undergoes before it becomes toxic. This so-called “code of Tau” is now about to be cracked by EPFL scientists. Their method is based on building proteins from polypeptide fragments that are either produced chemically or expressed in cells and then assembled sequentially in a test tube, almost like Legos. This “semisynthetic” strategy offers great flexibility for incorporating one or several modified amino acids at the desired sites in each building block. The method also preserves the native sequence of Tau, including parts that which have recently been shown to play critical roles in its disease-related processing.



<http://swissinnovation.org/news/web/2018/03-180430-49>

## Efficient "Double-Bridged Peptides" Bind Disease Targets

(EPFL, April 30, 2018)

Peptides are short chains of amino acids that can bind to proteins and change their function. The peptides’ highly efficient binding, combined with their small size and high stability, make them ideal for drug therapies. However, using peptides as drugs faces two challenges: Binding affinity and peptide stability. EPFL scientists addressed both challenges by developing the new peptide format that they call “double-bridged peptides”. These are chains of 10-15 amino acids, four of which are chemically connected by two bridges. Each bridge links a pair of two cysteine amino acids – four in total. Because the four cysteines can be placed in many different ways along the sequence of amino acids, the double-bridging strategy allowed the researchers to generate an enormously large number of structurally diverse peptide architectures.



<http://swissinnovation.org/news/web/2018/03-180430-3b>



## Substance in Chinese Medicine Can Cause Cardiac Arrhythmia

(University of Basel, May 02, 2018)

Extracts of the plant *Evodia rutaecarpa* are used in Traditional Chinese Medicine for a variety of symptoms, such as headaches, nausea and vomiting as well as menstrual complaints and ulcers in the mouth area. Researchers at the University of Basel investigated the effect of *Evodia* extracts in collaboration with the University of Vienna. The natural substances dehydroevodiamine (DHE) and hortiamine isolated from the plant proved to be very potent inhibitors of potassium channels in the heart muscle. If these channels are blocked, the excitation processes in the heart muscle change, which can trigger severe heart rhythm disturbances – so-called Torsade de pointes (TdP) – and ventricular fibrillation and lead to sudden cardiac death. Further investigations showed that the two natural substances cause oscillations in the heart muscle cells even in very low concentrations, which can cause cardiac arrhythmia.



<http://swissinnovation.org/news/web/2018/03-180502-eb>

## Hot Vapor Causes Severe Burning of Lower Skin Layer

(Empa, May 08, 2018)

When hot steam hits the skin it quickly causes burns, even if the wound looks superficially harmless. The uppermost skin layer cannot protect against water vapor - the skin pores are larger than water molecules and thus let them pass freely. Only in the lower skin layer the steam condenses, releases its thermal energy, and severely damages the lower layer. This is what Empa's Laboratory for Biomimetic Membranes and Textiles has found, using a special kind of spectroscopy during experiments with pigskin. The scientists also explain that steam burns have to be cooled even longer than conventional burns, since the skin releases heat very slowly. As a result, the heat can act on the inner tissues for longer and damage it even more.

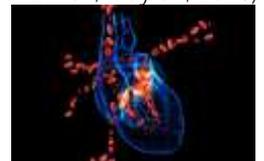


<http://swissinnovation.org/news/web/2018/03-180508-84>

## Computer-Designed Customized Regenerative Heart Valves

(University of Zurich, May 09, 2018)

Tissue engineering, which involves growing replacement parts in the laboratory, forms a key part of research in regenerative medicine. The parts can be used to replace defective cells and tissues and restore their normal functioning. The replacements have significant advantages over artificial implants: They do not cause immune reactions and can grow and regenerate themselves. An international consortium led by University of Zurich Professor Simon P. Hoerstrup has reached a milestone towards being able to treat heart patients using new heart valves cultured from human cells: As part of the project LifeValve, they, using computer simulations, succeeded in individually predicting how well cultured heart valves would grow, regenerate, and function in large animal models (sheep). In particular, changes to the structure of the heart valve that occur in the body during the dynamic regeneration process can be predicted by computer simulations and anticipated accordingly.



<http://swissinnovation.org/news/web/2018/03-180509-52>

## Advanced Proton Therapy Against Cancer

(Paul Scherrer Institute, May 14, 2018)

The most modern irradiation facility at the Center for Proton Therapy (CPT) of the Paul Scherrer Institute (PSI) – Gantry 3 – is now open. The main benefit the collaborators cite with the arrival of Gantry 3 is shorter waiting times for patients with cancer. With pioneering contributions such as the development of a new irradiation technique – so-called spot scanning – PSI researchers revolutionized proton therapy. With the introduction of this technique, it has become so precise and low-risk that doctors in ever more countries are using proton therapy to treat cancer patients. This is because, with spot scanning, even tumors in parts of



the body that are close to radiation-sensitive, critical structures can be treated. Among these are, for example, certain brain tumors, tumors in the ear-nose-and-throat area, tumors near the spinal cord, and several types of connective tissue and bone tumors.

<http://swissinnovation.org/news/web/2018/03-180514-a9>

## Malaria Detectable in Olfactory Cocktail

(ETH Zurich, May 15, 2018)

Malaria is still a deadly disease in tropical and subtropical regions. In many cases the infected host carries the pathogen without presenting any external symptoms. ETH Zurich researchers working with collaborators at the International Centre for Insect Physiology and Ecology in Nairobi, examined volatile chemicals released from the skin of Kenyan children and identified characteristic patterns for both acute and asymptomatic malaria infections. The researchers identified volatile biomarkers that helped to clearly identify whether a child is infected with the malaria parasite. In addition, the odor profiles were found to be significantly different in the case of acute and asymptomatic infections. They were able to detect the pathogen extremely reliably even when it was only present in minute quantities and was not yet observable under the microscope. Even for asymptomatic infections, the detection rate in the study was close to 100%.



<http://swissinnovation.org/news/web/2018/03-180515-a0>

## Cellular Valve Structure Determined

(University of Zurich, May 16, 2018)

Human cells are enclosed by membranes and are in osmotic equilibrium with their environment. If the concentration of solute molecules (osmolarity) in the fluid surrounding the cells decreases, cells start to swell; in extreme cases, this can result in the cells bursting. To avoid this, cells activate volume-regulated chloride channels (VRACs) of the LRRC8 protein family. If the cell volume increases as a result of inflowing water, these cellular valves open to allow the negatively charged chloride ions and uncharged osmolytes to flow out, returning the cell to its original state. The molecular make-up of VRACs and the basis for their selectivity has remained elusive, but biochemists from University of Zurich have, using cryo-electron microscopy and X-ray crystallography, determined the detailed molecular structure of a VRAC. In addition, the researchers analyzed the functional properties of the protein through electrophysiological techniques.



<http://swissinnovation.org/news/web/2018/03-180516-d2>

## Trojan Horse for Modified Cell Functions

(University of Basel, May 22, 2018)

In order to accelerate biochemical reactions, living organisms rely on enzymes. Each natural enzyme has its own particular task, but artificially created catalyst, in contrast, can promote many other chemical processes. For this reason, they offer great potential to modify cell functions or to create drugs from harmless precursors in the cell itself. Researchers from the Universities of Basel, Geneva and the ETH Zurich have now been able to develop a special enzyme that can penetrate a cell, accelerate the release of a hormone, and activate a defined gene switch. This Trojan horse-like enzyme is a biocompatible protein with an incorporated metal fragment. It was the first time that an artificial so-called metalloenzyme could penetrate a mammalian cell.



<http://swissinnovation.org/news/web/2018/03-180522-ae>



## 4. Nano / Micro Technology / Material Science

### Smart Wound Band-Aid

The idea of being able to see through a wound dressing gave rise to the project Flusitex: Fluorescence sensing integrated into medical textiles. Researchers from Empa teamed up with ETH Zurich, CSEM and the University Hospital Zurich to develop a hightech system that is supposed to supply the nursing staff with relevant data about the condition of a wound. A smart wound dressing would mean a gentler treatment for patients, less work for the nursing staff and, therefore, lower costs. According to the researchers, it might one day even be possible to read the signals of the smart wound dressing with the aid of a smartphone camera. <http://swissinnovation.org/news/web/2018/04-180411-b0>

(Empa, April 11, 2018)



### Measuring Light with the Thinnest Guitar String

EPFL scientists have engineered a tiny guitar string that vibrates 1 billion times when plucked, or at 1 MHz for tens of minutes. For a standard guitar this is equivalent to playing a note for an entire month. The team, however, is not composing new music with this so-called nanostring, but they want to use it to detect light. These extremely low loss nanostrings are capable of measuring very weak light forces. By coupling a nanostring to an optical waveguide, the strings can “hear” the gentle sound of photons flowing in a laser beam, as they impart a tiny radiation pressure force to the string. Another intriguing application of the string is the detection of local disturbances at the level of attonewtons – one billionth of a billionth of a newton –, which is equivalent to the gravitational pull between two human beings. <http://swissinnovation.org/news/web/2018/04-180412-90>

(EPFL, April 12, 2018)



### Diamonds in Meteorites Indicate Planetary Origin

In 2008 an asteroid entered Earth’s atmosphere and exploded 37 km above the Nubian Desert in Sudan. The asteroid, now known as “2008 TC3”, was just over four meters in diameter. When it exploded, it scattered multiple fragments across the desert, which were gathered and catalogued. These meteorites are mostly ureilites, a rare type containing clusters of nano-sized diamonds. An unanswered question, so far, has been the planetary origin of 2008 TC3 ureilites. Scientists from EPFL, with colleagues in France and Germany, have studied large diamonds in some of these meteorites by using a combination of advanced transmission electron microscopy techniques and discovered that the asteroid came from a planetary “embryo” whose size is between Mercury to Mars. <http://swissinnovation.org/news/web/2018/04-180417-72>

(EPFL, April 17, 2018)



### Rapid-Hardening Concrete

Sabiha Gökçen International Airport in Istanbul is one of the fastest growing airports in the world. Due to its growing capacity, large parts of the runway now need to be replaced. The work is being carried out in 5-hour night shifts, reconstructing up to 100 square meters of runway per night. Thanks to concrete developed by Concretum, a spin-off of ETH Zurich, flight operations can continue without interruptions. The rapid-hardening concrete can be processed in around 90 minutes and hardens to a load-bearing surface in just one hour, allowing aircraft to take off and land normally on the new concrete surface the following morning.

(Switzerland Global Enterprise, April 17, 2018)





The new concrete pavements have a lifespan of around 40 years, at the end of which the concrete can be fully recycled. This creates a closed construction material cycle, in contrast to asphalt.

<http://swissinnovation.org/news/web/2018/04-180417-26>

## New Materials for Sustainable, Low-Cost Batteries

(ETH Zurich, April 30, 2018)

The electrolyte fluid in aluminium batteries is extremely aggressive and corrodes stainless steel, and even gold and platinum. Therefore, scientists are searching for corrosion-resistant materials for the conductive parts of these batteries. Scientists from ETH Zurich and Empa have found what they are looking for in titanium nitride, a ceramic material that exhibits sufficiently high conductivity. Another new material the scientists found can be used for the positive electrode (pole) of aluminium batteries. Whereas the negative electrode in these batteries is made of aluminium, the positive electrode is usually made of graphite. The new material they found that rivals graphite in terms of the amount of energy a battery is able to store. The material in question is polypyrene, a hydrocarbon with a chain-like (polymeric) molecular structure.



<http://swissinnovation.org/news/web/2018/04-180430-db>

## Window Glass Keeps out Heat and Allows Clear View

(Empa, May 07, 2018)

The first prototypes of a high-tech window glass, that keeps the heat away and prevents glare from the sun in summer and distributes the little light optimally in the room in winter, are produced on the laser system at Empa. A PhD student from EPFL, used Empa's highly complex laser system to produce a so-called master form with a microstructured surface with the precision laser. Micro mirrors are then evaporated into these micro-grooves and encapsulated in a polymer film. This film can then be easily inserted into a conventional double-glazed window. The arrangement of so-called «Compound Parabolic Concentrator» (CPC) lenses is used to optimally reflect sunlight with low restrictions in visibility. «The glass can reduce the consumption of thermal energy from heating or air conditioning by 10 to 20 percent,» says Patrik Hoffmann from Empa.



<http://swissinnovation.org/news/web/2018/04-180507-c8>

## Nanoscale Valves

(ETH Zurich, May 22, 2018)

Valves are commonly used to mechanically close and open flows in pipelines. When aiming at controlling the flow of nanoparticles, however, the standard mechanical method does not work. In order to regulate nanoparticle flows in ultrathin channels, scientists from ETH Zurich created tiny valves working with electric forces. The microscopic channels are narrowed at the desired valve location and equipped with electrodes on both sides of the bottleneck. By activating the electrodes, the electrical field is changed, which leads to forces acting on the nanoparticles. Depending on the liquid, this force pushes the particles through the bottleneck or keeps them inside. As a proof of concept, the scientists built a silicon chip with a junction and three valves where a single particle – a virus, for example - can be captured and examined.



<http://swissinnovation.org/news/web/2018/04-180522-3a>



## 5. Information & Communications Technology

### Digital Self-Measurement of Health Data

(Zurich University of Applied Sciences [ZHAW], April 05, 2018)

New technologies, increased physical and health awareness, and the changed communication behavior with smartphones is driving the trend towards digital self-measurement. "The body is seen as a result of personal achievement and no longer as fate," said Ursula Meidert from ZHAW. In addition to self-optimization, however, it is often just curiosity why people, at least for a while, measure themselves. Most of the downloaded health apps will be deleted after just a few days or weeks. Nonetheless, digital self-measurement in the field of health promotion and prevention has great potential, especially through playful and motivating elements trackers and apps can help to walk more or eat healthier. Also research could benefit from this huge amount of data. With little effort, patterns of behavior of entire population groups could be analyzed.



<http://swissinnovation.org/news/web/2018/05-180405-51>

### Using Big Data to Combat Cyberattackers

(ETH Zurich, April 06, 2018)

Cyberattacks pose a major risk for companies. ETH Zurich spin-off Exeon Analytics has developed a piece of software that uses big data to help companies protect themselves against data theft. David Gugelmann, founder and CEO of Exeon Analytics, describes the problem: "Cyberattackers no longer have to hide, as they blend in easily with the millions of other normal web activities." The ExeonTrace algorithm changes this: it uses machine learning to restore a user's true internet activities and identifies an attacker's covert actions among millions of data points. Thus, cyberattackers can be blocked early before data thefts happen. The software developed by Exeon Analytics offers companies another advantage, however: "Our analytics help customers understand what is happening within their own IT networks," says Gugelmann.



<http://swissinnovation.org/news/web/2018/05-180406-c1>

### Algorithms Control Newsfeed on Social Media

(EPFL, April 19, 2018)

When you click on one link rather than another, your choice will influence the content you will be shown by various websites further down the line. The algorithms used by social media platforms learn what our preferences are and provide more and more content that matches our interests. The risk is that we will never be shown anything that goes against our opinions, and this can distort our view of the world. EPFL researchers have developed a solution that would make users' personalized content more balanced, and their project has already generated interest among human rights campaigners.



<http://swissinnovation.org/news/web/2018/05-180419-69>

### Health-Related Data at a Safe Place

(ETH Zurich, April 24, 2018)

As digitalization continues to progress, personal data is becoming a precious resource. However, as the recent scandal involving Facebook and Cambridge Analytica has shown, we have largely relinquished control of our data. The EU General Data Protection Regulation will go into effect next month. Thanks to its article on data portability, everyone will be able to decide whether and with whom they share data and how it may be used. MIDATA is a non-profit cooperative, operating a data platform, which was developed at ETH Zurich and Bern University of Applied Sciences. On this platform, people can collect their health data. Further, they can grant research projects access to their datasets in order to actively contribute to medical research.



<http://swissinnovation.org/news/web/2018/05-180424-a3>



## Fake News Revealed Through Artificial Intelligence

(Università della Svizzera italiana, May 03, 2018)

Social media has become one of the main sources of news. As the past elections in the United States and the United Kingdom have shown, however, they have also become a platform for sharing forged information, or “fake news”. This is a problem that undermines the very heart of the democratic system, blurring the ability of citizens to distinguish between fiction and reality. Researchers at Università della Svizzera italiana have devised and developed a new method – based on algorithms and artificial intelligence – that could prove to be the most effective solution to the spreading of fake news through the Internet. Instead of focusing on content, the new system analyses the processes that generate news items, in automated fashion, identifying models useful to distinguish real news from fake ones.



<http://swissinnovation.org/news/web/2018/05-180503-2c>

## 6. Energy / Environment

### Water Quality Reflected in Fish Genes

(Eawag, April 04, 2018)

The regulation of gene expression in living organisms is the mechanism by which the various proteins are synthesized in cells. This mechanism enables organisms to react to pollution from harmful chemicals to protect their bodies. To observe these changes in the aquatic ecosystem, scientists from Eawag and EPFL have identified a set of genes in the brook trout and the rainbow trout that act as biomarkers for harmful chemicals. The researchers needed locations at which trout were to be found above and below a waste-water treatment plant. The water above the plant could not be polluted. The regulated genes enabled the researchers to show that the fish below the treatment plant were more stressed. They were even able to identify to which group of micropollutants the fish were exposed – pharmaceuticals, pesticides or chemicals that affect the hormonal balance.



<http://swissinnovation.org/news/web/2018/06-180404-74>

### North-Exposed Ice Cliffs Accelerate Glacier Melt

(ETH Zurich, April 09, 2018)

Researchers previously assumed insulating debris protects glaciers from direct solar radiation, thereby slowing down the melting. However, satellite measurements show debris-covered glaciers might lose mass as quickly as debris-free glaciers. ETH doctoral student Pascal Buri's simulations and data confirm that ice cliffs do contribute to the melting of debris-covered Himalayan glaciers. South-facing cliffs receive more direct solar radiation, and this means they disappear quicker. They melt irregularly: The upper section, receiving more sunlight, melts quickly, while the more shaded lower section melts less and slower. The ice cliff thus becomes increasingly flat, and at some point, debris reburies and gradually shields it from the sun. But north-facing cliffs melt at similar rates throughout, so the steep face remains for longer. Heat radiating from the surrounding debris and air is transferred into the ice. This contributes to the melting process.



<http://swissinnovation.org/news/web/2018/06-180409-4a>



## Crab Spiders Following the Scent of Flowers

(University of Zurich, April 10, 2018)

Anina Knauer and Florian Schiestl from University of Zurich looked closer at the interaction between crab spiders and the buckler-mustard, a common flowering plant. Crab spiders are predators that lie in wait for their prey on the flowers. The assumption used to be that these spiders harm the plant, because they catch pollinating insects or discourage them from visiting the flowers. But the ecologists revealed a surprising phenomenon: “Crab spiders find the plant by following the scent of its flowers. They do so using  $\beta$ -ocimene, the floral volatile that also attracts bees,” says Schiestl. If crab spiders are sitting on the flowers, fewer bees will visit. But they also eliminate plant-eating insects and their larvae. This way the crab spiders benefit from the plant - and vice versa.



<http://swissinnovation.org/news/web/2018/06-180410-ee>

## Producing Animal Feed from Biowaste Products

(ETH Zurich, April 14, 2018)

ETH Zurich and Eawag researchers are developing a method to produce animal feed from biowaste products. They focus their research on the Black Soldier fly. The larvae of the fly not only breaks down waste material into compost, but can also be used as an animal feed. They carry out controlled feeding experiments using sterilized larvae and spiking them with certain microorganisms to see which trigger a change in their growth. The research aims to produce a stable and safe process for municipal organic solid waste. Researchers from Switzerland are working together with local processing facilities in developing countries, such as Indonesia, Kenya, and Tanzania.

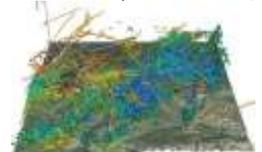


<http://swissinnovation.org/news/web/2018/06-180414-52>

## 3D Weather Maps

(ETH Zurich, April 23, 2018)

Visualization plays a huge role in the study of weather data, such as temperature, air pressure and the cloud water content of the atmosphere. Displaying this data graphically is quite natural and two-dimensional representations are currently the standard in meteorology, both in research and for the purposes of weather forecasts. ETH Zurich computer graphics specialists have however analyzed cloud formation and air flow in high resolution weather situations and visualized a high-resolution weather situation in 3D. The new visualizations simplify the classification of cloud formations as they can reveal clouds that are unobservable from satellites above or from the ground. The aviation industry and meteorologists may be able to benefit from this visualization method in the future.



<http://swissinnovation.org/news/web/2018/06-180423-a7>

## Ultraperformant Solar-Panel Modules for Extreme Conditions

(CSEM, April 26, 2018)

Anne Quéméré will tackle the arctic ice this summer in an attempt to navigate the North West Passage, the mythical link between the Pacific and the Atlantic. Fully aware of the environmental issues, she will undertake the voyage powered by ultraperformant solar-panel modules developed to her specifications by CSEM. “In 2015, in a kayak, I undertook a journey with the eco-explorer Raphaël Domjan, who is collaborating with CSEM on his stratospheric aircraft Solarstratos,” explains Quéméré. “It quickly became obvious that the Swiss center would be the ideal partner for developing a solution that would be resistant to impact and the extreme conditions of my adventure.” The result is the Solarboat Icade, a 20-foot light and flexible vessel.

<http://swissinnovation.org/news/web/2018/06-180426-b2>



## Introduced Species Overlooked in Biodiversity Reporting

(University of Geneva, April 27, 2018)

Nature is intimately connected with human well-being of current and future generations – which is why an array of reports track the state of biodiversity and predict the impact of our way of life on its evolution. These reports are based on several indicators that only take indigenous species into account for each region. Yet today modern environments are made up of indigenous and introduced species. The introductions are either deliberate or accidental. Although these introduced species play important roles, they are ignored by specialists, a fact that partly distorts the international nature reports. A study by the University of Geneva recommends that the positive and negative contributions made by these species should be included so that the public has an accurate view over the surrounding nature and its evolution.



<http://swissinnovation.org/news/web/2018/06-180427-55>

## Soils in Conversation Land Contain Microplastics

(University of Bern, April 27, 2018)

Researchers at University of Bern therefore developed a new method to measure and quantify the smallest plastic particles in soil, and for the first time, 29 floodplain soils were investigated all over Switzerland, from Geneva to Grisons. "Although the sites are located in nature reserves, microplastics were found in 90% of the soils", says Moritz Bigalke. Even in many remote mountainous areas, evidence of microplastics particles could be found – an indication that microplastics are transported by the wind. The researchers estimate the quantity of microplastics in the top 5cm of the Swiss floodplain soil at 53 tonnes. The largest concentrations of microplastics appear, where larger plastic waste (so-called macroplastics) was found in the soil. Here, microplastics arise, probably due to the disintegration of larger plastic particles. However, microplastics are also found in many soils without larger plastic parts.



<http://swissinnovation.org/news/web/2018/06-180427-3a>

## Correlation Between Extreme Rainfall and Higher Temperature

(ETH Zurich, May 14, 2018)

ETH Zurich researchers examined an unusually long series of measurements to ascertain how the spatial and temporal characteristics of individual extreme rainfall cells are related to temperature. The researchers deployed the ETH Zurich mainframe computer Euler to evaluate a massive data set from a weather radar system, which was used by meteorologists over a period of 25 years to measure high-resolution rain in the eastern Mediterranean region. The researchers were able to confirm that in the eastern Mediterranean region the peak intensity of extreme rainfall increases at higher temperatures. However, at 4.3 percent per degree Celsius, this increase is lower than the theoretical average based on the physical principle whereby under ideal conditions and on average worldwide, rain intensity increases by seven percent for every degree Celsius of temperature rise. This means that theoretically heavy rain should become even heavier in a warmer climate.



<http://swissinnovation.org/news/web/2018/06-180514-f4>

## App for Flood Research

(University of Zurich, May 17, 2018)

The CrowdWater project, developed by doctoral candidates from University of Zurich, is a citizen science project. It collects hydrological data on water levels, streamflows and soil moisture from all over the world. The smartphone app makes it possible for anyone to use their own observations and simple graphical methods to take hydrological measurements and add these to a central database. In many regions of the world where infrastructure to collect water data is lacking, the data captured through CrowdWater can be analyzed using hydrological models. These models help to predict floods and improve water management. The researchers





have yet to find out whether this crowdsourcing approach to collect data through an app will work. Switzerland is the ideal place to test the app because the data from the measurement stations can be used as a benchmark.

<http://swissinnovation.org/news/web/2018/06-180517-3d>

## Phasing Out Nuclear Energy Could Impact Safety

(University of Basel, May 31, 2018)

In game theory, endgame behavior means players behave increasingly self-interested as a game draws to an end. Scientists from University of Basel and the Max Planck Institute for Human Development used three approaches to examine whether there are indications of endgame behavior in the nuclear industry. In media reports on phasing out nuclear energy in Germany, there is evidence that trust and cooperative behavior between the utilities and government decision-makers has become increasingly precarious since the phase-out decision in 2011. The psychologists found, contrary to their hypothesis, no statistical increase in reportable events (accidents, malfunctions or other safety-related events) within these five years. However, a phase-out was also agreed back in 2001. In the five-year period after this decision, the number of reportable events rose by 39%. In behavior-based experiments, participants showed endgame behavior in the role of managers. By the end of the several rounds, less was invested in safety.



<http://swissinnovation.org/news/web/2018/06-180531-be>

## 7. Engineering / Robotics / Space

### Most Distant Star Ever Observed Using Cosmic Lens

(EPFL, April 04, 2018)

An international team of astronomers, including researchers from EPFL, has detected the most distant individual star observed to date, located 9 billion light-years from Earth. This star, normally too weak to be seen, could be observed thanks to a gravitational lensing effect of a massive cluster of galaxies. The international team was monitoring the cluster of galaxies called MACS J1149 + 2223, located 5 billion light-years from Earth as they made their discovery, "This star is at least 100 times farther than the farthest star we could study so far, with the exception of supernova explosions," says Patrick Kelly of the University of Minnesota, lead for the study. Combining the powerful power of this cluster with Hubble's exceptional resolving power, "we were able to observe for the first time a star some 9 billion light years away," added Jean-Paul Kneib, professor at the laboratory of astrophysics of EPFL. The detection of the star through Hubble was only possible because the light from the star was magnified thousands of times.



<http://swissinnovation.org/news/web/2018/07-180404-ea>

### Robot Removes Lacquer from Airplane with Corn

(Zurich University of Applied Sciences [ZHAW], April 10, 2018)

Removing existing lacquer layer from air crafts has previously been done by chemical means or manually with the grinder. A newly developed sandblasting process from the company Sappi uses corn starch, which is blown through a nozzle onto the painted surface using compressed air. However, this method requires that the nozzle is guided over the surface at constant speed at always the same distance. Therefore, researchers from ZHAW have developed a semi-automatic solution for this precision work. They created a system in which the workers use a robot as an intelligent tool - as a high-precision extended arm. The user manually moves the robot arm with a tablet to the starting position with the attached sandblasting nozzle. The robot





independently controls both the alignment and the distance of the nozzle to the surface and controls the speed precisely.

<http://swissinnovation.org/news/web/2018/07-180410-f0>

## Disks Forming Around Young Stars

(ETH Zurich, April 12, 2018)

With an instrument at the Very Large Telescope in Chile scientists of ETH Zurich observed planet-forming disks around young stars similar to the sun 4,5 billion years ago. Surprisingly, the disks are very different. The data will help to shed more light on the formation processes of planets. An instrument, which was partially developed and built at ETH Zurich, has now been particularly successful at studying new born stars still surrounded by gas and dust. With SPHERE (Spectro-Polarimetric High-contrast Exoplanet REsearch) at the European Southern Observatory (ESO), astronomers of ETH Zurich and Max Planck Institute for Astronomy in Heidelberg were able to take images of planet-forming disks around the young stars: these disks, called protoplanetary disks, exist around so-called T Tauri stars – the progenitors to our Sun – as well as around the more massive siblings called Herbig Ae/Be stars. So far astronomers focused mostly on Herbig Ae/Be stars in their studies, but with a new, ambitious program called DARTTS-S (Disks Around T Tauri Stars with SPHERE), Henning Avenhaus and Sascha Quanz, former and current members of the NCCR PlanetS at ETH Zurich, have now been able to use the capabilities of SPHERE to undertake a survey of T Tauri disks.



<http://swissinnovation.org/news/web/2018/07-180412-6b>

## World's Largest Electric Truck

(Empa, April 20, 2018)

The eDumper dump truck is the largest electric vehicle in the world and an example of successful applied research. Together with industry partners, the Bern University of Applied Sciences BFH, the NTB Interstaatliche Hochschule für Technik Buchs and Empa have developed this eco-friendly truck. It is the largest and most powerful battery-powered electric wheeled vehicle in the world. In it the largest battery ever produced for an electric vehicle was installed, which weighs 4.5 tons and is as heavy as two complete passenger cars. Never before has a comparable vehicle been able to save such a large amount of CO<sub>2</sub>. The eDumper will transport more than 300,000 tons of rock per year over the next 10 years. According to preliminary calculations, the vehicle will save up to 1,300 tons of CO<sub>2</sub> and 500,000 liters of diesel over the next 10 years.

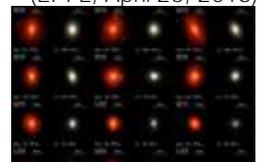


<http://swissinnovation.org/news/web/2018/07-180420-99>

## Big Bang Theory

(EPFL, April 23, 2018)

EPFL scientists have analyzed 27 dwarf galaxies in detail, identifying the conditions under which they were formed and how they've since evolved. These small-scale galaxies are perfect for studying the mechanisms of new star formation. The researchers found that the specific star formation mechanism used depends on the density of the galaxy's dark and baryonic matter. That density determines whether a galaxy will keep on making stars or suddenly stop. If a dwarf galaxy's matter is too dispersed, then its hydrogen will get too hot and evaporate, meaning it can no longer form stars. If on the other hand a dwarf galaxy has a dense halo of dark matter protecting it, then star formation will continue apace.



<http://swissinnovation.org/news/web/2018/07-180423-49>



## Connection Between Earthquake in South Korea and Geothermal Project Plausible

(ETH Zurich, April 26, 2018)

An earthquake, which occurred on 15 November 2017, injured about 80 people and caused damage to numerous buildings in the city of Pohang, South Korea. A study by ETH Zurich, GFZ Potsdam and the Glasgow University shows that the mainshock and its largest aftershocks occurred within 2 km distance or less of a geothermal site. Furthermore, they are located within 1.5 km distance of an induced event, which occurred in April 2017 during one of the underground stimulation operations. They concluded that a connection between the magnitude 5.5 earthquake in South Korea and the nearby geothermal project is plausible. However, the mainshock occurred about two months after the last stimulation activities. So far, there is no quantitative model available that relates the injection activities conducted to the occurrence of this event.



<http://swissinnovation.org/news/web/2018/07-180426-28>

## Seismometer Electronic Box on the Way to Mars

(admin.ch, May 03, 2018)

On 5 May the US lander 'InSight' commenced its journey to Mars from California. Its aim is to gather data to enable a better understanding of the formation and evolution of the Red Planet. Switzerland's contribution to 'InSight' was developed under the lead of ETH Zurich together with the electronics company SYDERAL SA. The element in question is the Seismometer Electronic Box (SEIS E-Box), the power supply and control unit, which supplies the sensors with power, receives their measurement data, temporarily stores them, processes them and holds them for transmission to the ground station. The highpoint of the adventure for the team from the ETH Zurich will be when SEIS begins operating on the planet's surface. With its collective knowledge of earthquake research the team from the ETH Zurich will continue to play a key role in the mission.

<http://swissinnovation.org/news/web/2018/07-180503-91>

## "Looking" Through Walls

(Bern University of Applied Sciences [BFH], May 03, 2018)

"Looking" through walls without being in the room sounds like magic. It would be very helpful, for example, for security and rescue forces to detect movements of persons behind a wall or in buildings. At ETH Zurich, a prototype of a "Through Wall Sensing" system was recently developed, with which movements of persons behind a wall can be detected. Researchers at the Bern University of Applied Sciences were commissioned by armasuisse Science and Technology to analyze, optimize and miniaturize the system. The aim was to develop a compact and cheaper demonstrator with the help of the Software Defined Radio (SDR) platform developed at Bern University of Applied Sciences. Current systems are far more cost-intensive, more complex, and require in some cases even a frequency approval by BAKOM in Switzerland.

<http://swissinnovation.org/news/web/2018/07-180503-9e>

## Brain-Computer Interfaces for Physically Impaired Individuals

(EPFL, May 10, 2018)

Brain-computer interfaces (BCIs) are seen as a potential means by which severely physically impaired individuals can regain control of their environment. BCIs use the electrical activity in the brain to control an external device. At EPFL, two tetraplegic adult men were trained with a BCI system designed to detect multiple brain wave patterns. Electroencephalography recording of the subjects during their training showed that the brain wave patterns related to imagined movements (called sensorimotor rhythms), which have been adopted to control the avatar, became stronger over time, indicating that the subjects were learning how to better control the BCI during the training. The researchers believe they have maximized the chances for human learning by infrequent recalibration of the computer, leaving time for the human to better learn how to control the sensorimotor rhythms that would most efficiently evoke the desired avatar movement.



<http://swissinnovation.org/news/web/2018/07-180510-18>



## Formation Process of Small Inner Moons of Saturn

(University of Bern, May 21, 2018)

Martin Jutzi and Adrien Leleu from University of Bern calculated the formation process of the small inner moons of Saturn. The first, simple tests worked well. But when taking tidal forces into consideration, they faced some problems. Since Saturn has 95 times more mass than Earth and the inner moons orbit the planet at a distance of less than half the distance between Earth and Moon, the tides are enormous and pull almost everything apart. Therefore, Saturn's inner moons could not have formed with these peculiar shapes by gradual accretion of material around a single core. An alternative model called pyramidal regime suggests that these moons were formed by a series of mergers of similar sized little moonlets. Later the researchers verified the pyramidal regime and showed that the collisions of the moonlets resulted in exactly the shapes imaged by the Cassini spacecraft.



<http://swissinnovation.org/news/web/2018/07-180521-09>

## Quantum Cascade Laser Flies for Astrophysics

(ETH Zurich, May 23, 2018)

In order to better understand how stars form in our galaxy, astronomers require high-quality data. The flying observatory SOFIA - the Stratospheric Observatory for Infrared Astronomy - is installed in a converted Boeing 747SP and provides infrared signals for this kind of research. However, some signals detected by the airborne telescope are so weak that they can only be measured using a special laser. Physicists at ETH Zurich have now developed a quantum cascade laser specially tailored for SOFIA. It changes the frequency of the incident far infrared light in order to make it distinguishable from the background noise.



<http://swissinnovation.org/news/web/2018/07-180523-2c>

## 8. Physics / Chemistry / Maths

### Observing Water Molecules to Better Understand Lipid Membranes

(EPFL, April 03, 2018)

EPFL researchers were able to map out in real time how charges are transported across and along membranes by observing the behavior of adjacent water molecules. They did this, by using a unique second-harmonic microscope that was invented at the Laboratory for fundamental BioPhotonics (LBP). Their non-invasive and label-free method could shed light on how ion channels function, along with other processes at work in membranes. This clinically viable method could potentially also be used to directly track ion activity in neurons, which would deepen researchers' knowledge of how nerve cells work.



<http://swissinnovation.org/news/web/2018/08-180403-3c>

### Thermodynamics and Information Theory

(ETH Zurich, April 11, 2018)

Information processing requires a lot of energy. Computers' energy consumption has become a significant cost driver in many areas, including cryptocurrency. By combining thermodynamics and information theory, ETH Zurich physicists have shown, that the efficiency of computer systems can't be increased indefinitely. The efficiency limit for the processing of information is not fixed but can be influenced: the better you understand a system, the more precisely you can tailor the software to the chip design, the more efficiently the information will be processed. That is done today in high-performance computing. In future, programmers will also have to take the thermodynamics of computing into account, experts say.

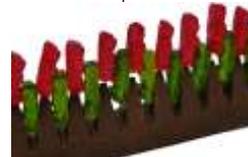


<http://swissinnovation.org/news/web/2018/08-180411-e6>

## Superconductivity Disappears in Low Dimensions

(University of Geneva, April 13, 2018)

If a material is a metal or an insulator depends on the strength of the interactions between electrons, or the potential generated by electrons circulating the nuclei of positively-charged atoms. Predicting the electronic properties of a material is therefore not easy. Physicists from the University of Geneva, ETH Zurich and EPFL replaced the electrons with ultra-cold lithium atoms in order to make predictions easier. They were then able to confirm an unusual state of matter that was predicted by theory, but which no one had been able to observe before. The team found that they created a material that retains its insulation regardless of the strength of attraction between the particles, demonstrating that the correlation between attraction and conductivity properties is only present for the three-dimensional world. For low-dimensional quantum environments, however, it cannot be found.



<http://swissinnovation.org/news/web/2018/08-180413-94>

## Detecting Individual Impurity Atoms in Graphene

(University of Basel, April 13, 2018)

A team including physicists from the University of Basel has succeeded in using atomic force microscopy to clearly obtain images of individual impurity atoms in graphene ribbons. Thanks to the forces measured in the graphene's two-dimensional carbon lattice, they were able to identify boron and nitrogen for the first time. They replaced particular carbon atoms in the hexagonal lattice with boron and nitrogen atoms using surface chemistry, by placing suitable organic precursor compounds on a gold surface. Under heat exposure up to 400°C, tiny graphene ribbons formed on the gold surface from the precursors, including impurity atoms at specific sites. Scientists from the team led by Professor Ernst Meyer from the Swiss Nanoscience Institute and the University of Basel's Department of Physics examined these graphene ribbons using atomic force microscopy (AFM). They used a carbon monoxide functionalized tip and measured the tiny forces that act between the tip and the individual atoms. By looking at the different forces, the researchers were able to map and identify the different atoms.

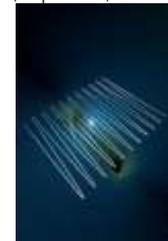


<http://swissinnovation.org/news/web/2018/08-180413-54>

## Dual State Electrons

(University of Geneva, April 16, 2018)

Half a century ago the theoretic physicists Walter Henneberger wondered if it was possible to free an electron from its atom with a laser, but still make it stay around the nucleus. Such a dual state would make it possible to control the motion of the trapped electrons and make them be tunable by light. Many scientists considered this to be impossible. However, it was accomplished by physicists from the University of Geneva and the Max Born Institute in Berlin. For the first time they managed to control the specific shape of the laser pulse to keep an electron both free and bound to its nucleus. The scientists further discovered that electrons trapped in such states can amplify light, which could play a fundamental role in enhancing knowledge about the propagation of intense laser beams.



<http://swissinnovation.org/news/web/2018/08-180416-c6>

## First Time: EPR Paradox Observed in Many-Particle System

(University of Basel, April 26, 2018)

In 1935 Albert Einstein, Boris Podolsky, and Nathan Rosen showed that precise predictions of the results of measurements on a physical system in the world of tiny particles are theoretically possible under certain circumstances. Now, physicists at the University of Basel and the Swiss Nanoscience Institute successfully observed the EPR paradox. They used lasers to cool atoms to just a few billionths of a degree above



absolute zero. The atoms then behave entirely according to the laws of quantum mechanics and form a Bose-Einstein condensate. In this ultracold cloud, the atoms constantly collide, causing their spins to become entangled. The researchers were able to measure the spin correlations between separate regions of the condensate directly and, at the same time, to localize the atoms in precisely defined positions. They succeeded in using measurements in a given region to predict the results for another region.

<http://swissinnovation.org/news/web/2018/08-180426-aa>

## Changing States of Quantum Matter

(University of Geneva, May 07, 2018)

The 2016 Nobel Prize in physics was awarded for the prediction that topological excitations in quantum materials are inducing phase transitions in those same materials. Scientists at the Universities of Geneva and Grenoble Alpes, together with other Swiss and French research institutions, now provided the first experimental confirmation of the theory. When a neutron beam is sent through a quantum material – a cobalt oxide in this case –, the particles of the material reveal some of their properties by interacting with those of the beam. The scientists could test the new models and prove the simultaneous existence of two sets of topological excitations in the same material, which indicates the phase transition. These results open up a range of possibilities in quantum physics and have been published in the journal Nature Physics.



<http://swissinnovation.org/news/web/2018/08-180507-34>

## New Drug Target to Combat Prostate Cancer

(University of Bern, May 24, 2018)

One in seven men in Europe are diagnosed with prostate cancer. While majority of cases are treated with surgical procedures and hormone therapy, in about 70'000 cases tumor growth continues even after surgical castration, where chemotherapeutic intervention is required. One promising target has been the enzyme CYP17A1, which produces a precursor of androgens. Current treatment options include a drug called abiraterone. However, abiraterone has strong side effects and the life extension gained from treatment is only a few months. Now a research team from Inselspital Bern and the University of Bern, in collaboration with Vall d'Hebron Research Institute in Barcelona, has reported a gene mutation that damages the specific enzyme CYP17A1 which controls the production of androgens. The results of this study could lead to a more efficient therapeutic approach for the treatment of castration-resistant prostate cancer.



<http://swissinnovation.org/news/web/2018/08-180524-b9>

## Two Different Forms of Water Differ in Chemical Reactivity

(University of Basel, May 29, 2018)

It is not well known that water exists in two different forms (isomers) at the molecular level. The difference lies in the relative orientation of the nuclear spins of the two hydrogen atoms. Depending on whether the spins are aligned in the same or opposite direction, one refers to ortho- or para-water. Researchers from University of Basel have investigated how the two forms differ in terms of their chemical reactivity. It was demonstrated that para-water reacts about 25% faster than ortho-water. This effect can be explained in terms of the nuclear spin also influencing the rotation of the water molecules. As a result, different attractive forces act between the reaction partners. Para-water is able to attract its reaction partner more strongly than the ortho-form, which leads to an increased chemical reactivity.



<http://swissinnovation.org/news/web/2018/08-180529-4c>



## 9. Architecture / Design

### Designing Urban Energy Systems Based on the Urban Climate

(EPFL, April 24, 2018)

A new model, developed at EPFL combines an urban climate model with a building simulator and energy system optimization. Dasun Perera says: “Heat, cold and wind all have an influence on energy needs, and buildings have an impact on each other, too.” Dasaraden Mauree explains that it is important to think ahead when renovating and constructing buildings, so that they meet the Minergie P energy-efficiency standard. In a century's time, Switzerland's climate will be much more Mediterranean, so demand for air conditioning will rise. The researchers have shown how buildings can influence energy integration and have proven that energy optimization at the neighborhood or community level is more cost effective than optimizing the energy consumption of a single building. Going forward, rapid urbanization, increasingly dense construction and the impact of climate change will all have to be factored in.



<http://swissinnovation.org/news/web/2018/09-180424-ae>

### Homogenized Public Spaces in European Cities

(EPFL, May 01, 2018)

For almost two decades, designers of public spaces throughout Europe have been striving to give passers-by unique experiences. Using a multitude of materials, shapes, interactive street furniture and sensory effects, these squares, streets and walkways are becoming genuine tourist attractions for their cities. The problem is that, rather than integrating with the existing urban environment, the public spaces of the 21st century are tending to diverge from it intentionally and, most importantly, to look alike. This is one of the findings in Sonia Curnier's thesis, which she researched at EPFL. Until now, academic research has mainly focused on the use of public spaces, for example observing whether or not passers-by really connect with them but spent very little time looking at their design. This is the novel approach taken by Curnier's thesis, which offers the first comprehensive overview of the subject.



<http://swissinnovation.org/news/web/2018/09-180501-48>

## 10. Economy, Social Sciences & Humanities

### Inner Ear Provides Clues to Human Dispersal

(University of Zurich, April 04, 2018)

An international research team led by University of Zurich paleoanthropologists discovered the 3-D shape of the bony labyrinth of the inner ear contains information about the global dispersal of humans. The further away a population from South Africa, the more the shape of the labyrinth differs from the South African population. The data also indicate population movements within the continents, e.g. the data reveals that today's Europeans and Japanese mainly have their roots in the respective local populations of the Neolithic Period. It was previously assumed the shape of the labyrinth was mainly determined by its function, but nature tolerates a wide variation. “This is probably due to random changes in the genetic material. Such changes may have few or no functional consequences, but the associated structural changes provide a record of human dispersal and evolution history,” summarizes Christoph Zollikofer.



<http://swissinnovation.org/news/web/2018/10-180404-b4>



## Obesity Is Linked to Income and Education

(University of Zurich, April 04, 2018)

Various studies have shown that people in more disadvantaged sections of society are more likely to be overweight. David Fäh, a preventive medicine specialist and University of Zurich researcher has been able to confirm the link between income, education, and obesity. While genes have an influence, what is inherited is not obesity, but the predisposition for an excess of calories to be stored in the form of body fat. Therefore, it is possible even for people with a genetic predisposition to maintain a normal weight. However, children primarily learn their eating and exercise habits, and the physical ideals they strive for, from their parents. The findings of David Fäh's research suggest that, besides financial resources, another factor is more decisive: Education. Children of less well-educated parents are three times more likely to be overweight, regardless of their cultural background.



<http://swissinnovation.org/news/web/2018/10-180404-90>

## Motivation of Entrepreneurs

(University of St.Gallen, April 04, 2018)

"In psychology, there is the concept of regulatory focus," says Justus von Grone from University of St.Gallen. "The theory is that each individual is motivated to achieve their goals either by promotion or prevention focus." While in the case of promotion focus, the individual is focused on profits and positive outcomes, in the case of prevention focus, the individual is focused on preventing losses and negative outcomes. According to the researcher, depending on the situation, entrepreneurs can have different motivation in achieving their goals. He found that promotion-focused entrepreneurs intend to set up more companies. "Prevention focused entrepreneurs also want this, but only if they have acquired enough knowledge about potential critical situations and failure", he adds. Dealing openly with entrepreneurial failure, therefore, has the benefit of learning from it and supporting entrepreneurial motivation.



<http://swissinnovation.org/news/web/2018/10-180404-8a>

## Comparing Impact of Life Saving Measures on Future Demographics

(University of Lausanne, April 04, 2018)

Changes in life expectancy is a relatively blunt tool for measuring the impact of interventions, such as a new drug, or safety law, on different causes of death. Séverine Arnold from University of Lausanne and her co-authors offer a more sophisticated approach which enables interventions to be measured in terms of their relative impact on the age distribution of future populations. For example, how might curing a particular disease, or reducing cycling deaths by making cycle helmets mandatory, affect the age structure of the population over time? More specifically, as a result of the impact on age distribution how might that affect the old age dependency ratio? A ratio which provides an idea of the burden of the old age population on the active population; important for social security system planning, for example.



<http://swissinnovation.org/news/web/2018/10-180404-4f>

## Babies Make Link Between Vocal and Facial Emotion

(University of Geneva, April 11, 2018)

Do babies recognize emotions or only distinguish the physical characteristics of voices or faces? In a study by University of Geneva researchers 24 six-month-old babies took part. During a first phase the babies listened to a neutral, happy or angry voice. In the second stage, the babies were placed in front of two emotional faces, one expressing happiness and one anger. The results revealed that the six-month-olds did not have a preference for either of the emotional faces if they had already heard a neutral voice or a voice expressing anger. But they looked longer at the face expressing anger, especially its mouth, after hearing a voice



expressing happiness. This visual preference for novelty lead to the researcher's conclusion that six-month-olds are able to recognize the emotion of happiness regardless of these auditory or visual physical characteristics.

<http://swissinnovation.org/news/web/2018/10-180411-4d>

## Privacy Paradox

(University of Zurich, April 12, 2018)

Privacy is important for many people. Nevertheless, they share their personal photos, mobile number, and current mood on the internet. Researchers call this phenomenon the privacy paradox. Data protection experts like to explain it by pointing out that many users are not aware of all the places their data is collected. They speak of peer pressure and the contradictory nature of humans. For Florent Thouvenin, professor of Information and Communications Law at University of Zurich, a much more plausible explanation is that those affected have a very different notion of what privacy means than the notion on which today's data protection framework is based. Current data protection goes back to concepts that predate the internet by a quarter-century. While society and technology have undergone profound changes, the regulations have remained more or less unchanged.



<http://swissinnovation.org/news/web/2018/10-180412-55>

## Analysis of Creation Process of French-Language Manuscripts

(University of Geneva, April 17, 2018)

Nearly 500 French-language manuscripts are kept in the Martin Bodmer Foundation. Until recently, they had never been available to researchers and the wider public, but now they have been digitalized by the Bodmer Lab at University of Geneva and form part of a vast research project. This research aims to analyze the creation process behind every document, contextualize it and gain access to an additional way of interpreting the texts. Analyzing a manuscript helps to deepen our understanding of the author's work process: the doubts and repeated attempts to find the right word or phrase are made visible and become concrete. Making the manuscripts freely available online will enhance the ways the documents can be read. Henceforth we will not only look at a text's "definitive" (printed) version but also at the successive stages in its development and its different "states".



<http://swissinnovation.org/news/web/2018/10-180417-0e>

## Practical Instrument for Digital Transformation

(University of St.Gallen, April 18, 2018)

Digitization present companies with challenges. Many managers would have difficulties introducing a comprehensive change process in their companies, because digital transformation affects strategy, business model, organization, processes and corporate culture. To identify the levels of digital maturity in companies in Sabine Berghaus from University of St.Gallen developed a "Digital Maturity Model" and surveyed companies with the "Digital Maturity Check". The questionnaire is an important instrument for managers, be it for triggering discussions in companies, identifying areas of activity or identifying internal differences in perceptions. "One thing that was especially interesting for me was the correlation between maturity and the activities during the initial phases of a digital transformation," says Berghaus. Companies with a high level of digital maturity were a lot more open to innovation and were more strategic than companies with a low level of maturity.



<http://swissinnovation.org/news/web/2018/10-180418-9b>



## Children as a Career Killer for Women

(Neue Zürcher Zeitung, April 19, 2018)

For a long-term study the University of Bern regularly polls the same 6000 people about their education and employment. Now they analyzed the latest survey in which around 3,000 people (average age: 30) took part. One eye-catching finding is the large employment differences between the genders. Among the childless women, the proportion of the ones working at least 50% was practically the same as for men. Measured against the full-time workers, the childless women were already slightly behind, but the differences become big when there are children. While 93% of men with children were full-time workers, this was true for just less than 1/5 of women. Almost half of the women with children only had a small workload or were not working at all. However, this does not answer the question of what (temporary) career breaks mean for the longer-term employment process.



<http://swissinnovation.org/news/web/2018/10-180419-f0>

## Dialect Expressions and Their Function in the Story of Heidi

(University of Zurich, April 25, 2018)

The research focus of Yuta Daigi, who studied at the University of Zurich and now teaches at Mie University in Japan, is very Swiss: He researches dialect expressions and their textual function in the novel of 1880 by Swiss author Johanna Spyri, Heidi. The story became a classic of children's literature – not only in Europe, but also in Japan. After the Second World War, people in the emergent industrial nation yearned for harmony and a return to nature. Spyri's Alpine idyll tugged at the Japanese readers' heartstrings. The story was then given a new lease of life in the seventies, when two Japanese anime artists made a cartoon adaptation of Heidi. When Yuta Daigi comes to publish his research findings, he can be sure that they will be met with interest both in Switzerland and in Japan.



<http://swissinnovation.org/news/web/2018/10-180425-82>

## Glass Cliff: Company in Crisis Hires More Women for Executive Posts

(University of Geneva, April 26, 2018)

The term "glass cliff" is used to describe the phenomenon whereby women reach positions of responsibility when a company is in crisis – roles that would not usually be assigned to them in more "normal" times. Several studies since 2005 have shown that when a firm or a political party is suffering a downturn, women are more likely to attain management positions or be appointed as candidates for elections. How can this be explained? Researchers at University of Geneva have examined this question. They found that women symbolize change at the head of a company, a symbol that helps a business bolster its image. The research team also observed that during periods of crisis, qualities typically associated with men are prioritized in recruitment criteria, regardless of the individual's gender.



<http://swissinnovation.org/news/web/2018/10-180426-8b>

## Low Self-Control Influences Smartphone Use

(University of Bern, May 02, 2018)

Researchers from University of Bern based a recent study on an established method in psychology: They invited 108 test subjects to take part in an "experience sampling". This is a method where the test subjects receive a message on the smartphone several times each day to answer a few questions on their current state. In this case in particular, these were about consumer behavior. The actual aim of the research team was, however, to measure the time the person required to react to the message. The analysis showed the following: People with lower self-control found it significantly harder not to react to the smartphone signal immediately.





This effect remained stable, even when a series of further personality features were also incorporated into the statistical model.

<http://swissinnovation.org/news/web/2018/10-180502-b3>

## Carnivores in Captivity Give Birth at Same Time of Year as Those in Wild

(University of Zurich, May 07, 2018)

Many species have a specific mating season when living in their natural habitat. The young animals are usually born in spring. Researchers at the University of Zurich investigated the seasonality of more than 100 species of carnivores by evaluating data from 150,000 births that took place in zoos. For more than 80% of the species, the time period for births was the same in the zoo as in the wild. "Seasonality is an evolutionary feature and thus a fixed characteristic of a species – most probably through a genetically determined reaction to a signal given by the length of daylight," says Marcus Clauss. Only a few species – those whose natural habitat is in the tropics and whose seasonal reproduction is for reasons of food availability – start reproducing all year round when living in captivity, where food is always plentiful.



<http://swissinnovation.org/news/web/2018/10-180507-5e>

## Nouns Slow Down Our Speech

(University of Zurich, May 14, 2018)

When we speak, we unconsciously pronounce some words slower than others, sometimes make brief pauses or throw in meaningless sounds. Such slow-down effects provide key evidence on how our brains process language. A team of researchers partly from University of Zurich and partly from University of Amsterdam analyzed thousands of recordings of spontaneous speech from linguistically and culturally diverse populations from around the world. They looked at slow-down effects before nouns and verbs. "We discovered that in this diverse sample of languages, there is a robust tendency for slow-down effects before nouns as compared to verbs," the researchers explain. "The reason is that nouns are more difficult to plan because they're usually only used when they represent new information." Otherwise they are replaced with pronouns or omitted. But no such replacement principles apply to verbs.



<http://swissinnovation.org/news/web/2018/10-180514-72>

## Identifying Needs and Motivations of Future Users of Autonomous Vehicles

(University of Geneva, May 15, 2018)

The aim of the AVENUE project consortium, led by the University of Geneva, is to identify needs and motivations of future users of autonomous vehicles, meet many of the technological and regulatory challenges, and design new business models. The project is structured around three major themes: autonomous driving, optimization of itineraries and in- and out- of vehicle services. The first theme addresses security, fluidity of traffic and ability to adapt to exceptional road situations. The second theme will optimize the vehicles itineraries in a perspective of cost reduction and user comfort. "The third theme will focus on in and out of vehicle services, such as augmented reality solutions on vehicle windows, video conferencing options, as well as assistance to meet special needs' and less autonomous passengers, such as children or seniors", says Dimitri Konstantas.



<http://swissinnovation.org/news/web/2018/10-180515-6a>



## 11. Startups / Technology Transfer / IPR / Patents

### Startup Urban Farmers Expands Abroad

(startupticker.ch, April 20, 2018)

For the startup Urban Farmers it is a fact that it is harder for them to establish themselves in Switzerland than abroad. This is also because there is hardly any industrial agribusiness in Switzerland. Urban Farmers lacks the unique selling point compared to conventional agriculture, because in Switzerland, all farmers are actually urban farmers. Therefore, Urban Farmers is expanding, in addition to the Netherlands, into two highly interesting markets. The Brazilian organic market is growing by 30 to 40 per cent per year, but at the same time the country does not have its own organic production. The second focus is in China, where soon more than 200 cities will have more than one million inhabitants. In addition, China wants to become the world market leader in terms of sustainability.



<http://swissinnovation.org/news/web/2018/11-180420-76>

### Swiss Tech Company Powers Asia's First B2B-Platform for the IT Industry

(startupticker.ch, April 23, 2018)

Last autumn Balluun announced the opening of a subsidiary in Hong Kong. Now the Swiss company provided the technology for ITB2B.Asia, Asia's first end-to-end digital marketplace for technology vendors and business partners for the IT Industry, operated by Hong Kong-based Appicon. The Balluun365 patented technology is an integrated social e-commerce solution for launching industry-specific marketplaces to connect buyers, suppliers and products; develop and expand businesses, or buy and sell products online 24 hours a day all year round. Leveraging social commerce technology, ITB2B.Asia matches the leading technology companies in the world with local business partners in the APAC region. First in its industry, Appicon builds an ecosystem to facilitate business-to-business interaction. On one single platform: matching, building partnerships, engaging partners and e-commerce.



<http://swissinnovation.org/news/web/2018/11-180423-65>

### Switzerland Ranked as Best European Country for Blockchain Startups

(fintechnews.ch, May 17, 2018)

Blockchain conference, BlockShow Europe 2018 has released a study identifying the top 10 European countries for starting a blockchain company. Switzerland is number one on the list, due to its positive regulatory dynamics and forward-thinking position on setting government guidelines for crypto startups. The country has been a hotbed for crypto innovation as home to Zug's "Crypto Valley." Gibraltar and Malta round out the top three due to similar dynamics and government participation. The study looked at 48 European countries in total, analyzing different aspects to determine which of them promoted blockchain and cryptocurrency advocacy, while also looking at actual regulations set in place for the growing blockchain sector. The official criteria used examines Initial Coin Offering (ICO) regulations, regulations on cryptocurrency as a form of payment, as well as the taxation of cryptocurrencies.



<http://swissinnovation.org/news/web/2018/11-180517-96>

## 12. General Interest

### Only Few Companies Use Diversity Management

(Bern University of Applied Sciences [BFH], May 02, 2018)

Sexual orientation and gender identity, just as gender, age, religion, disability or ethnicity, are dimensions of diversity management. It is a management tool that sees diversity in the workforce as an opportunity. That diversity management is not widespread in Swiss companies was shown by the first empirical study on the topic conducted at the Bern University of Applied Sciences by Prof. Dr. Andrea Gurtner. The researcher contacted 462 larger companies, education and health institutions and public administrations, and was able to question 67 organizations in detail. Only around a quarter of all companies contacted use diversity management. Only just under two-thirds of the 67 organizations using diversity management surveyed in detail integrated it in their overall concept and only about twenty companies include sexual orientation and gender identity in their diversity management.

<http://swissinnovation.org/news/web/2018/12-180502-4b>

### higgs.ch – Bringing Science Knowledge to the Broad Public

(higgs.ch, May 31, 2018)

Fake news travel around the world seven times faster than their prettier siblings, facts. The Swiss project «higgs» has an answer to that alarming development: free science news for everyone. On its website and through its social media channels, the media project covers a broad spectrum of science and technology topics. The primary goal of the team behind «higgs» – a small group of science journalists around Beat Glogger at Scitec-Media GmbH in Winterthur – is to reach an audience as broad and diverse as possible. In support of that goal, higgs gives its contents to other print and online media outlets for free. Currently, the team is looking for financial support to be able start a non-profit foundation that will help raising funds to ensure the survival of higgs in the long term. More information at [www.higgs.ch](http://www.higgs.ch).

<http://swissinnovation.org/news/web/2018/12-180531-c5>



## 13. Calls for Grants/Awards

### Call: Promotion of Cross-Border Co-Operation

(interreg, April 18, 2018)

interreg is a regional program of the European Union for the promotion of the cross-border co-operation, in which also non-EU states can participate. The objectives are more competitiveness, innovation, employment and education. Also environmental, energy and transport issues are addressed and an additional focus is on research and innovation, greater energy efficiency and greater use of renewable energies. Legal persons of public or private law as well as individuals can apply. The funding priorities support sustainable projects that are carried out across borders by at least two partners from two different countries in the program area, one of which must be a member state of the EU. The deadline for submitting project outlines and project proposals to be discussed at the 12th Steering Committee meeting is 25 September 2018.

<http://swissinnovation.org/news/web/2018/13-180418-ed>



## Call: Innovative Projects Between South Korean and Swiss Partners

(Innosuisse, April 30, 2018)

The Korea Institute for Advancement of Technology (KIAT) and the Swiss Innovation Agency (Innosuisse) are launching a new call in 2018 for joint innovation projects between Switzerland and South Korea. The call for joint innovation projects is aimed at companies and research institutions in Switzerland and South Korea (consortia) looking to carry out a joint science-based innovation project. It is aimed for Swiss and South Korean companies which see the two countries as a major market and research location; and which want to take advantage of the benefit from KIAT and Innosuisse funding. The Call is open for all topics. However, projects in following topics are particularly appreciated: Biotech; Medtech, Renewable Energy; Mobility, Digitalization; Industry 4.0; IoT, Additive Manufacturing, Smart Materials / Innovative surfaces, Augmented and Virtual Reality. The deadline for submission is 10 August 2018.



<http://swissinnovation.org/news/web/2018/13-180430-30>

## Upcoming Science and Technology Related Events

### POLAR 2018

June 15-26, 2018

<https://www.polar2018.org>

SCAR & IASC, Arctic/Antarctic Research  
Davos

### ETH Industry Day

September 5, 2018

<http://www.ethz.ch/industryday>

Technology Transfer, Innovation, Research  
Zurich

### Crypto Valley Conference

June 20-22, 2018

<https://www.cryptovalleyconference.com>

Blockchain Technology, Real-Life Application  
Zug

### Rob | Arch 2018 Conference

September 9-15, 2018

<http://www.robarch2018.org>

Robotic Fabrication in Architecture, Art and Design  
Zurich

### 2nd Swiss Diagnostics Start-up Day

June 21, 2018

<https://is.gd/eWNiLZ>

Biomaterials, Biotech  
Olten

### 30<sup>th</sup> Annual EAIE Conference and Exhibition

September 11-14, 2018

<https://www.eaie.org/geneva.html>

Higher Education Exhibition  
Geneva

### International Symposium on Reactive Intermediates and Unusual Molecules (isrium) 2018

July 15-20, 2018

<http://www.isrium2018.ethz.ch/>

Chemistry, Research  
Ascona

### FinTech+

October 1-2, 2018

<https://2018.fintechplus.ch/>

Wealth Management, Insurance, Social Finance  
Zurich



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



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