



Science-Switzerland, December 2015 - January 2016

News on Swiss science, technology, education and innovation

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swissnex Day 15 in Fribourg

(swissnex Boston, December 03, 2015)

As witnesses to the digital revolution, every year we produce the equivalent amount of data as that produced over the course of the entire human history. While some consider Big Data to be akin to the discovery of oil, its value is in its ability to extract meaning from raw data and transform it into knowledge and innovation. Against this backdrop, governments and businesses around the world are investing heavily in this new field to remain competitive. Where does Switzerland stand in this regard? Are we seizing all available opportunities? Beyond the question of how Big Data fuels innovation and impacts our society, new data technology also challenges the traditional scientific method. Does “data-driven science” equate to a scientific method void of theoretical models and hypothesis? Hosted by the University of Fribourg and inaugurated by State Secretary Mauro Dell’Ambrogio, the first half of the swissnex Day’15 will be devoted to exploring such questions through a discussion led by a panel of distinguished experts.



<http://swissinnovation.org/news/web/2015/00-151203-d8>

World’s Most International Universities 2016

(Times Higher Education, January 14, 2016)

In addition to its World University Ranking, Times Higher Education has produced a list of the world's most international universities. The "international outlook" indicator considers the proportion of international students, faculty and the institution’s research papers that are published with at least one author from another country. In the 2016 edition, Qatar University tops the list, followed by the University of Luxembourg and the University of Hong Kong, while the UK is the nation that does the best on this measure overall. Four Swiss universities appear in the top 10: EPFL ranks 4th, University of Geneva 5th, ETH Zurich 7th and the University of St. Gallen 8th. Moreover, most of the other Swiss universities appear in the top 100: the University of Basel ranks 16th, the University of Neuchatel 37th, the University of Zurich 43rd, the University of Lausanne 56th, the University of Fribourg 64th, and the University of Bern 92nd.



<http://swissinnovation.org/news/web/2016/02-160114-73>

Wyss Acceleration Center in Zurich

(ETH Zurich, December 08, 2015)

The Wyss Translational Center Zurich (Wyss Zurich), founded jointly by ETH Zurich and the University of Zurich has the goal to transition knowledge from basic or pre-clinical research into a new medical treatment or products. Breakthrough discoveries in medical and technological fields have to be made available as soon as possible for the benefit of mankind. The interdisciplinary development center is situated at the interface between medicine, natural



sciences and engineering. Currently the center is working on regeneration projects for liver and heart, biocompatibility of cardiac assist pumps, and robot vision.

<http://swissinnovation.org/news/web/2015/00-151208-95>

1. Policy

UNESCO Chair in Hydropolitics at University of Geneva

(University of Geneva, December 03, 2015)

Water-related crises are one of the most serious global risks identified by the World Economic Forum in its 2015 report. Switzerland is committed to preventing water-related conflicts and to using sustainable water resource management to promote peace. The University of Geneva (UNIGE) has established a UNESCO Chair in hydropolitics, thereby reinforcing its excellence in this field. Led by Professor Géraldine Pflieger, it will integrate research and education in water resource management, and facilitate synergies among the many researchers working on related environmental and political themes. The goal is to build bridges between science and policy to foster science-based decision making. As well as encouraging international collaboration, the Chair will educational resources to analyze water governance issues, making them freely available online.

<http://swissinnovation.org/news/web/2015/01-151203-a6>

Strengthened Collaboration Between CERN and US

(CERN, December 18, 2015)

Ever since CERN has been founded, collaboration between the US and CERN was strong and the number of US partners for CERN has multiplied over the years, with the arrival of laboratories such as Fermilab and SLAC on the global particle physics scene. Today, the US contributes to the capital investment in the facility, to the running of LHC experiments and to the globally distributed computing infrastructure necessary to process the vast data volumes. A new agreement confirms the US' commitment to the LHC project, and for the first time, European participation through CERN in pioneering neutrino research in the US is set down in black and white. CERN will serve as a platform for European scientists engaged in neutrino detector R&D who will go on to work at neutrino experiments in the US and elsewhere.

<http://swissinnovation.org/news/web/2015/01-151218-b3>



2. Education

University of Basel Becomes Part of the European Campus

(Basler Zeitung, December 09, 2015)

The University of Basel has signed the foundation documents of the European Campus «Eucore», together with the universities of Freiburg, Haute-Alsace and Strassburg as well as the Institute of Technology in Karlsruhe. As a member of Eucore, the University of Basel has access to the European scope of education and research and therefore to European aid money. With this new collaboration, the University of Basel will see a further strengthening of its research location and for now, this should cushion the difficult situation that has arisen from the Swiss immigration referendum and simplify the exchange between the universities. Around 15'000 researchers and 115'000 students will profit from this cooperation.

<http://swissinnovation.org/news/web/2015/02-151209-e4>



Colorado Interested in Swiss Dual Vocational Training

(Le Temps, January 28, 2016)

A 50-member delegation from the state of Colorado travelled to Switzerland in order to better understand the mode of the Swiss model for vocational education. The delegation met with representatives of the State Secretariat for Education, Research and Innovation SERI and the Swiss Federal Institute for Vocational Education and Training. The visit involved further meetings with representatives of the confederacy as well as deputies of Swisscom, Mikron,





Pilatus and the Swiss Hotel Management Academy Lucerne. Various US representatives confirmed the difficulties they have in finding qualified labor force. With \$10 million state funding, Pilatus will now initiate an apprenticeship pilot project for 300 youths in Colorado, together with Intertech Plastics, Mikron and Sandoz.

<http://swissinnovation.org/news/web/2016/02-160128-72>

3. Life Science / Health Care

30 Genes Influence Physical Ageing

(ETH Zurich, December 01, 2015)

Out of 40,000 genes from three different organisms, scientists at ETH Zurich found genes that are involved in physical ageing. They measured the amount of messenger RNA molecules, as a measure of gene activity. Out of the large data set, they found only 30 genes in common that significantly influence the ageing process. By blocking some of these genes, the healthy lifespan of laboratory animals could be extended. Researchers think that the same mechanism occurs in humans. Accordingly, a follow-up study in humans is being planned. The overall aim of the scientists is however, not for people to grow even older, but rather to stay healthy for longer.



<http://swissinnovation.org/news/web/2015/03-151201-4b>

Characterizing the Microbial Flora of Plants

(ETH Zurich, December 02, 2015)

In research recently published in Nature, scientists from the ETH Zurich and the Max Planck Institute for Plant Breeding Research in Cologne have described a large inventory of the bacterial strains found to be living on leaves and the root of thale cress (*Arabidopsis thaliana*) plants. The different species of bacteria they found number in the ten thousands of which 432 were studied in detail. In a surprising twist they found that more than 50 percent of the observed species could be cultivated in the laboratory, a percentage that is a lot higher than previous studies suggested. Now the goal is to fully characterize the role of the bacteria for the well-being of plants and reproduce the fundamental natural processes of the interactions in the laboratory.



<http://swissinnovation.org/news/web/2015/03-151202-63>

Long Term Memory through Exercising

(University of Basel, December 02, 2015)

Exercise can result in the development of new brain cells in adult humans and animals – a process called adult neurogenesis. Researchers from the University of Basel have indeed found that mice that have been running a wheel showed better long term memory than inactive mice. Running mice were able to recall subtle differences of objects from memory, which is called pattern separation. Microscopic analysis of the mice's brains showed that running mice had developed about twice as many new cells as sedentary mice. The results of this experiment have been published in the journal Brain Plasticity.

<http://swissinnovation.org/news/web/2015/03-151202-89>

Sleep Specialist Wins Prestigious ERC Grant

(University of Fribourg, December 02, 2015)

The sleep specialist and biopsychologist Professor Björn Rasch at the University of Fribourg has been awarded the European Research Council (ERC) Starting Grant, one of the ERC's largest grants. This support to talented researchers totals CHF 1.63 million over 5 years. Selected from 2,920 applicants, Professor Rasch is investigating how to sleep better without medication. He aims to discover whether psychological techniques applied before going to bed can affect sleep in an objective and measurable way. This could extend deep sleep, essential for health and mental recovery, providing a real solution for people with sleep disorders – particularly the elderly. It could also replace medication, which reduces deep sleep and, with prolonged use, causes dependency and side effects.

<http://swissinnovation.org/news/web/2015/03-151202-45>



Brain Tumor Growth Impacted by Signaling Pathway Activity

(University of Basel, December 04, 2015)

Researchers led by Professor Verdon Taylor at University of Basel's Department of Biomedicine published novel results regarding the formation of gliomas, the most common type of brain tumor in adults. In their research they show how an inactivation of the Notch signaling pathway can lead to more aggressive tumors. The Notch pathway is important in many processes in the human body including central nervous system development. The finding that an inactivation of the Notch can lead to faster growing gliomas could lead to novel treatments as well as refined diagnostic methods, possibly improving the outlook of patients who as of today often face dire prognoses.

<http://swissinnovation.org/news/web/2015/03-151204-f0>

Microflora Linked to Tolerance to Cold and Obesity

(University of Geneva, December 04, 2015)

Researchers at University of Geneva demonstrated few weeks ago that the absence of gut microbiota can be linked to increased brown fat activation as a mean of limiting obesity. Today, pursuing their research, the scientists show that mice exposed to cold experience a sharp shift in their microbiota composition, rendering them leaner and more sensitive to insulin. Transplantation of this cold-modified microbiota to germ-free mice is sufficient to enable complete tolerance to cold. Indeed, it increases their brown fat levels and thus improves their sensitivity to insulin, even without exposing them to cold. However, prolonged cold exposure can also attenuate the body weight loss as the body takes up more calories from the consumed food. This is due to a disappearance of a key bacterium, Akkermansia muciniphila, which acts on the way nutrients are absorbed by the organism. When the bacterium is artificially administered, the weight loss resumes. This discovery may lead researchers to develop new solutions to fight obesity.

<http://swissinnovation.org/news/web/2015/03-151204-28>

New Musculoskeletal Research Center Inaugurated

(University of Zurich, December 04, 2015)

The University of Zurich inaugurated its new center for musculoskeletal research in Zurich. The new building is designed to facilitate communication between researchers by architectural means, allowing employees to see their coworkers from their benches. Introducing a work environment encouraging cooperation between different scientists is meant to boost the research and development in the center, allowing for novel breakthroughs in a field that is ever more important. As the new building is located next to the university hospital building Balgrist, the planners hope that the quick translation of research results into therapies will be facilitated. The construction of the novel campus was financed through private means thanks to investments by the Balgrist Campus AG, whose main contributor is Dr. Hansjörg Wyss.



<http://swissinnovation.org/news/web/2015/03-151204-8d>

More Fat Cells Can Lead to Better Health

(ETH Zurich, December 06, 2015)

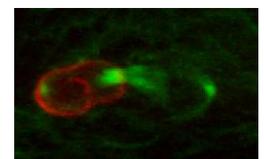
Professor Christian Wolfrum, Head of the Laboratory of Translational Nutritional Biology at the ETH Zurich is looking for novel methods to increase the formation of fat cells. Contrary to popular belief, more fat cells can lead to better health, as a larger number of fat cells in general means smaller fat cells. Especially in the development of diseases, like for example diabetes, the cell size is a determining factor. The reason for this is that large fat cells are unable to absorb fatty acids, leading to higher concentrations of fatty acids in the bloodstream, which in turn can lead to the development of insulin resistance. Studying the process of fat cell formation the group was able to find substances that stimulate fat cell formation, a finding that could lead to new treatments of diabetes down the road.

<http://swissinnovation.org/news/web/2015/03-151206-4c>

Asymmetric Cell Division Mechanism Discovered

(University of Geneva, December 07, 2015)

Researchers at the University of Geneva have discovered one of the mechanisms behind asymmetric cell division. This type of cell division signifies a cell splitting into two different types of cells, which means that different information was sent to each cell. Information, or instructions for the cell, is stored in molecules known as endosomes, and these endosomes are transported by a spindle. A set of proteins in the spindle move the endosomes from one end to another, terminating at the two daughter cells. If the proteins are distributed





unequally, the endosomes are more likely to move in one direction than in the other, which causes the asymmetric distribution of information and thus asymmetric cell division.

<http://swissinnovation.org/news/web/2015/03-151207-ae>

Microscope that Sees Live Cells in 3D

(EPFL, December 09, 2015)

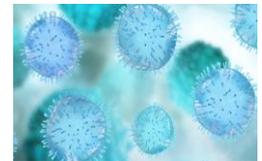
EPFL spin-off Nanolive has launched the 3D Cell Explorer. A microscope that will allow researchers to peer inside living cells without damaging them, that is without having to prepare the sample in advance or stain them. Thanks to its specially designed software, users can tint various parts of a living cell and observe the cell's behavior and reactions in real time. The device works like an MRI scanner: it takes images at different depths in the cell, then reassembles them using its smart holographic software which can tint any part of the scanned cell based on its refractive index. This new tool could be a real boom for researchers in such areas as infertility.

<http://swissinnovation.org/news/web/2015/03-151209-90>

Data Analysis Reveals Flu Replication Proteins

(University of Zurich, December 09, 2015)

The influenza virus requires certain host proteins to replicate, so blocking these proteins could be a method to fight a flu infection. One host protein that was recently discovered by an international team involving the University of Zurich is UBR4. This protein helps transport the virus from the interior of an infected host cell to the surface, allowing it to replicate and spread. The study combined several large sets of data and provides a public Internet interface for other researchers to use to explore the results.



<http://swissinnovation.org/news/web/2015/03-151209-fb>

Animal Brain Research for Better Mental Illness Treatment

(University of Zurich, December 10, 2015)

The prefrontal cortex region of the brain is responsible for many cognitive skills and is also at the center of several mental illnesses, such as schizophrenia. To better treat these illnesses, researchers at the University of Zurich and ETH Zurich want to apply new methods of brain research to understanding the prefrontal cortex, starting with studies on macaque monkeys. These monkeys have the most similar prefrontal cortex structure to humans. The Canton of Zurich has approved the universities' license to perform these experiments, though it is not final yet. The universities follow strict laws and guidelines to minimize the negative impact on animals when performing research.

<http://swissinnovation.org/news/web/2015/03-151210-43>

Faulty Neuronal Communication May Provoke Dementia

(University of Fribourg, December 10, 2015)

Changes in signaling within our brains may cause memory loss, as occurs in neurodegenerative diseases like Alzheimer's disease. Researchers at the University of Fribourg have deciphered the major molecular processes affecting memory and learning. Nerve cells (neurons), connected via synapses, connect and exchange signals, but when their function becomes disrupted they may atrophy and die. In people with Alzheimer's, this neurodegeneration causes disorientation, learning difficulties and memory loss. The Fribourg study investigated the role played by the Notch1 receptor and signaling pathway, which allows direct communication between neighboring cells. The study findings, published in *Frontiers in Cellular Neuroscience*, reveal how changes in this signaling affect the learning process, possibly contributing to dementia, and may thus play a key role in regenerative medicine.



<http://swissinnovation.org/news/web/2015/03-151210-07>

How Astrocytes Affect Our Memory

(University of Zurich, December 11, 2015)

Researchers from the universities of Lausanne and Zurich could show that astrocytes play an essential role in inhibiting cognitive skills in patients with inflammations in their brains, as it is the case for MS patients. Astrocytes compose approximately half of our brain mass and even though they are long known, we don't know much about them. They belong to the glial cells and constantly affect the neurons' activity. Many brain diseases origin in deficient interactions between neurons and glial cells, and if the astrocytes disturb neural connections in the hippocampus the memory can be severely affected. Scientists could now identify the receptors that are essential in



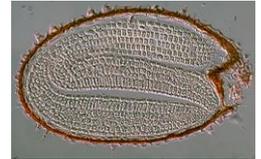
the progression of the disease. These receptors could be blocked medicinally which then alleviates the cognitive impairment of the patient.

<http://swissinnovation.org/news/web/2015/03-151211-87>

Plant's Wax Layers Key to Evolution of Seeds

(University of Geneva, December 15, 2015)

Researchers at the University of Geneva have just discovered one of the keys to this success of seeds' colonization of terrestrial habitats. Cutin is the main component of the cuticle that covers plants' leaves. This waterproof film, a very ancient adaptation to terrestrial life, prevents excessive water loss and protects plants against insects and various pathogens. Their experiments provide evidence that maintaining the thick layer of cutin exactly as such, which results from an ongoing dialogue between different molecular actors, is essential to the survival and propagation of the seed. Plants have thus recycled one of the first adaptations related to life on dry land, the cuticle, by assigning it these new roles to perfect their last major innovation: the seed.



<http://swissinnovation.org/news/web/2015/03-151215-ab>

Future of Digital Medicine

(Empa, December 15, 2015)

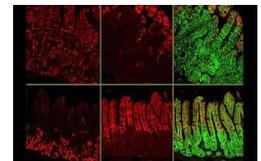
The SME Update at Empa has shown how doctors and researchers imagine the future of digital medicine and what research projects they are involved in. For instance, doctors are planning the continuous monitoring of patients using sensors that register parameters such as movement and heartbeat. These sensors could be integrated in textiles. Thanks to these sensors, doctors could make a remote diagnosis thus lowering hospital costs. Researchers have also developed a smartphone app that is able to detect stress. When a person is stressed, the smartphone will warn the patient and give instructions for some relaxation exercises.

<http://swissinnovation.org/news/web/2015/03-151215-7a>

Vitamin A Against Colon Cancer

(EPFL, December 15, 2015)

Researchers at the EPFL identified a pathway in persisting colon cancer cells that could become a target for novel treatments. Colon cancer is one of the major forms of cancer leading to a significant percentage of cancer deaths each year. The newly discovered pathway is highly dependent on HOXA5, an important protein whose absence leads to a disruption of the mechanism controlling stem cell proliferation. This in turn leads to abnormal growth of colon cancer cells. Searching for a way to reactivate HOXA5 the scientists at the EPFL identified vitamin A as a promising candidate. In first experiments with mice as well as tissue from actual patients, a treatment with vitamin A led to a normalization of the colon tissue.

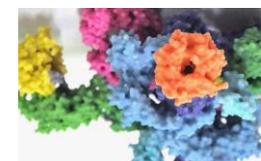


<http://swissinnovation.org/news/web/2015/03-151215-2e>

Architecture of mTOR Protein Complex Solved

(ETH Zurich, December 18, 2015)

It has long been known that the protein TOR (Target of Rapamycin) controls cell growth and is involved in the development of diseases such as cancer and diabetes. Scientists from ETH Zürich and the Biozentrum of the University of Basel have now succeeded in revealing the unique architecture of the mammalian TOR complex 1 (mTORC1) in detail. Combining biochemistry, crystallography and electron microscopy, researchers could explain how proteins are recruited to the active site of the complex and how the rapamycin-induced change in the complex composition affects substrate specificity, leading in turn to the pharmaceutical effects of the drug. The results have been published in the latest issue of Science.

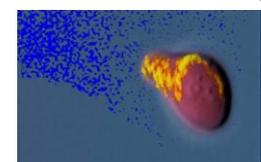


<http://swissinnovation.org/news/web/2015/03-151218-33>

Cell Signal Detection and Movement Mechanism

(ETH Zurich, December 20, 2015)

Cells have the ability to detect chemical signal gradients and move in the direction of the signal source. Researchers at ETH Zurich have discovered how yeast cells do this to find sexual partners. These cells have a protein complex called a polarity site that performs the detection, processing, and movement all by itself. Certain proteins in the complex receive the signal, another causes the polarity site to move towards the signal, and a third regulates the entire process. Once the polarity site has moved in the correct direction, the movement





stops and the cell grows in the direction of the signal. This research is still at the level of fundamental research but will hopefully soon have further applications.

<http://swissinnovation.org/news/web/2015/03-151220-a2>

New Antibodies Overcome Malaria Parasite Diversity

(Università della Svizzera Italiana, December 21, 2015)

A study conducted by Università della Svizzera Italiana in collaboration with the KEMRI-Wellcome Trust Research Program in Kenya and the University of Oxford presents a new groundbreaking mechanism that generates super-antibodies that can broadly target malaria parasites. The most deadly malaria parasite, *Plasmodium falciparum*, uses the chameleon-like technique of continuously changing its protein coat. Antibodies that simultaneously target many different parasites would potentially lead to the development of new interventions against malaria. The newly discovered antibodies are not only special for their broad reactivity, but also for their novel and surprising structure characterized by the presence of a large extra fragment. Unlike conventional antibodies that are made by assembling DNA segments, the new antibodies contain an additional large piece of DNA derived from a gene called LAIR1. Remarkably, this extra piece alone is sufficient to bind to malaria parasites.

<http://swissinnovation.org/news/web/2015/03-151221-3e>

Mechanotransduction Turns Eyes into Skin

(EPFL, December 21, 2015)

Chronic inflammation can lead to many disorders including cancer formation and is thus of interest to many researchers. One possible consequence of chronic inflammation, the irregular change of the nature of a tissue also known as metaplasia, is the focus of new research published by the EPFL's Swiss Institute for Experimental Cancer Research (ISREC). The researchers led by Prof. Freddy Radtke were able to show that the change in the environment of stem cells of the murine cornea due to prolonged inflammation, leads to stiffening of the tissue. The stiffness then leads to changes in stem cell differentiation programs induced by mechanotransduction sensed by the corneal stem cells. As a result of this newly discovered mechanism, the researchers observed how stem cells differentiated into skin cells instead of corneal epithelial cells.

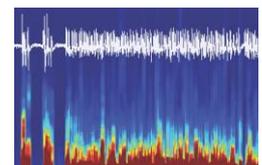


<http://swissinnovation.org/news/web/2015/03-151221-b0>

The Mechanisms of Controlling Sleep

(University of Bern, December 21, 2015)

The importance of sleep is well known to be essential for overall health. However chronic sleep perturbances affect many members of our society and recent results have shown that sleeping patterns can even serve as early disease markers for neurological disorders. Researchers from the University of Bern have now described a mechanism that controls brain circuits responsible for light or non-REM sleep. Using optogenetics, a novel technique, which is rapidly growing in popularity among researchers, allowing for a controlled activation and deactivation of neurons via light pulses, they found that a waking state can be induced in mice by transient activation of the discovered mechanism. Further they were able to show that a chronic activation leads to an extended period of wakefulness. The researchers hope that the identified pathway will serve as a target for future treatments of a variety of sleep disorders.



<http://swissinnovation.org/news/web/2015/03-151221-7f>

Reproductive Labor in Ant Societies

(myScience, January 22, 2016)

To understand the organization of ant colonies, Romain Libbrecht from the University of Lausanne UNIL has studied the fundamental mechanisms that determine the division of labor between queen and workers. In the last years, evidence of epigenetic mechanisms involved in the division of reproductive work in colonies of social insects has grown stronger. Libbrecht looked at a special species, called *Cerapachys biroi*, that doesn't have a queen. Every member of the colony can reproduce by parthenogenesis without any male gamete, creating clones. In the reproductive phase all ants lay eggs, behaving like a queen, and in a second stage they feed the offspring, acting like workers. This allowed the researchers to directly compare the methylation of the DNA, the most common epigenetic mechanism, in genetically identical ants. To Libbrecht's surprise and opposed to other findings, no difference in methylation could be detected and thus the correlation between methylation and reproduction is further to be probed.



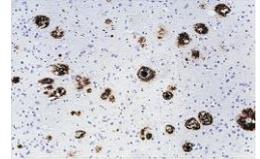
<http://swissinnovation.org/news/web/2016/03-160122-93>



Alzheimer's Disease Could Be Transmissible

(University of Zurich, January 26, 2016)

Alzheimer's disease (AD), an illness characterized by progressive dementia and brain plaques consisting of A β protein, has long not been recognized as transmissible. However, plaques recovered from brains of AD patients were repeatedly found to induce further plaques in the brains of laboratory mice where they were injected. Now, researchers from the University of Zurich and the Medical University Vienna demonstrated Alzheimer-type pathology in brains of recipients of dura mater grafts. The dura mater, a leathery membrane covering the brain and spinal cord, is sometimes transplanted after a surgery to allow the brain to heal. Some patients suffered from the fatal Creutzfeldt-Jakob disease after their surgery, probably caused by infection with prions through the dura mater grafting.

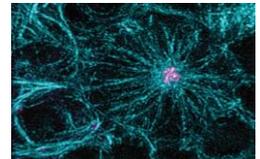


<http://swissinnovation.org/news/web/2016/03-160126-fe>

Protein Found to Play Key Role in Brain Development

(University of Basel, January 28, 2016)

Thanks to new super-high resolution microscopy, Prof. Clemens Cabernard's team at the University of Basel was able to make a new discovery in understanding microcephaly, an abnormally small brain [such as associated with the zika virus]. By studying dividing neuroblasts, nerve stem cells, in fruit flies, the effects of a specific protein named Wdr62 on brain development became clear. Like all stem cells, neuroblasts divide asymmetrically, so cell division not only forms a neuroblast, but also another cell which is one step closer to a mature nerve cell. Wdr62 was found to play a key role in aligning several structures within the neuroblast during division, and the absence of Wdr62 led to faulty positioning of these structures, thus compromising the division process. In fruit flies, this resulted in a 40 percent smaller brain volume. This new knowledge about Wdr62 means an important step forward in unraveling the neuroblast division process.



<http://swissinnovation.org/news/web/2016/03-160128-e9>

Strong Pipeline of New Drugs

(myScience, January 28, 2016)

2015 has been a successful year for Roche, according to CEO Severin Schwan, mainly due to new drugs and diagnostic platforms. Sales raised by 5% to 48.1 billion Swiss Francs. In the US, growth amounted to 6%. The immunology sector grew by 24% thanks to the outstanding market acceptance of Esbriet, a treatment against idiopathic pulmonary fibrosis. In 2015, Roche obtained the breakthrough therapy designation of the FDA and got approval for five of their products. The FDA has further granted an accelerated admission procedure for the cancer drug Alecensa. In addition, a promising pipeline of products has been established. Roche counts on an increase in sales by a small to moderate single figure for the year 2016, assuming constant exchange rates.

<http://swissinnovation.org/news/web/2016/03-160128-d5>

4. Nano / Micro Technology / Material Science

World's Smallest Color Picture

(ETH Zurich, December 15, 2015)

Using their 3D NanoDrip printing technology researchers from the ETH spin-off company Scrona set a new world record for the tiniest printed color picture. The picture depicting clown fish and a sea anemone was printed on an area of 0.0092mm² which corresponds roughly to the size of the cross-section of a human hair. The NanoDrip technology takes advantage of nanoparticles called quantum-dots, which allow the researchers to create an image with vivid colors by printing layers of red, green and blue quantum-dots. The resulting picture is about the size of a single pixel of a retina display and therefore not visible without the help of a special microscope. In the future researchers hope that technologies using nanostructured materials like quantum-dots could revolutionize display technology.



<http://swissinnovation.org/news/web/2015/04-151215-b4>



Spintronics, Low-Energy Electricity Take a Step Closer

(EPFL, December 18, 2015)

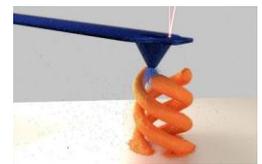
EPFL scientists have identified bismuth iodide as a topological insulator and the first representative of a whole new structural class of materials that could propel topological insulators into applications. One clear advantage of bismuth iodide is that its structure is more ordered than that of previously known topological insulators, and with fewer natural defects. For experimental testing of the properties of bismuth iodide, angle-resolved photoemission spectroscopy or ARPES, turned out to be the crucial technique. Bismuth iodide as a topological insulator could one day enable electricity with less energy loss, spintronics, and perhaps even quantum computing. The work is published in Nature Materials.

<http://swissinnovation.org/news/web/2015/04-151218-f2>

Novel Copper 3D Microprinting System

(ETH Zurich, January 20, 2016)

Scientists at ETH Zurich have refined the 3D microprinting system FluidFM, making it possible to print overhangs without templates and in one step. A droplet of liquid is placed on a base plate made of gold. The droplet is penetrated by the tip of a micropipette that acts as a print head. A copper sulfate solution flows steadily through the pipette. Using an electrode, scientists then apply a voltage between the droplet and the substrate, causing a chemical reaction under the pipette aperture. The copper sulfate emerging from the pipette reacts to form solid copper, which is deposited on the base plate as a tiny 3D pixel. The printer can produce individual 3D pixels with diameters ranging from 800 nanometers to more than five micrometers. This could revolutionize watchmaking or keyhole surgery, for example.



<http://swissinnovation.org/news/web/2016/04-160120-f9>

Fabrication of Highly Efficient Perovskite Nanowires

(EPFL, January 25, 2016)

EPFL scientists have developed a method for controlling the growth of nanowires from perovskites which can be automated on an industrial scale. Perovskite nanowires are extremely thin wires used in sensors, nanoelectronics and photonics, making excellent candidates for the efficient transport of electrons and excitons. Their advantage is the efficient evacuation of photoinduced carriers towards the electrodes. Nanowires serve as conductive highways, and the charges have a high probability to arrive at the electrodes and create an electric current. In order to use this method in solar cells, perovskite nanowires have to build an actual surface and therefore need to be of the exact same length and diameter. For this reason, EPFL-researchers guided the growth of perovskite nanowires with nanofluidic channels, which are part of a tiny, chip-mounted circuitry allowing the control and manipulation of fluids on a nanometer scale.

<http://swissinnovation.org/news/web/2016/04-160125-76>

Nanosurf Moves into Swiss Integrative Center for Human Health

(Freiburger Nachrichten, January 26, 2016)

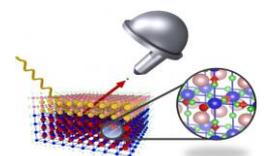
Nanosurf, a American manufacturer of microscopes in the range of nanometers allowing for three-dimensional observation of samples, joins the Swiss Integrative Center for Human Health (SICCH). SICCH is one of the centers of the Bluefactory in Fribourg focusing on life and material sciences. The collaboration is fruitful not only but also because of the new and innovative technology that Nanosurf brings in. On the other hand, Nanosurf profits from the on-site experts that may help improving their devices. The Bluefactory network of universities and research institutions includes 8000 staff members, 400 professors and 17'000 students. SICCH further reports that negotiations with another 30 appliance manufacturers are under way.

<http://swissinnovation.org/news/web/2016/04-160126-6a>

Slow Electric Current Is Key to Power-Saving Electronics

(Paul Scherrer Institute, January 27, 2016)

Electronic devices account for a substantial portion of worldwide energy use. Materials that possess the needed characteristics for lower energy consumption have to be magnetic and superconductive, but they exhibit those properties only at very low temperatures. A team from the Paul Scherrer Institute PSI has now determined the reasons for this. Electrons that flow in the material pull on the ions that form it and thus deform the framework. These ions attract the electrons and decelerate them. But apparently the same deformation enables the material to become superconducting, namely when electrons bound together in pairs move unhindered through the





material. Knowing this, researchers could alter similar materials in a targeted way so that they also remain superconducting at higher temperatures, for example by replacing individual oxygen atoms in the material with atoms of another element possessing extra electrons.

<http://swissinnovation.org/news/web/2016/04-160127-6e>

Vanadium Oxide Based Super Battery

(NZZ, January 31, 2016)

ETH Zurich and Belenos, a company belonging to the Swatch Group, have developed a battery that provides 30 percent more power by unchanging weight. In order to enhance the battery's efficiency, a team around Reinhard Nesper, professor emeritus for chemistry at ETH Zurich, has found vanadium(V) oxide to take three times more positively charged lithium ions than the conventional lithium iron phosphate. The range of an electric car could be boosted from 500 to 700 km and the charging time of the new battery is halved. Another advantage is the absence of cobalt and nickel in the new type battery, two elements that are hard to extract and toxic, respectively. In contrast, vanadium is a byproduct of steelmaking and therefore abundant. Studies have shown that as much as 10 million electric and hybrid cars will be sold in 2023. Swatch CEO Nick Hayek counts on battery sales worth over CHF 10 billion in the next five years.



<http://swissinnovation.org/news/web/2016/04-160131-c4>

5. Information & Communications Technology

Smart Tennis Court

(EPFL, December 04, 2015)

An EPFL spin-off has come up with a technology that is embedded in the tennis court surface, which provides performance statistics for the players, such as foot impact and faults, and also brings augmented reality to the court. Players can choose goals or challenges, such as hitting virtual targets on the court with the ball. They can also compare their game with their opponents or with the pros. The start-up will run pilot tests on a court together with interested partners.

<http://swissinnovation.org/news/web/2015/05-151204-16>

Algorithms to Make a Campaign go Viral

(EPFL, December 14, 2015)

For a marketing message to spread like wildfire, not only does it have to reach the target audience, but it also has to be well-placed and well-timed. SThAR, a Federal Institute of Technology Lausanne (EPFL) spin-off based at the institute's Innovation Park, draws on large quantities of telecommunications data to identify where and when to deliver a message most effectively. The startup has developed algorithms that model connectivity among people, their mobility patterns and collective behavior. It offers geographic and temporal targeting to increase a message's impact. It also helps develop communications-related actions, using traditional and social media, to further boost the spread of the message. This could be useful in electoral and advertising campaigns, as demonstrated successfully in tests during local elections in Spain.



<http://swissinnovation.org/news/web/2015/05-151214-15>

Strategic Partnership in Digital Revolution

(EPFL, December 16, 2015)

The digital revolution is transforming our way of life and our economy in a fundamental and lasting way. Swisscom and EPFL have established a strategic partnership to take advantage of EPFL's innovative ecosystem and Swisscom's expertise in telecommunications, to meet the challenges of an increasingly connected society. By creating a Swisscom Digital Lab on the EPFL campus, the partners aim to develop a digitalization competence center. This will enable the study of a wide range of applications that are opening up thanks to digitalization – new user interfaces, professional and household robotics, intelligent towns and buildings, biological sensors and artificial intelligence. This partnership is set to make Switzerland an international model for access to digital solutions.

<http://swissinnovation.org/news/web/2015/05-151216-e9>



Anonymous Analysis of Mobile Phone Data

(Tagesanzeiger, January 31, 2016)

Teralytics, a spin-off of ETH Zurich, collects and analyses personal data from telecommunication companies. A mobile phone connects itself regularly to an antenna – approximately 300 times a day. Every time the signal is registered the owner of the mobile phone can be located. Teralytics developed software to easily and efficiently find the interesting data according to the customer's problem. However, the data is anonymous and there are no personal profiles built up with the collected data. It's not the individual that is of interest to Teralytics, but the behavior of the population in its entirety. The company employs more than 50 engineers and has recently expanded to New York and Singapore. Donald Kossmann, founder of Teralytics, is convinced that if you know how to wisely use data, you can make good money.



<http://swissinnovation.org/news/web/2016/05-160131-44>

6. Energy / Environment

2016 Watt d'Or Awards for Energy Efficient Projects

(Swiss Federal Office of Energy, January 07, 2016)

2016 marks the tenth anniversary of the Watt d'Or Awards, which are won by Swiss organizations and enterprises that have shown outstanding commitment and progress towards a sustainable future concerning energy and the environment in the past year. This edition's winners for each of the six categories are Groupe E with RoadLab (Society), Elektroplan Buchs & Grosse AG and ElektroLink AG with smart-grid-ready building (Energy technologies), Designergy SA with Triactive core roof (Renewable energies), the Swiss Federal Railways with ADL, "the Green Wave of rail transport" (Energy-efficient mobility), Swisscom AG and Ernst Basler + Partner with Swisscom Business Park Ittigen (Buildings and space), and both Coop with "Energy and CO2 vision: deeds instead of words" and Migros with Generation M (Corporate strategy). Although no prize money can be won with the award, it's nationwide prominence will be highly valuable for CSR branding and guarantees extensive media coverage.



<http://swissinnovation.org/news/web/2016/06-160107-1c>

Costly Carbon Capture and Storage

(PSI, December 01, 2015)

The worldwide emissions of carbon dioxide are still rising and around 50 percent of it is due to fuel, coal and gas-fired power plants. One solution to this problem is storing the emissions in the ground, a method called Carbon Capture and Storage (CCS). The carbon dioxide is concentrated and then stored in a geologic reservoir. If this reservoir lays more than 800 meters below the earth's surface, capped by impervious rock and flooded with saltwater, the carbon dioxide eventually transforms into carbonate rock. Estimations show that it is possible to store emissions from many decades. However, CCS requires a lot of energy and plants using CCS produce power that may cost up to 90 percent more. However, if carbon taxes were raised, CCS would be economically efficient. The use of CCS is particularly interesting in countries like India and China, where fossil-fuel electricity production is increasing steeply.

<http://swissinnovation.org/news/web/2015/06-151201-1b>

Environmental Impact of City Dweller Travel

(EPFL, December 07, 2015)

While city dwellers typically travel less to commute and therefore pollute less in doing so, they travel more on occasional leisure trips such as to visit friends or seek out nature. This increased leisure travel is thought to cause greater pollution by urbanites than by suburbanites. However, research at EPFL shows that, because urbanites are more likely to use public transportation rather than cars, the overall pollution by urbanites is lower. Additionally, not all leisure travel is to seek nature outside of the city. Instead, the researchers propose that travel by urbanites deliberately goes with the lifestyle of living in a city, and can include travel to other cities.



<http://swissinnovation.org/news/web/2015/06-151207-10>



Studying the Feasibility of Re-burying Carbon

(EPFL, December 17, 2015)

The UN Climate Conference ended with a promising deal to reduce our impact on the climate, ratified by all 190 participating countries. Technology to remove excess carbon is certainly part of the solution. Mature, proven technologies like underground carbon sequestration will be crucial during the transition period until renewable energy becomes the norm. The Federal Institute of Technology Lausanne (EPFL) has developed facilities to reproduce the conditions at depths down to seven kilometers, as well as tools to appropriately design installations for sequestering carbon dioxide, and to predict the behavior of rock layers after injecting the gas. With support from the Swiss Federal Department of Energy, the institute is currently identifying potential sites to run a full-scale pilot test to prove the feasibility of carbon sequestration technology.



<http://swissinnovation.org/news/web/2015/06-151217-8a>

Fast 2.2 MWh Capacity Charging of EVs on Any Grid

(EPFL, January 20, 2016)

While the batteries for electric vehicles (EVs) become available with ever increasing capacities, the charging cycle remains the weak link compared to fuel-powered cars. Whereas filling up diesel for a minute and a half gives a range of up to 1000 km, charging electricity for the same time would only cover 6 km. The bottleneck is the power grid, which can only deliver a certain amount of power (typically 3-4 kW). EPFL's Industrial Electronics Lab has come up with a simple, yet useful solution: adding a high-capacity lithium iron battery as intermediate storage between the power grid and the EV. By continuously drawing power from the grid at a low rate and then discharging it quickly to juice up EVs' batteries in minutes, no adaptations to the grid infrastructure are required. Simulations show that their intermediate storage station with a 2.2 MWh capacity could replenish over 200 EV batteries a day.



<http://swissinnovation.org/news/web/2016/06-160120-05>

Low Power Harvesting Electric Devices

(20 Minuten, January 22, 2016)

In many situations it's desirable to avoid cables and batteries in devices, either because the replacement is intricate or the functionality should be guaranteed even if there is a power shortage. That's why researchers from ZHAW try to make the devices produce their own energy. One idea is to use vibrations, generated by a motor for example, that can bend a special material which thereby produces power. Other application areas are heaters with sensors that decide independently when a room should be heated. The new, intelligent system developed by ZHAW can use the difference in temperature between the radiator and the surrounding air to create power and sustain the sensors. A mere difference of 3 degrees is enough.

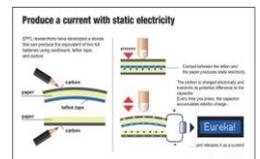


<http://swissinnovation.org/news/web/2016/06-160122-65>

Producing Power with Cardboard, Tape, and Pencil

(EPF Lausanne, January 25, 2016)

Paper, graphite from a pencil and Teflon tape. Xiao-Sheng Zhang, a postdoc at EPFL's Microsystems Laboratory, demonstrated that this is all you need to make a tiny generator with the same voltage as two AA batteries. This generator is easily made by sticking a strip of Teflon tape on one side of two pieces of paper and using a pencil to cover the other side with graphite. When the paper ends are taped together with the graphite facing outward, static electricity is generated. This static electricity which is discharged when pressing the two pieces together and releasing them can power a small LCD screen. Such tiny self-made and eco-friendly generators from readily available household materials could have endless possibilities to power sensors and other micro electronics at a minimal cost.



<http://swissinnovation.org/news/web/2016/06-160125-67>

Risks of Upward Lightning Strikes

(EPFL, December 11, 2015)

An EPFL study analyzed the mechanisms underlying upward lightning strikes, that is strikes initiating on the ground and headed skyward. The ground-to-cloud lightning is a poorly understood phenomenon and mainly occurs where tall and slender structures are located on high ground. These discharges are harmless when it comes to



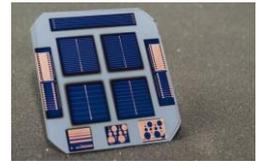
communication antennas and skyscrapers. The metallic structures, equipped with lightning rods, conduct the electricity from the ground to the top where they escape without causing any damage. However, they can seriously affect wind turbines. Their blades are of non-conductive materials and fragile by construction. By analyzing data of two mountaintop radio transmitters, scientists found that these high structures can record up to 100 more upward than downward strikes. Determining the exact nature of the risks will require careful study of both geographical and climatological data specific to each site.

<http://swissinnovation.org/news/web/2015/06-151211-b8>

Solar Cell Production Made Simpler and Cheaper

(EPFL, January 27, 2016)

An international group of researchers from Berkeley, EPFL and the Australian National University have created a high-efficiency silicon solar cell in a seven-step process both simpler and cheaper than the usual production method. The main advantage is the omission of the doping step of the silicon wafers. Doping is a process to introduce atoms that change the number of available electrons, thereby giving the wafers the desired conductive properties. So far, doping-free solar cells only reached power-conversion efficiency levels around 14%, significantly short of doped units that reach over 20%. The new doping free alternative uses molybdenum oxide, also known as moly oxide, at the sun-facing side of the solar cell, and lithium fluoride at the bottom surface, and introduce similar conductive properties as dopant atoms. Beside simplifying processing and decreasing losses in performance, these new materials could also prove useful in semiconductor components.



<http://swissinnovation.org/news/web/2016/06-160127-9d>

7. Engineering / Robotics / Space

What Is the Universe Made Of?

(University of Geneva, December 01, 2015)

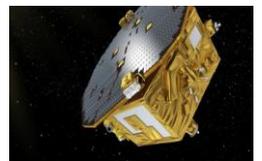
Matter known as ordinary, which makes up everything we know, corresponds to only 5% of the Universe. Approximately half of this percentage still eluded detection. Numerical simulations made it possible to predict that the rest of this ordinary matter should be located in the large-scale structures that form the “cosmic web” at temperatures between 100,000 and 10 million degrees. A team led by a researcher from the University of Geneva observed this phenomenon directly. The research shows that the majority of the missing ordinary matter is found in the form of a very hot gas associated with intergalactic filaments. The article reporting this discovery is published in the journal Nature.

<http://swissinnovation.org/news/web/2015/07-151201-6e>

Detecting Gravitational Waves with Satellites

(ETH Zurich, December 03, 2015)

ETH Zurich and the University of Zurich are part of a team to detect the gravitational waves theoretically predicted by Einstein. These waves are emitted by high energy events in the universe but have never been detected. An initial satellite, LISA Pathfinder, was just launched to test some of the components that will go on the ultimate eLISA satellite in 2034. ETH Zurich and the University of Zurich are responsible for the electronics and controls of the detection device. This device measures the distance between two gold-platinum masses to an accuracy of picometers, which would be affected by gravity waves. The satellite is so sensitive, the experiments could not be replicated on Earth.



<http://swissinnovation.org/news/web/2015/07-151203-71>

All-Terrain Robot for Nuclear Decommissioning

(EPFL, December 02, 2015)

An EPFL spin-off company, Rovenso, is developing an all-terrain robot that it hopes will be used in the decommissioning of nuclear power plants. The robot has a novel mechanical suspension that allows it to easily



traverse rough terrain with obstacles up to two thirds of its own height. The company has built a small prototype and it now trying to raise funds to build a full-scale prototype that will weigh 500kg.

<http://swissinnovation.org/news/web/2015/07-151202-8f>

Dark Matter Particle Explorer Satellite

(University of Geneva, December 17, 2015)

The DArk Matter Particle Explorer (Dampe) satellite has been launched from Jiuquan in NW China. Designed by the Chinese Academy of Sciences (CAS), in collaboration with a team of researchers from the University of Geneva (UNIGE), Dampe aims to detect dark matter – one of the great scientific mysteries of our time, forming 27% of our universe's mass. The Geneva scientists specialize in trace detectors, a vital contribution to this project. Orbiting at an altitude of 500 km, the satellite will allow data on particles in space to be analyzed, to improve our understanding of the origin and nature of dark matter. This launch is part of a major CAS program, which will send four satellites into orbit over the coming years.



<http://swissinnovation.org/news/web/2015/07-151217-21>

Moving Cargo Underground

(20 Minuten, January 26, 2016)

A new study published by Cargo Sous Terrain comes to the conclusion that the construction of an underground railway system for the transport of cargo in Switzerland is technically and economically feasible. The network of underground tunnels, which should one day connect major cities of Switzerland from Geneva to St. Gallen and Basel to Lucerne, is planned to transport cargo directly to their final destination at a constant speed of roughly 20 miles per hour in an environmentally friendly manner. A first section is planned to be built near Zurich until 2030 for an estimated 3.5 billion Swiss Francs. Cargo Sous Terrain is looking to finance the project without public funds, however the list of members of the society includes several government related companies like Post and the cargo branch of SBB next to major private retailers like Coop and Migros.



<http://swissinnovation.org/news/web/2016/07-160126-b9>

Advanced Solar Cell Manufacturing

(Arcinfo.ch, January 28, 2016)

Today about 90 percent of solar cells are made of crystalline silicon, and until now, a necessary step in manufacturing them was doping, or introduction of impurities to improve electrical conductivity of the silicon. The Photovoltaics Laboratory of the EPFL in Neuchatel, collaborating with the University of California at Berkeley and the Australian National University, has invented a manufacturing process for crystalline silicon cells without the step of doping. This simplifies and reduces the cost of manufacturing. The solar cell thus produced has a higher-than-average energy conversion efficiency of almost 20%, and voltage of 700 millivolts. The study findings are published in Nature Energy.



<http://swissinnovation.org/news/web/2016/07-160128-68>

Highly Sensitive Gas Analyzer

(ETH Zurich, January 30, 2016)

ETH scientists pushed the sensitivity limits of state-of-the-art trace gas analyzers by improving the geometry of the device with help of a computer model, making it five times more sensitive than the previous model. The technology, called secondary electrospray ionization (SESI), consists of a specially adapted mass spectrometer in which gas samples are ionized in real time before being measured. The detection limit for airborne volatile compounds is now around a concentration of one trillionth, which is sufficient to be used for breath analysis in medicine. ETH scientists aim at diagnosing bacterial pneumonia using breath analysis, a process that today takes two days and which could be cut down to a quarter of an hour with SESI. SESI mass spectrometry in breath analysis is part of a long-term research project initiated by the network "Hochschulmedizin Zurich", composed of ETH, University of Zurich and local university hospitals.



<http://swissinnovation.org/news/web/2016/07-160130-ee>



8. Physics / Chemistry / Math

Definition of Simultaneity Crucial in Understanding Muon Decay

(PSI, December 08, 2015)

Muons decay into an electron, a muon neutrino and an electron antineutrino almost as soon as they are formed. However, some theories suggest that there is another – extremely uncommon – decay mode where a muon decays into one electron and one light particle. Physicists at PSI have been searching for the products of this second type of decay in order to determine whether the decay is only very rare or entirely impossible. They search for one electron and one light particle that hit the detectors on exactly opposing points of their large-scale experiment, each having precisely half the energy of the original muon. The electron and the light particle could only belong together if they are detected at precisely the same time. Yet, to determine this simultaneity, researchers had to develop a high-precision electronic chip that senses each particle signal and finds its precise temporal position. The latter can thus be determined precisely to within a billionth of a second.

<http://swissinnovation.org/news/web/2015/08-151208-dd>

7 ERC Grants for ETH Zurich

(ETH Zurich, December 14, 2015)

Seven researchers from ETH Zurich are to receive a starting grant by the European Research Council, in research fields as widespread as processing algorithms for turbines, paralleling supercomputers with different architectures, understanding dietary fiber at an atomic level, or profile the molecular network of antibody responses and improving the rational design of vaccines. The ERC awards the grants of about CHF 1.5 million to promote independent young scientists of any nationality with two to seven years of experience following completion of their doctorate. Last year, Swiss researchers were not eligible to apply for the starting grants awarded by the ERC, since Switzerland had been barred from the Horizon 2020 research program after the adoption of the mass immigration initiative.

<http://swissinnovation.org/news/web/2015/08-151214-9b>

Step Towards Quantum Electronics

(University of Geneva, December 16, 2015)

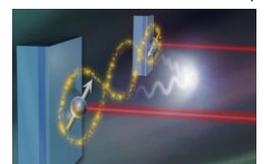
Physicists at the University of Geneva (UNIGE), Switzerland, and the Swiss Federal Institute of Technology in Zurich (ETH Zurich) are using ultracold temperatures to create clean materials possessing intriguing quantum-mechanical properties, such as unusual superconductivity. These ultracold temperatures bring out strong-interaction effects between particles. The researchers also managed to efficiently transport ultracold atoms between two quantum superconductors with strong interactions through a single quantum point, a so-called quantum point contact. Connecting two materials with this new quantum connection, could open up a novel path towards both a deeper understanding of physics and future electronic devices. The results have been published in the journal Science.

<http://swissinnovation.org/news/web/2015/08-151216-ee>

Faster Entanglement of Distant Quantum Dots

(ETH Zurich, December 21, 2015)

Quantum entanglement, by which two separated objects have states that are dependent on each other, will play an important role in future information technology developments. Until now, creating entangled objects has been slow, but new developments from ETH Zurich have increased the speed of this process 1000 times. Quantum dots are entangled by hitting them with lasers and then measuring the backscattered light to determine if the two dots became entangled. The researchers created a process where two dots separated by up to five meters can be hit with laser pulses ten million times per second and the backscatter measured without knowing which dot it originated from (which would negate the quantum entanglement).



<http://swissinnovation.org/news/web/2015/08-151221-b6>

Cellular Sense of Direction

(EPFL, January 28, 2016)

An EPFL research group led by Alexander Verkhovsky has developed a new model that shows how cells prepare for their movement. Cell motion is essential for its survival and is preceded by cell polarization, the rearrangement of cellular structures and internal molecules from a symmetric to an asymmetric state. This process presets the direction in which the cell will move, and the cell will protrude with its forward extensions (the leading edge), while



retracting at the other end (the trailing edge). The researchers found that these structures switch from protrusion to retraction by sensing their distance from the cell's center. The developed computer model was able to faithfully reproduce a wide range of cell-migration behaviors. The group will further investigate the physical and biological mechanisms behind distance-sensing, and determine how common it is among different cell types and migration behaviors.

<http://swissinnovation.org/news/web/2016/08-160128-c9>

Highly Efficient Heavy Metal Ions Filter

(ETH Zurich, January 25, 2016)

Water pollution is one of today's most serious problems. Now ETH researchers have developed a highly efficient filtration system that removes more than 99% of toxic heavy metal ions and radioactive substances from water in just a single pass through the filter membrane. The technology has a very simple structure and comprises whey protein fibers and activated charcoal, two low-cost raw materials. The whey proteins are denatured to form amyloid fibrils and together with activated carbon are applied to a suitable substrate material, such as a cellulose filter paper. To filter a liter of contaminated water, the researchers used a membrane weighing only a 5th of a gram. One kilo of whey protein would be enough to purify 90'000 liters of water. The filter can also remove metal cyanides such as gold cyanide, which is used in the electronics industry, and could therefore be used in gold recycling.

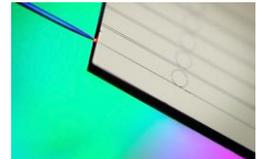


<http://swissinnovation.org/news/web/2016/08-160125-2c>

Tiny Ring-shaped Device for Pulsed Laser Signals

(EPFL, January 29, 2016)

Researchers led by EPFL have made a tiny, ring-shaped device that can generate a pulsed laser signal. Coupled to laser light, a microscopic ring-shaped structures made from very fine silicon nitride named microresonators will separate incoming light based on its frequency. The microresonator does by storing the incoming laser light for a few nanoseconds, and then releasing it in short bursts. These ultrashort pulses are named solitons. Solitons are a type of wave that, unlike other waves, retains its shape even as it moves further away from its source. Since the solitons are emitted with regular spacing, physicists refer to this phenomenon as a "frequency comb". The device could prove to be useful in telecommunications applications and in chemical analysis.



<http://swissinnovation.org/news/web/2016/08-160129-3b>

9. Architecture / Design

Efficient Building Technology Saves Energy

(news.admin.ch, January 12, 2016)

Energy consumption in buildings amounts to 45% in Switzerland. For the first time, a study compiled by industry experts and researchers numerates the potential of building technologies regarding energy and carbon dioxide reduction. According to this study, the energy demand could be diminished by 23% until 2050, using today's technologies and despite an expected growth of useful areas of around 30%. However, if efficient heating systems and building automation could be pushed further, an extra 15% of power and 40% of greenhouse gas emissions could be avoided.

<http://swissinnovation.org/news/web/2016/06-160112-45>

10. Economy, Social Sciences & Humanities

IT, Society, and Law Research Center

(University of Zurich, December 01, 2015)

The University of Zurich launched a new research center focusing on the themes of information technology, society, and law. The center will undertake research projects around how the rapid development of IT affects



power, privacy, and ethics. For example, information gives individuals and organizations power, but there are not always clear ethical guidelines around this issue. Research areas for the center could range from traditional versus new media to personal health information.

<http://swissinnovation.org/news/web/2015/10-151201-7c>

Study of Violence in Teenagers

(University of Zurich, December 08, 2015)

A researcher from University of Zürich explored a sample representative of German adolescent population in order to study violence among teenagers. More precisely, he investigated how involvement in a brutal group, acceptance of violence norms and acts of aggression are interrelated. The statistical analysis confirmed that belonging to a circle of fierce friends and acceptance of violence norms are related. He found that there exists the significant association between value orientation and various measures of delinquency. On the one hand, those teenagers, who endorse traditional values, do not accept pro-violent norms. On the other hand, the so called hedonistic values reinforce brutality. For individuals prone to their short-term desires, an informal peer group focused on unsupervised and deviant activities might be a good framework for gratification.



<http://swissinnovation.org/news/web/2015/10-151208-0a>

11. Technology Transfer / IPR / Patents

Impact Hub Incubator

(Le Temps, December 07, 2015)

After Zurich, Geneva is the second Swiss city to host an Impact Hub. This incubator supports start-ups that aim to have a positive social and environmental impact. Since 2014, a passionate entrepreneurial community has been developing this collaborative workspace, offering its members advice, seminars, funding and a network. The hubs are part of an international movement, born in 2005 in London. Since then, 69 Impact Hubs have been opened worldwide. Founded in 2010, Impact Hub Zurich has supported over 113 companies. Impact Hub Geneva has 150 members and four winners of the first edition of the "Incubation Pulse" program. The Swiss hubs are supported by the Confederation, international organizations, universities and private companies, which share the goal of encouraging entrepreneurship.

<http://swissinnovation.org/news/web/2015/11-151207-64>

Swiss FinTech Ecosystem Growing

(Le Temps, December 07, 2015)

Switzerland got off to a slow start, but startups focusing on financial technologies are starting to blossom. There are now almost 160 throughout the country, while institutions are also undertaking more research in this field. New Swiss FinTech initiatives suffer from a lack of funding, according to a study published in November by the online broker IG Bank Switzerland. Swiss FinTech is starting to be more widely represented worldwide, with a total of 1,233 companies, yet they obtain only 0.7% of funding invested in this field. There are still cultural and regulatory challenges to be overcome, but the FinTech ecosystem is now growing thanks to changing consumer habits and changing technologies, opening the way for new business models.

<http://swissinnovation.org/news/web/2015/11-151207-70>

Swiss Startups Enter Unicorn Territory

(Bilan, January 26, 2016)

The year 2015 saw Swiss startups raising almost 50% more capital than the previous year, according to the Swiss Venture Capital report 2016. Total funds invested rose to CHF 670 million, supporting 120 enterprises compared to 92 in 2014. A few of the Swiss startups achieved funding rounds that brought their capital valuation above the USD 1 billion "unicorn" threshold. The majority of new investments comes increasingly from foreign investors, with one quarter of the total from American firms. Notable also is the new establishment of the MassChallenge accelerator program in Geneva, and its launch at the Lift16 Conference. Prominent in the Swiss startup ecosystem are innovators in medicine and life sciences.



<http://swissinnovation.org/news/web/2016/11-160126-29>



Swiss and Silicon Valley Entrepreneurs Explore Innovation

(Le Temps, January 28, 2016)

The fourth Worldwebforum, held in Zurich, enabled US and Swiss entrepreneurs to share their views on entrepreneurship and innovation. Under the theme of 'Digital Leadership', the event included drone demos, testing of virtual reality devices, and presentations by Silicon Valley's most emblematic companies like Uber, Google and Hyperloop. Advice to budding entrepreneurs included: having a global vision, aiming for global relevance, involving employees and users in experimenting with and enriching new ideas, preparing for IPOs thoroughly, collaborating broadly across disciplines, and sharing company ownership through stock options. The Worldwebforum, sponsored by Swisscom, the Swiss Post Office, Ringier, Leonteq, Swiss Life and Aduno, awarded its prize for best startup to Sobu.ch.



<http://swissinnovation.org/news/web/2016/11-160128-20>

12. General Interest

Growing Taller through Physical Activity

(20 Minuten, December 04, 2015)

Researchers at the Center for Pediatric Endocrinology Zurich have found evidence linking the level of physical activity during childhood and adult height. In the study they conducted, they equipped 99 children between 5th and 9th grade with accelerometers, measuring their physical activity for the duration of one week. The level of activity was then compared to the height of each kid, with the height of his or her parents serving as a control variable. The data showed a positive correlation between the level of activity and the height supporting the hypothesis that more activity leads to more growth, through added load on the skeletal structure. Even though the effect is only in the millimeter range the researchers emphasize the correlation and point out that there is no such thing as too much physical activity during childhood.

<http://swissinnovation.org/news/web/2015/12-151204-5b>

Conferences Proliferate and Specialize

(Le Temps, December 08, 2015)

EPFL organizes many events, especially at the SwissTech Convention Center, founded less than two years ago. The number of conferences, speakers and attendees is increasing, while the format of conferences is changing. Whereas in the past they tended to address a single broad theme and last two days, now they focus on two specific themes, each filling two and a half days. Conferences fall into two main categories: scientific, purely for information sharing; commercial, with a real business model aiming at profitability. The EPFL convention center caters to both audiences, benefiting companies and the EPFL itself. Events range from press conferences (with 250-270 participants) to TED Talks (with up to 2,500 participants).

<http://swissinnovation.org/news/web/2015/12-151208-35>

13. Calls for Grants/Awards

Call: MassChallenge Switzerland

(MassChallenge, January 31, 2016)

MassChallenge, the most startup-friendly accelerator on the planet, launches a Swiss program based on the same proven model as the MassChallenge Boston. MassChallenge rewards the highest-impact startups through a competition to win a portion of several million dollars in equity-free cash awards. Through the global network of accelerators in Boston, London, Jerusalem, Geneva and Mexico City, MassChallenge can have a massive impact - driving growth and creating value the world over. Applications involve creating a Startup Profile, paying the application fee, and submitting an application. Early bird application deadline is March 2nd, 2016 (discounted application fee is \$49). The regular application deadline is March 31st, 2016 (regular application fee is \$99).



<http://swissinnovation.org/news/web/2016/13-160131-5f>



Call: Impact Hub Fellowship

(energie-cluster.ch, January 25, 2016)

The Impact Hub Zurich and the Swiss Federal Office of Energy are seeking the most innovative business ideas in the energy sector with a focus on technologies and services that augment added value and contribute to the retrenchment of natural resources. The program aims at promoting the economic, technologic and ecological potential of Cleantech. Finalists and winners profit from a broad network, mentoring, financial support, and work station. Five teams will get support amounting to more than CHF 10'000 in the first four month and the winner gets support amounting to more than CHF 50'000 for the first year. The deadline is February 28th, 2016.



<http://swissinnovation.org/news/web/2016/13-160125-ca>

Call: Kickstart Your Business Idea in Switzerland

(Kickstart Accelerator, January 31, 2016)

The Swiss Accelerator Kickstart is a fast-track gateway for entrepreneurs from around the world to access the Swiss innovation ecosystem. In the three-month summer program selected founders with promising business ideas within the four verticals Food, Smart & Connected Machines, FinTech or Future & Emerging Technologies will live and work in Zurich. Kickstart provides founders with up to 25'000 Swiss francs in seed-funding, a monthly founder stipend, a shared office space and fast-track access to relevant industry partners and the Swiss startup ecosystem. Mentoring is carried out by a few hand-selected entrepreneurs that have first-hand experience of building a successful company. Application deadline is March 31st, 2016.

<http://swissinnovation.org/news/web/2016/13-160131-7c>

Upcoming Science and Technology Related Events

NTN Swiss Biotech: Cell Therapy and Tissue Engineering in Ticino

March 10, 2016

<https://goo.gl/b11AT1>

Cell Therapy

Lugano

Swiss Biotech Day 2016

April 12, 2016

<http://swissbiotechday.ch/home/>

Biotech

Basel

9th Annual European Life Sciences CEO Forum & Exhibition

March 15-16, 2016

<http://goo.gl/mHbxGn>

Life Science

Zurich

Lab Innovations Lausanne 2016

April 13-14, 2016

<http://goo.gl/T9IEZD>

Lab Technologies

Lausanne

Swiss Symposium on Lab Automation 2016

March 17, 2016

<https://goo.gl/FuEvrH>

Lab Technologies

Rapperswil

2. Convention on Energy & Building

May 27, 2016

<http://goo.gl/rQIZnb>

Construction, Energy

St. Gallen

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