Science-Switzerland, April - May 2011

News on Swiss science, technology, education and innovation

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Switzerland Strong in EU Flagship Programs

(ETH Zurich, March 08. 2011)

Several Swiss universities are in the running for funding of EU Flagship Projects up to one billion Euros each. Six projects have been shortlisted, five with Swiss participation. FuturICT (ETH Zurich) will attempt to model and simulate the entire world. Guardian Angels (ETH Zurich and EPFL) will investigate pervasive robotics in our everyday lives. The Human Brain Project (EPFL) will attempt to better understand the human brain through detailed simulation. The IT Future of Medicine Project (University of Geneva) will develop individualized medicine based on a data-driven approach. The Robot Companions for Citizens project (EPFL) will develop soft-skinned robots as everyday companions. Two of these projects will be chosen for initial 12-month pilot studies.
http://www.swissinnovation.org/articles/2011/00-110308.html
http://www.swissinnovation.org/articles/2011/00-110308-2.html

1. Policy

Strengthening Scientific Ties to China

(Federal Administration, April 15, 2011)

Federal Councillor Didier Burkhalter and the presidents of ETH Zurich and EPFL travelled to China in April to strengthen scientific ties with that country by signing a declaration of intent. Their trip took them to Shanghai, Beijing, and southern China, all scientific centers with a Swiss presence. They visited the Swiss science hub swissnex China, the Chinese Academy of Sciences, and several research institutions. Additionally, they visited Tsinghua University to inaugurate the social sciences library, which was designed by Swiss architect Mario Botta. The declaration of intent signed by Councillor Burkhalter indicates a desire to deepen the relationship between Switzerland and China established by previous agreements.
http://www.swissinnovation.org/articles/2011/01-110415.html

Patrick Aebischer Confirmed as EPFL President

(Federal Administration, May 04, 2011)

The Federal Council has confirmed Patrick Aebischer for another term as president of EPFL, keeping him in the post through February 2016. Aebischer is a professor and neuroscientist, and he has been a proven leader of the university, holding the presidency since 2000. Under his leadership, the university has risen in national and international prominence, as shown by developments such as the new Rolex Learning Centre, the Blue Brain Project, and Quartier de l'Innovation.
http://www.swissinnovation.org/articles/2011/01-110504.html

International Agreement on Biodiversity

(Federal Administration, May 12, 2011)

Swiss Ambassador Franz Perrez has signed the Nagoya Protocol. This agreement helps to protect biodiversity by ensuring fair and sustainable use of genetic material and the results arising from its use. Any country that provides genetic material can share in the benefits derived thereof; it also facilities international research requiring access to genetic material. An additional agreement, the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress, addresses the issue of liability and redress in case genetically modified organisms damage biodiversity.
http://www.swissinnovation.org/articles/2011/01-110512.html

Smart Specialization of Regions

(EPFL, May 13, 2011)

According to EPFL Professor Dominique Foray, the future of many regions in Europe depends on what he calls “Smart Specialization”, or economic and research specialization that takes into account a region’s strength. Many regions across Europe try to focus on the same research and technology sector, be it ‘bio’, ‘nano’, ‘info’, or ‘eco’. The result is that some regions become world-class centers while others experience brain drain and don’t do well. Instead, regions should consider their own and their neighbor’s strengths, as well as private research and industry in the region. A good approach is well balanced in all supporting fields.
http://www.swissinnovation.org/articles/2011/01-110513.html

2. Education

New Education Studies Course

(UZH, April 20, 2011)

The Swiss Conference of Cantonal Ministers of Education (EDK) has officially recognized the University of Zurich’s new course of study in secondary and higher education. This new course of study is designed to build teachers from the ground up, as opposed to traditional pedagogy programs, which are designed as a supplement to traditional studies. The new course branches off from a pedagogy program previously developed with ETH Zurich and the Pedagogical School of Zurich, and offers concentrations in almost all major fields. In Switzerland, education is the responsibility of each canton, but the EDK serves to coordinate efforts between cantons.
http://www.swissinnovation.org/articles/2011/02-110420.html

Important Combination of Teaching and Research

(CRUS, May 11, 2011)

ETH Zürich president Ralph Eichler believes that it is important for professors at top Swiss universities to focus on both research and teaching. Only this way they can teach the most up-to-date material. Also, introducing all students to research, even if the ones that won’t make a career of it, teaches them to think innovatively, work independently and solve unanswered questions. Teachers, in turn, are evaluated by students to help identify and recognize the best teachers. This research-oriented model is not necessarily appropriate for developing countries, where a good foundational education is possible without a research component.
http://www.swissinnovation.org/articles/2011/02-110511.html

3. Life Science / Health Care

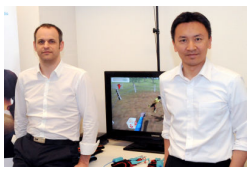
Biological Method Against Fire Blight

(Federal Administration, April 04, 2011)

The bacteria Pantoea agglomerans is effectively used to combat fire blight in North America and New Zealand, and now scientists are testing its usefulness in the Swiss environment. Fire blight is a contagious disease that affects apple and pear trees and can quickly destroy orchards. The tests of the protecting bacteria showed that they inhabited between eighty and one hundred percent of flowers and did so at a sufficient density. They did not establish themselves in the other surroundings, and they did not affect how bees are attracted to the flowers. However, in 2009 and 2010 spring temperatures were too cool to promote fire blight, so warmer years are needed to complete tests.
http://www.swissinnovation.org/articles/2011/03-110404.html

Computer Games for Stroke Patient Rehabilitation

(ETH Zurich, April 06, 2011)



The ETH Zurich spin-off "YouRehab" is developing a computer game to help stroke patients overcome paralysis and recover their motor skills. The therapy is built on the foundation of mirror neurons, which are neurons that fire both when an action is performed and when the same action is observed. Patients use instrumented gloves to interact with the game and perform activities in it. The game shows the patient's actions on screen, but amplifies them if the natural motion of the patient is restricted. Through this process, the appropriate neurons are exercised and, in theory, motor skills are regained. So far, clinical tests are promising, and the company recently won the ZKB Pioneer Award.
http://www.swissinnovation.org/articles/2011/03-110406.html

Sleep Habits of Animals

(UZH, April 06, 2011)

All animals need to sleep, but how they sleep varies widely from species to species. Irene Tobler, a researcher at the University of Zurich, studies the sleep habits of many species, including ones that aren't easily studied in a laboratory environment. Her subjects include elephants, dolphins, birds, and horses. Elephants and horses only sleep 3-4 hours per night, while bats and opossums can sleep up to twenty. Dolphins sleep with only one half of their brain at a time, while the other half performs essential functions such as breathing. They also don't experience REM sleep. Some birds are also able to sleep with half their brain while flying. Research shows that sleep plays an important role in almost all life forms.
http://www.swissinnovation.org/articles/2011/03-110406-2.html

Genomics and Nutrition

(UNIL, April 11, 2011)

For a society that places a lot of emphasis on healthy living, obesity is becoming an ever-larger problem. This illustrates the inadequacy of our diet for our increasingly sedentary lifestyle and our genomic heritage. The solution may lie in nutrigenomics, or the study of how food interacts with our genes. This is an interdisciplinary field that draws from medicine, biology, life sciences, and the pharmaceutical and agricultural industries. A new book by University of Lausanne professor Walter Wahli and research scientist Nathalie Constantin studies this field from a nontechnical perspective.
http://www.swissinnovation.org/articles/2011/03-110411.html

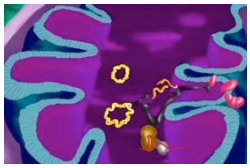
Sleep and Learning

(UZH, April 12, 2011)

SNF Development Professor Björn Rasch is commencing his professorship at the University of Zurich in the field of bio-psychology, specifically studying how long-term memories are formed. His current project is studying what role sleep plays in forming long-term memories. During sleep, memories are reactivated and reprocessed by the brain. Further study will determine the role of memory reactivation during both sleeping and waking states. So far, Professor Rasch's research has shown that, for memory formation, deep sleep is more important than REM sleep, which, instead, plays a role in emotional development. His research is mainly empirically based, and he will collaborate with several other professors at the University of Zurich.
http://www.swissinnovation.org/articles/2011/03-110412.html

Diabetes Treatment Drug

(EPFL, April 13, 2011)



Researchers at EPFL developing new cancer treatment drugs have made an exciting discovery; the same drugs have a positive effect on patients suffering from metabolic diseases such as type 2 diabetes. The drugs, known as Paribs, modify the level of the enzyme PARP1, which control the metabolic efficiency of cells. Cancer cells, like cells with a metabolic disease, run on glucose instead of fatty acids. By modifying this enzyme, cells begin to use more fatty acids and they can more efficiently turn food into energy. In cancer cells this modification slows the spread of the cancer. It is likely that PARP modification will be part of every cancer treatment within five years.
http://www.swissinnovation.org/articles/2011/03-110413.html

Yeast for Drug Research

(EPFL, April 19, 2011)

Sulfasalazine is a drug used to treat intestinal inflammation, but its anti-inflammation mechanism has been poorly understood until now. Researchers at EPFL modified yeast to produce human proteins and then combined the drug with this modified yeast. In this way, they were able to discover which proteins the drug targeted. The same method was also used to discover the target proteins of other drugs. The researchers hope that with a better understanding of how sulfasalazine works it can be used to treat other diseases as well.
http://www.swissinnovation.org/articles/2011/03-110419.html

Life in the Arctic

(UNIBAS, April 19, 2011)

Over one hundred species of ice fish have flourished in Antarctic waters. These fish have special mechanisms to survive in the freezing temperatures. They produce a special antifreeze protein that pervades their bodily fluids. Genetic analysis shows that this protein developed around the time that the temperature in the Antarctic cooled significantly. Additionally, the blood of ice fish contains very little hemoglobin. These properties demonstrate how key evolutionary innovations can be important and lead to evolutionary radiation. Scientists plan to further study these fish and the chemistry of their nutrients.
http://www.swissinnovation.org/articles/2011/03-110419-2.html

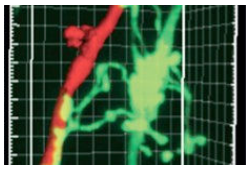
Key Factor Behind Multiple Sclerosis

(Tages Anzeiger, April 25, 2011)

Multiple sclerosis is an autoimmune disease that, as of now, has no cure. Furthermore, its cause is not yet completely understood. Researchers have been trying to determine which immune cells are responsible for such diseases and which proteins they release. Researchers at the University of Zurich have now found a protein, GM-CSF, without which multiple sclerosis cannot arise; it is a key factor in brain inflammation. This first study was conducted over the course of six years and eliminated many other possible proteins. The researchers will now start a study on humans. Whether this will lead to a treatment method is unknown, but the researchers are cautiously optimistic.
http://www.swissinnovation.org/articles/2011/03-110425.html

Brain Structures for Learning

(Friedrich Miescher Institute, May 02, 2011)



Scientists have long wondered how memories are encoded in the brain. Since the end of the nineteenth century it has been hypothesized that the structure of the brain changes during learning, but this has been difficult to show directly. Now, neurobiologists have been able to show a direct link between new synapses in the hippocampus and new memories. They used mice learning to navigate a water maze, and in certain instances inhibited the connection of synapses with a drug. In these cases, the mice were not able to find their way with as much precision. They also discovered that after several days synapses began to disappear and memory degraded in a similar way.
http://www.swissinnovation.org/articles/2011/03-110502.html

Discovering Human Self-Consciousness

(EPFL, May 02, 2011)

Neuroscience researchers at EPFL have been studying the human seat of self-consciousness by inducing out-of-body experiences in test subjects being imaged by an MRI. They induced the full-body illusion by having a subject watch a 3D image of a human back being stroked while synchronously stroking the subject's back with a robot so that the he thought he was watching himself being stroked. They discovered lower activity in the temporo-parietal junction when a subject was having an out-of-body experience than under normal conditions. The researchers also studied neurological patients who reported having out-of-body experiences, and they discovered damage to the same area of the brain.
http://www.swissinnovation.org/articles/2011/03-110502-3.html

Cycle-Sensitive Sperm Capsules

(ETH Zurich, May 02, 2011)

Most Swiss cows are artificially inseminated, but the process is not very exact, and only three in five artificially-inseminated cows bear a calf. The main problem lies in knowing the right moment to inseminate the cow. Researchers at ETH Zurich have developed a method to make this process more robust. They produced a cellulose

capsule that contains bull sperm and other cells. The cells react strongly to a hormone produced during ovulation when the cow is ready for insemination. The chain of reactions that is triggered produces cellulase, which breaks down the cellulose capsule and frees the sperm to inseminate the egg. This approach is mature enough to be put into practice, and it may be expanded to other species.
http://www.swissinnovation.org/articles/2011/03-110502-2.html

HIV Eradication Method

(UNIL, May 02, 2011)

The Institute of Microbiology at the Cantonal University Hospital of Vaud and the University of Lausanne has received an initial phase of funding from the Bill & Melinda Gates Foundation to explore a new idea to fight HIV. Specifically, the researchers hope to identify biological markers for HIV during its latent phase. They will try to accomplish this by combining cellular models with complete sequences of human and viral RNA. Additionally, they will test their method in laboratory specimens taken from HIV patients. Identifying these markers would allow more in-depth study of the latent phase of HIV and potentially lead the way to an eradication method.
http://www.swissinnovation.org/articles/2011/03-110502-4.html

Modeling Antibiotic Resistance

(ETH Zurich, May 03, 2011)

Researchers at ETH Zurich have developed a stochastic statistical model of how antibiotic-resistant bacteria develop. They analyzed data from various hospitals in the USA and Ireland and determined the key factors that control how quickly resistance to a new antibiotic develops. Resistant bacteria are especially a problem in hospitals where they can spread quickly. The model shows that having several small hospitals is better than one large, central hospital. Where this is not feasible, it is important to isolate the different units of the hospital, enforce good hygiene, and minimize the movement of patients from unit to unit.
http://www.swissinnovation.org/articles/2011/03-110503.html

Inhibitor for Autoimmune Diseases

(Debiopharm, May 04, 2011)

Debiopharm and Yale University have announced a worldwide licensing agreement to develop and commercialize Debio 1036, which is an inhibitor for autoimmune and inflammatory diseases. It inhibits a primary inflammatory pathway of many diseases and is taken orally. The Debiopharm Group is a Swiss-based biopharmaceutical group that focuses on treatments for serious medical conditions. The partnership between Debiopharm and Yale will take advantage of the complementary strengths of the two institutions.
http://www.swissinnovation.org/articles/2011/03-110504.html

Medical Devices for Developing Countries

(EPFL, May 10, 2011)

Many of the medical devices that developing countries receive are not useful because of missing parts, difficult user interfaces, or poor electrical grids. Spare parts and accessories are also difficult to come by. To overcome these problems, EssentialMed, a start-up in EPFL's science park, is developing medical devices specifically for developing countries, starting with an X-ray machine. The machine will need to be easy to use, robust to dust and humidity, and able to work during short electrical outages. The company is collaborating with three different EPFL labs, the Paul Scherrer Institute, the HEIG-VD school, and the Institute of Tropical Medicine and Public Health.
http://www.swissinnovation.org/articles/2011/03-110510.html

Development Process of Limbs

(SNSF, May 10, 2011)

Researchers at the University of Basel have been studying the developmental process of limbs. Diverse kinds of limbs, such as fins, wings, or legs, are all controlled by a genetic network that has remained unchanged by evolution. The researchers were able to establish this finding by studying mice with genetic defects. They found that such mice developed symmetric front paws instead of normal asymmetric ones. These defective limbs resemble the symmetric limbs of prehistoric fish, showing that a similar developmental process still existed. Only later in evolutionary development did animals develop asymmetric limbs that let them leave the water.
http://www.swissinnovation.org/articles/2011/03-110510-2.html

Health Effects of Mobile Phone Radiation

(SNSF, May 12, 2011)

The Swiss National Science Foundation supported a national research program to study the effects of non-ionizing radiation from mobile phones and other wireless devices. Although some effect on biological processes was found, statistical studies showed no bad health effects from everyday exposure to mobile phones. For example, such radiation can cause additional DNA strand breaks, but does not damage the DNA itself. Radiation also affects brain activity during sleep, but doesn't affect the sleep cycle or quality. Nevertheless, some areas need further study, such as the effect of radiation of fetuses.
http://www.swissinnovation.org/articles/2011/03-110512.html

Changing Biological Clock

(UNIBAS, May 17, 2011)

Researchers at the University of Basel and the University of Zurich have been studying how the human circadian rhythm, or our internal clock, functions, and how it changes with age. We are born either as early or late risers. Through puberty our clock shifts later, and then in our twenties it shifts earlier. A master clock in our brain controls slaved clocks throughout our body. The researchers cultivated various human cells and bound them to fireflies so that the human gene responsible for our circadian rhythm controlled the light output of the firefly, allowing for easy visualization of the circadian gene's activity. They showed that our clock doesn't change *per se*, but rather that factors in our blood affect it.
http://www.swissinnovation.org/articles/2011/03-110517.html

Future of the Y Chromosome

(UNIL, May 17, 2011)

In humans and other mammals, the sex of an individual is determined by the presence or lack of a Y chromosome. This chromosome cannot recombine and exchange genetic material with the X chromosome, so it has accumulated degenerative mutations. However, as discovered by researchers at the University of Lausanne, the same is not true for cold-blooded vertebrates, such as frogs, where the environment also helps determine an individual's sex. Thus, an XX genotype can develop a male and an XY a female. This allows the Y chromosome to exchange genetic information with the X chromosome. Paradoxically, the increasing global temperatures can negatively affect such animals through this mechanism by disproportionately increasing the number of individuals of one sex.
http://www.swissinnovation.org/articles/2011/03-110517-2.html

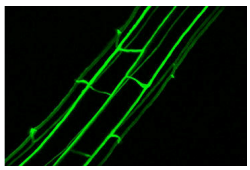
Stroke Recovery Technology

(EPFL, May 19, 2011)

A new EPFL spin-off company, MindMaze, is developing a virtual reality tool to help patients recover from strokes by helping to repair the damaged part of the brain. When using the device, patients move their active hand, but see an avatar move the disabled limb. This activates neurons adjacent to the damaged brain area, slowly healing it. The exercises are then switched to the disabled limb. The system is currently undergoing preclinical trials at the cantonal university hospital of Vaud, and results so far are promising, showing that recovery may be faster than with existing systems.
http://www.swissinnovation.org/articles/2011/03-110519.html

Root Development Mechanism

(UNIL, May 19, 2011)



Researchers at the University of Lausanne have discovered the mechanism for the growth of 'Casparian Strips' in vascular plant roots. These impermeable structures help filter water and nutrients, and act as a barrier against microorganisms. Using fluorescent marking, the researchers identified five proteins, dubbed "CASPs", which form a trellis structure upon which the barrier polymer is formed. Because many plants are similar, these results should be transferable to other species, such as food crops, possibly finding ways to make them more robust and efficient. Furthermore, the high performance of the Casparian Strips in blocking pathogens may lead to new areas of research that make use of this property.
http://www.swissinnovation.org/articles/2011/03-110519-2.html

Faster Medical Diagnoses Through Nanotech Device

(UNIBAS, May 26, 2011)

Researchers at the University of Basel have been developing an atomic force microscope (AFM), originally developed for a NASA Mars mission, for diagnosis of breast cancer, arthritis, and other tissue diseases. The new tool is faster and less invasive than current methods. It is also able to make diagnoses based on quantitative measures rather than qualitative ones, as is often done today. Researchers also hope to enable earlier disease detection. Finally, the microscope, named "Artidis", will also be useful for non-destructive quality control of artificially-produced tissues.
http://www.swissinnovation.org/articles/2011/03-110526.html

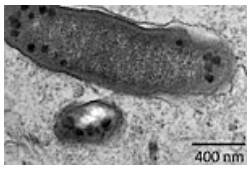
Pain Management in Newborns

(UNIBAS, May 26, 2011)

The University of Basel's Institute for Nursing Science is conducting a study on pain management in newborns. Preterm infants exposed to inadequately managed pain in a neonatal intensive care unit can have an altered pain response later in life. Non-pharmacological methods exist to manage pain during single painful procedures, but their exact effectiveness is not known. The study is specifically looking at pain management in preterm babies. It has found that sucrose can be an effective pain management strategy, but age and previous pain exposure has an impact on pain response that must be considered.
http://www.swissinnovation.org/articles/2011/03-110526-2.html

Protection Against Salmonella

(UNIBAS, May 27, 2011)



Researchers at the University of Basel have discovered the mechanism by which the body protects itself against salmonella bacteria. Salmonella infection generally begins in the intestine. The bacteria are first marked as "garbage" and then connected with autophagosomes and lysosomes, two types of organelles that essentially digest the invading bacteria. This finding is significant because of the increasing resistance to antibiotics. Understanding this mechanism may provide a different pathway to treatment of salmonella infections. This research is also relevant to diseased caused by malfunctioning autophagy processes, such as cancer or neurodegenerative disease.
http://www.swissinnovation.org/articles/2011/03-110527.html

Catheter-Free Heart Imaging by Tomography

(UZH, May 30, 2011)

Typically, when heart problems are suspected, a catheter is used to help create a detailed image of the heart. However, this procedure can be dangerous due to its invasive nature and due to the relatively high radiation exposure. Now, researchers at the University of Zurich have developed a non-invasive method to accurately image the heart with a radiation dosage that is an order of magnitude lower. A computer tomography scan is used to build a three-dimensional image of the heart. The main difficulty is caused by the movement of the heart. The new method works with a low heart rate, and only emits radiation when the heart is at rest between successive beats, thereby minimizing the radiation dosage.
http://www.swissinnovation.org/articles/2011/03-110530.html

4. Nano / Micro Technology / Material Science

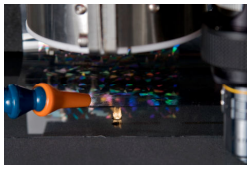
Supporting Watchmaking Research

(EPFL, April 06, 2011)

Swiss watchmaker Patek Philippe is sponsoring the creation of a new professorial chair at EPFL. The new position will be associated with the Institute of Microengineering in Neuchatel, and the goal is to support new research in micro- and nanotechnologies. Further advances are needed to increase the efficiency and reliability of micro mechanical parts and power reserves. Research will focus on all stages of watch design and production, from the individual materials to the assembly process. These advances will help maintain the competitiveness of the Swiss watch industry.
http://www.swissinnovation.org/articles/2011/04-110406.html

New Laser Center with Pulsed UV Beam

(Empa, April 07, 2011)



The Swiss Federal Laboratories for Materials Science and Technology Empa recently opened a new laser center in Thun featuring a pulsed ultraviolet laser beam, one of only three in the world. The laser can be used to microstructure the surface of materials, thereby changing their physico-mechanical properties. These surfaces might reduce friction, inhibit fungal growth, or serve as 3D screens that don't require special glasses. In addition to research, the facility can provide services to industry to manufacture large single-piece molds for structured films, or to manufacture security films for banknotes that are better than current holograms.
http://www.swissinnovation.org/articles/2011/04-110407.html

Self-Healing Polymer

(UNIFR, April 21, 2011)

Scientists are inventing self-healing polymers that may revolutionize how products are manufactured and repaired. The polymers they invented have a different structure than most polymers. Rather than being made up of long chains, they are made up of smaller chains "glued" together with metal ions. These 'metallo-supramolecular polymers' have a special property that help them self-heal. When irradiated with ultraviolet light they temporarily liquefy, allowing them to fill in scratches, for example. This technology, which has been demonstrated in a laboratory environment, allows for very targeted repair, as opposed to heat-based technologies.
http://www.swissinnovation.org/articles/2011/04-110421.html

Antibacterial Sports Clothing

(ETH Zurich, April 27, 2011)

Modern sports clothes are sometimes treated with the antibacterial chemical Triclosan or with silver nanoparticles to kill odor-causing bacteria. Researchers at ETH Zurich studied the overall lifecycle of such clothes from an environmental perspective and compared it to untreated sports clothes. From an energy usage perspective, they determined that treated clothes were just as good or better than untreated clothes if they were washed less often; the energy savings offset the extra energy needed for manufacturing. From a toxicity perspective, they found that little of the Triclosan or silver nanoparticles washed off, which was mostly trapped by sewage treatment facilities.
http://www.swissinnovation.org/articles/2011/04-110427.html

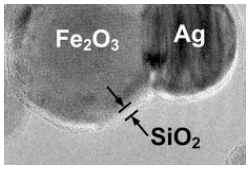
Noise-Reducing Curtains

(Empa, May 03, 2011)

Researchers at the Swiss Federal Laboratories for Materials Science and Technology Empa, along with industry partners, have developed a new type of curtain that helps absorb noise. The curtains are lightweight and translucent, making them well suited to interior décor. The curtains were first designed using computer simulation to determine the proper micro- and macroscopic structure of the textile. Samples were then woven and tested, before finally being turned into a complete product. The new curtains are up to five times better at absorbing sound than traditional lightweight curtains, but can be used where heavyweight curtains are not appropriate.
http://www.swissinnovation.org/articles/2011/04-110503.html

Silver Nanoparticles for Medical Therapy and Diagnostics

(ETH Zurich, May 12, 2011)



Nanoparticles play an increasingly important role in our lives, including in the medical sector. One use of silver nanoparticles is as a biological plasmonic sensor. Due to quantum effects, the nanoparticles glow under light, so if they are combined with an antibody that attaches to a certain molecule, they can be used to detect that molecule, or deliver a drug to a specific location. However, regular silver nanoparticles are harmful to cells because of the silver ion they release. To protect cells, researchers were able to coat the nanoparticles in a very thin layer silicon dioxide, without changing their useful properties. They also combined the silver nanoparticle with an iron oxide nanoparticle to create a magnetic sensor.
http://www.swissinnovation.org/articles/2011/04-110512.html

Micro-Parts Handling Machine

(Asyril, May 13, 2011)

Swiss company Asyril has developed a robotic system to handle micro-parts with dimensions ranging from 0.5 to 5 millimeters. It can pick them from bulk feed at a rate up to two cycles per second with an accuracy of 0.01 millimeters, while accurately recognizing the position and orientation of the part. It can also easily switch between different production batches and types of parts with very simple reconfiguration on the user interface. The picker works in conjunction with a vision system, which helps achieve the noted speed and accuracy. This system is being used in the Swiss watch industry to condition stone jewels and place them during the assembly process.
http://www.swissinnovation.org/articles/2011/04-110513.html

The Boom of Nanotechnology

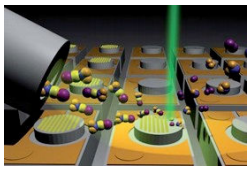
(Tages Anzeiger, May 17, 2011)

IBM has opened its new Nanotech Center on its campus in Rüschlikon, and this only underscores the boom in the nanotechnology sector that has occurred in the last several years. Nanotechnology generally deals with length scales of 100 nanometers and smaller, in the domain of atoms and molecules, and cuts across all kinds of sectors. The most important sectors include material science, chemistry, and pharmaceuticals, but nanotechnology also plays an important role in a variety of other fields. For example, silver oxides are used in textiles, and titanium oxides in sunscreen; carbon nanotubes, which are stronger than steel yet lighter, are also used in many applications.
http://www.swissinnovation.org/articles/2011/04-110517.html

5. Information & Communications Technology

Laser For Communications

(EPFL, April 12, 2011)



Lasers are an important component of high-speed, long-distance communication. They are used to send signals along a fiber-optic cable. However, the signal at the end of the cable must be clear enough to be properly decoded, and this depends, in large part, on the wavelength and polarization of the light. Researchers at EPFL and Empa have developed a laser with tighter control over these two parameters. First, they reduced the size of the laser to control the wavelength, and then they developed a nanometer-scale grating to act as a high-precision polarization filter. The laser enables a transmission rate of several gigabits per second, and is ten times more power efficient than current lasers.
http://www.swissinnovation.org/articles/2011/05-110412.html

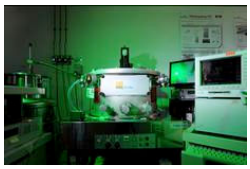
Global Computer Model

(ETH Zurich, May 04, 2011)

Researchers at ETH Zurich, together with European partners, are developing the idea of a "Living Earth Simulator", which will model technological, commercial, social, economical, and ecological interconnections on a global scale. The world has grown to such a complexity that it is difficult to understand global dynamics, and so this simulator would provide a tool for analyzing the effect that various changes, such as an earthquake or social upheaval, would have on other aspects of our global society. The development of this simulator is a groundbreaking undertaking that will require much interdisciplinary research. Researchers will also use the simulator as a tool to investigate privacy and data management in the digital age.
http://www.swissinnovation.org/articles/2011/05-110504.html

Pervasive Low-Power Sensors

(ETH Zurich, May 05, 2011)



ETH Zurich, EPFL, and industry partners are starting a project, called "Guardian Angels for a Smarter Life", to develop small, extremely low-power sensors to pervasively sense many different aspects of our environment and help with our daily lives. Some sensors in and on the body will sense and transmit information on bodily functions; others will help warn of natural disasters. Because of their nature, these sensors will need to harvest power from the surroundings; batteries will not be an option. They could exploit small temperature differenc-

es with nanowires or use the energy in vibrations. The consortium is applying for EU flagship project funding in the field of Future and Emerging Technologies.
http://www.swissinnovation.org/articles/2011/05-110505.html

Startup to Develop Scala Programming Language

(EPFL, May 17, 2011)

EPFL Professor Martin Odersky has started a new company, Typeface, to develop, promote, and support the Scala programming language developed at EPFL. Scala is a new programming language that mixes the object-oriented and functional programming paradigms. Scala is also designed to run on multiple processors or even across multiple computers in a cloud environment, thus taking advantage of the proliferation of these types of computing architectures. The language is very similar to Java, a mainstream programming language popular for Internet applications, and has already been adopted by major Internet sites such as LinkedIn and Twitter. The language is open source, but the copyright is held by EPFL.
http://www.swissinnovation.org/articles/2011/05-110517.html

Low-Energy IT

(EPFL, May 31, 2011)

Data centers and cloud computing centers are consuming an ever-increasing amount of electricity, and our world has become dependent on these centers. However, the current exponential increase in usage is not sustainable; instead a linear increase is needed. Researchers at EPFL are joining with industry partners to investigate ways to reduce energy usage. Improving microchip technology may not produce the needed gains, but different architectures, such as stacking memory directly on top of the processor, may reduce energy usage by optimizing the flow of information. The researchers hope to improve efficiency by a factor of 100 in the next ten years.
http://www.swissinnovation.org/articles/2011/05-110531.html

6. Energy / Environment

Smart Electrical Sockets

(EPFL, April 01, 2011)

Two doctoral students from EPFL have won the first prize of the PERL trophy for developing a system that allows the electricity consumption of a dwelling to be monitored and managed on a touchscreen. Small devices inserted into sockets and fixtures measure electricity usage and communicate with each other and a central computer via the electrical network. Lights can also be turned on and off remotely. Such devices enable a “smart grid” for optimized energy usage that can have a positive impact on the entire electrical grid. The prize includes 50,000 Swiss francs so that the researchers can form a company and commercialize their new product.
http://www.swissinnovation.org/articles/2011/06-110401.html

Phosphor Shortage

(ETH Zurich, April 11, 2011)

Phosphorus is an essential chemical in modern fertilizers, and the demand for it continues to increase. A possible shortage of the chemical is looming in the next 50 to 100 years with a so-called “phosphorus peak” happening in the next few decades. However, ETH Zurich researcher Roland Scholz disagrees with this prognosis, saying that we don’t understand the phosphorus cycle well enough yet. Instead, he is wary of the openness of the cycle, and the underestimated environmental damage caused by its use. Furthermore, there is the danger of global catastrophe if the main phosphorus producers limit its production. He is seeking to raise awareness of the issue with forums and international discussions on the topic.
http://www.swissinnovation.org/articles/2011/06-110411.html

Accelerated Glacial Warming

(UNIFR, April 12, 2011)

For thirty years, researchers at the University of Fribourg have been monitoring the temperature of the snow and glacier on Monte Rosa at an altitude of 4452 meters. As a result, they have discovered that the temperature at 20 meters of depth has been warming much more in recent years than thirty years ago, and even faster very recently; the temperature increase even exceeds the atmospheric temperature increase. The theory is that water from the

melting surface carries increased heat to the colder, lower depths. These results show the sensitivity of glaciers to small changes in the atmosphere. There is the danger that further warming will cause glacial instability and that embedded historical information about the atmosphere will be lost.
http://www.swissinnovation.org/articles/2011/06-110412.html

Bee Evolution

(UNINE, April 13, 2011)

A new study by the University of Neuchatel has decrypted the evolutionary link between bees and wasps. Bees descended from wasps more than 120 million years ago and changed from being carnivores to nourishing themselves on pollen. While most bees construct impermeable honeycomb structures as their shelter, the researchers discovered a species of bee found only in the southern African desert in Namibia and South Africa, and in the Atacama Desert in Chile that simply builds a burrow in the ground, similar to a wasp. This species of bee is most likely the missing link between bees and wasps.
http://www.swissinnovation.org/articles/2011/06-110413.html

Increasing Tick Danger

(UNINE, April 14, 2011)

Researchers at the University of Neuchatel have been studying the tick population in Switzerland, and have noticed a disturbing trend: ticks that carry Lyme disease causing bacteria are more likely to survive in hot and dry climates than other ticks; the bacteria increases the tick's resistance. Lyme disease is caused by pathogenic bacteria that can be passed on by a tick bite. To test the survival ability of ticks, the researchers collected 1500 ticks and placed them in chambers with varying humidity and temperature. Two days later they saw that in the hot and dry chamber 50% of ticks carrying the bacteria survived, but only 30% of other ticks survived. As global warming exacerbates such conditions Lyme disease could proliferate.
http://www.swissinnovation.org/articles/2011/06-110414.html

Oxygen Levels in European Waters

(Eawag, April 29, 2011)

The oxygen level in a body water serves as a gross indicator of its health. If the level drops below approximately twenty percent of the normal level, higher-level organisms, such as fish, begin to die, and if it continues to drop, other organisms die too and a lifeless environment is left. Swiss researchers have been participating in the pan-European research program HYPOX to accurately measure the oxygen level of various bodies of water over a period of three years. They have been able to measure oxygen levels in Swiss lakes to a very high accuracy. The program will have its next meeting in Switzerland to exchange results and set final plans for the upcoming final year of the program.
http://www.swissinnovation.org/articles/2011/06-110429.html

Ice-Penetrating Radar

(EPFL, May 06, 2011)

Mapping ice sheets and the underlying bedrock is important for understanding how the ice caps are changing. Researchers at EPFL are contributing to this effort by designing and building special antennas to perform the mapping. They developed an array of antennas mounted to an aircraft that send a radio wave through the ice and measure the returns. The antennas in the array each only produce part of the wave, allowing the combined beam to be steered and adjusted electronically. The strength, polarization, and travel time of each return provides information about the various layers of ice and bedrock being measured. Ice sheets up to three kilometers thick can be measured in addition to the depth of the bedrock below.
http://www.swissinnovation.org/articles/2011/06-110506.html

Eco-Balance of Coffee

(Empa, May 10, 2011)

Researchers at Empa, the Swiss Federal Laboratories for Materials Science and Technology, studied the environmental friendliness of coffee, including the system used to make the final drink, such as capsule or filter systems. The study shows that how the coffee is grown has the biggest environmental effect in the entire process, greater than the system used to make the coffee. Use of machinery, fertilizers, and pesticides are the main factors. As for the coffee-making system, aluminum capsules are better than heavy plastic ones, if they are

recycled. Automatic machines depend heavily on how much coffee is used. The best environmental choices are filtered coffee and soluble, instant coffee, though espresso machines are not much worse.
http://www.swissinnovation.org/articles/2011/06-110510.html

CO_2 Sequestration

(ETH Zurich, May 11, 2011)

Direct air capture (DAC), or the capture of carbon dioxide out of the atmosphere, has been proposed as one solution to global warming. However, according to a recent study by scientists from the American Physical Society, including ETH professor Marco Mazzotti, DAC is very expensive. DAC uses absorption material to absorb CO_2 and sequester it in a solid. However, the machinery to perform this process itself requires energy, which may come from CO_2-producing sources. It is much more efficient to capture CO_2 directly at concentrated industrial sources. DAC will only make sense when other, simpler reductions in CO_2 have been achieved or a breakthrough in absorption material is made.
http://www.swissinnovation.org/articles/2011/06-110511.html

Pesticide Dosing Tool

(ETH Zurich, May 11, 2011)

Researchers at ETH Zurich are working with local farmers in Colombia to analyze and model pesticide usage and requirements for potatoes. Oftentimes, farmers don't know how much of the chemicals to spray, so they use excessive amounts, which can be a health hazard to consumers. The appropriate dosage is not simple; instead, it depends on various environmental factors. The research team measured the pesticide levels of a typical potato field and used this to develop a dosing tool. The tool will be used by pesticide distributors to advise farmers on appropriate dosage in each of their specific cases.
http://www.swissinnovation.org/articles/2011/06-110511-2.html

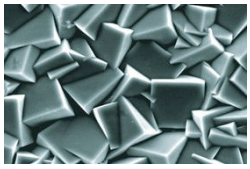
Rating Environmental and Social Responsibility

(UNIL / Tages Anzeiger, May 11, 2011)

Researchers at the University of Lausanne have developed a method by which to rate the social and environmental responsibility of companies in different industries. The researchers looked at four to five companies in each of four industries: coffee, cocoa, electronics, and pharmaceutical. For the coffee and cocoa industries, the researchers rated working conditions, child labor, wages, and environmental pollution. For the electronics industry, they rated eight criteria, including whether raw materials were sourced from conflict regions, and the disposal of end products. Lastly, for the pharmaceutical industry they rated six criteria, including safety of medicines, innovation effort, price fixing, and publication of clinical and laboratory studies.
http://www.swissinnovation.org/articles/2011/06-110511-3.html

Artificial Photosynthesis

(EPFL, May 12, 2011)



One technique for harnessing the Sun's energy is to use semiconductors to produce hydrogen to store the energy. However, the most efficient semiconductors, such as cuprous oxide, are also the most unstable. Cuprous oxide, for example, is unstable if exposed to sunlight and water. Researchers at EPFL have been able to improve cuprous oxide-based cells by using atomic layer deposition to coat them in atoms-thick layers of zinc oxide and titanium oxide, thereby protecting them from water. This technique can easily be scaled up for industrial fabrication. Next, they will improve the electrical properties of the protective layers.
http://www.swissinnovation.org/articles/2011/06-110512.html

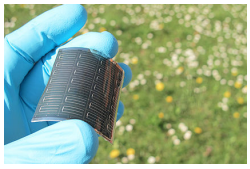
Leak Geneva Basin Groundwater

(EPFL, May 16, 2011)

The past winter and the current spring have been very dry, which affects the groundwater levels, and which may, in turn, affect the drinking water supply of communities in the Lake Geneva basin. Many communities around the lake take their drinking water from the groundwater supply, albeit in a sustainable way which allows the sheets to refill. However, current levels are already down to those seen later in the summer during particularly hot and dry summers. Alternatives include digging deeper wells or pumping water from the lake, which must first be treated. Additionally, rivers rely on groundwater when rainfall levels are low. EPFL professor Aurèle Parriaux is advising towns and cities on how to best deal with the water shortage.
http://www.swissinnovation.org/articles/2011/06-110516.html

World Record Efficiency of Flexible Solar Cell

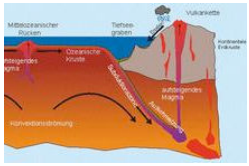
(Empa, May 19, 2011)



Researchers at Empa, the Swiss Federal Laboratories for Materials Science and Technology, have increased the efficiency of copper indium gallium (di)selenide (CIGS) solar cells on a flexible polymer substrate to 18.7%, a new record for CIGS and other types of flexible solar cells. This new efficiency approaches the efficiency of best-in-class polycrystalline silicon wafers or CIGS thin film cells on glass. One big advantage of flexible cells is low manufacturing cost and lower overall system cost due to their flexibility and low weight. Empa relied on its low-temperature deposition process, in situ doping, and improvements in the structural properties of the CIGS layers to achieve the efficiency gain.
http://www.swissinnovation.org/articles/2011/06-110519.html

Model for Atlantic Geology

(ETH Zurich, May 23, 2011)



Researchers at ETH Zurich created a model of the Earth's lithosphere to predict when and where an Atlantic subduction zone would form. A subduction zone is where the crust under an ocean sinks underneath a continental plate, creating a zone of volcanoes and earthquakes. The Pacific "Ring of Fire" is an example of a subduction zone. The creation of a subduction zone depends on factors such as the temperature and thickness of the crust, and the forces at play. The model shows that the Atlantic should remain fairly quiet for another 20-25 million years, but that the beginnings of the subduction zone would be along the coast of southern Brazil.
http://www.swissinnovation.org/articles/2011/06-110523.html

Groundwater Decontamination of Vinyl Chloride

(EPFL, May 27, 2011)

Researchers at EPFL and the University of Neuchatel have been studying how a common pollutant, vinyl chloride, breaks down in groundwater. Nominally, bacteria in this anaerobic environment remove the chlorines from vinyl chloride, converting it into harmless ethylene. Feeding the bacteria, for example with acetate, is supposed to enhance this natural effect. However, in simulated conditions in the laboratory, the researchers discovered that this is not always the case, and that feeding the bacteria might actually impair the process. Bacteria converted some of the vinyl chloride to ethylene, but not all of it. Some other reaction, currently unknown, also helped reduce the level of vinyl chloride.
http://www.swissinnovation.org/articles/2011/06-110527.html

7. Engineering / Robotics / Space

High-Tech Sailboat

(EPFL, April 14, 2011)

Researchers at EPFL are cooperating with the Décision shipyard and sailor Bernard Stamm to create a high-tech sailboat for the Vendée Globe 2012 race. The hull construction materials were optimized, a set of cameras were installed to monitor the sails and optimize their settings based on measured wind flow, several automated oceanographic experiments were installed, and an intelligent power system was developed to manage onboard electricity. This development effort provides a practical challenge to the participating students. The race is a challenging solo nonstop around-the-world race that sets off in November 2011.
http://www.swissinnovation.org/articles/2011/07-110414.html

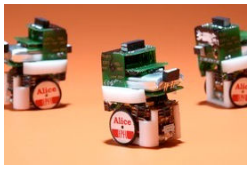
Hydroelectric Power Plant Model

(EPFL, April 27, 2011)

EPFL's Hydraulic Constructions Laboratory was asked to build a functioning model of the new pumped-storage hydroelectric power plant Veytaux 2. This power plant pumps water between Lake Geneva and the Hongrin reservoir to store energy or create electricity, as needed. Veytaux 2 represents a doubling of the existing installation's capacity. The model allows researchers to test the interaction between the two power plants, especially during borderline cases. Potential problems can be detected ahead of time and corrected before they become a problem in the real power plant.
http://www.swissinnovation.org/articles/2011/07-110427.html

Researching Evolution with Robots

(EPFL, May 04, 2011)



Robotics and biological researchers at EPFL and the University of Lausanne are collaborating to test the evolution of altruism, or selfless behavior. Since testing this theory on real biological species is difficult (it can take hundreds of generations to develop), the researchers substituted robots with simulated genes and genomes. Hamilton's Rule states that altruism exists because members that share food with their family members are more likely to pass on their genes through these family members. The robots used for this study push seeds to appropriate destinations. Robots that do well have their code mutated and passed on. Eventually, cooperative behavior developed and the robots worked together as teams.
http://www.swissinnovation.org/articles/2011/07-110504.html

Solar Impulse Flight

(Solar Impulse, May 13, 2011)

The Solar Impulse aircraft successfully completed its first international flight from Payerne, Switzerland to Brussels, Belgium. The flight lasted just under thirteen hours and was propelled only by solar energy. Solar Impulse is the first airplane to fly day and night without requiring fuel or producing carbon emission. The airplane was designed and built over seven years and is the largest airplane in its weight class. It has 12,000 solar cells and 400kg of lithium polymer batteries. The team eventually plans to fly the aircraft around the world to promote renewable energy, as it is doing in Brussels.
http://www.swissinnovation.org/articles/2011/07-110513.html

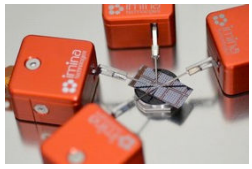
World Record of Battery-Powered Tram

(Tages Anzeiger, May 25, 2011)

Swiss rail manufacturer Stadler Rail has set a new world record for battery-powered tram runs with a 16 kilometer run around their test track in Berlin. After trying several different battery systems, Stadler settled on lithium-ion batteries with iron phosphate technology. However, batteries in the required size were not available, so they developed their own system. The main practical application for a battery-powered tram is to allow certain stretches of a line to not have overhead cables; Munich is considering such a solution to extend through the "Englischer Garten". Nevertheless, other technologies accomplish the same goal by supplying electricity from the trackbed.
http://www.swissinnovation.org/articles/2011/07-110525.html

Microrobots for Nanomanipulation

(EPFL, May 25, 2011)



An EPFL spin-off, Imina Technologies, is developing microrobots to precisely manipulate parts with nanometer-scale accuracy. The robots are the size of dice and move by jumping in very small steps actuated by piezoelectric devices. By varying the frequency of the signal sent to the actuators, very precise control can be achieved. The robots also have a manipulator arm that can be fitted with a variety of tools. They can, for example, be used to separate out a carbon nanotube and measure its electrical conductivity. Imina Technologies recently won a Vittoz Award that will allow it to travel to North America to attend trade shows and meet with potential customers.
http://www.swissinnovation.org/articles/2011/07-110525-2.html

8. Physics / Chemistry / Math

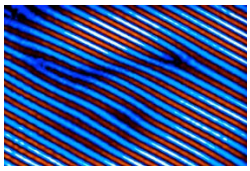
Physics Olympiad

(VSWO, April 04, 2011)

The five winners of the Swiss Physics Olympiad will be representing Switzerland at the 2011 International Physics Olympiad in Thailand. In the national competition, questions were posed from all areas of physics, and included both theoretical and practical problems. In one theoretical exercise, the students had to calculate the efficiency and cost of different heating models, and in an experimental exercise, they needed to determine the moment of inertia of an object using limited means. In Thailand, the middle-school students will face off against students from more than 90 other countries.
http://www.swissinnovation.org/articles/2011/08-110404.html

Turbulence in Solid Matter

(EPFL, April 05, 2011)



Researchers at EPFL have recently discovered that solids can behave like liquids when considered at the quantum level. They demonstrated the controlled formation of vortices in a solid-state semiconductor and correlated observations with theoretical predictions. The vortices were created by using a laser beam to inject polaritons, which are microscopic elements between matter and light, into the semiconductor. Also, the phase of polaritons was measured for the first time. Researchers will continue to experiment with this phenomenon and they hope that the new discoveries will lead to advances in quantum computing, such as the creation of polaritonic circuits.
http://www.swissinnovation.org/articles/2011/08-110405.html

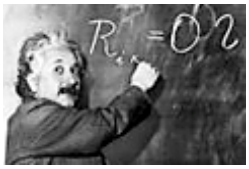
Centennial of Superconductivity

(UNIGE, April 06, 2011)

Superconductivity, the property of certain materials to conduct electricity with zero resistance below a certain temperature, was discovered 100 years ago. Since then, new discoveries have been made, such as high-temperature superconductors that don't require near-absolute zero temperatures. Superconductivity has the potential to change our future, such as by enabling levitation or super-efficient energy distribution systems. Researchers at the University of Geneva are working not only on better understanding this phenomenon, but also on developing applications, such as high-speed circuit breakers and superconducting cables. Already superconductivity is being used in everyday applications, for example by improving the resolution of magnetic resonance imaging (MRI) machines.
http://www.swissinnovation.org/articles/2011/08-110406.html

Empirical Measurement of Brownian Motion

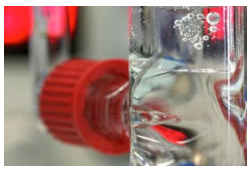
(UNIBAS, April 12, 2011)



Brownian motion, the random motion of particles due to intermolecular collisions, was first observed by Robert Brown in 1827 and described theoretically by Albert Einstein in 1905 in his doctoral thesis. The theory has been indirectly verified many times over by various thermodynamic theories. However, even though Brownian motion indirectly predicted the existence of molecules and atoms, it could never be verified independently. Now, however, researchers at the University of Basel were able to empirically measure Brownian motion and confirm that the theory closely matches the observations. A special laser was used to trap an individual molecule and follow its motion.
http://www.swissinnovation.org/articles/2011/08-110412.html

Efficient Hydrogen Production

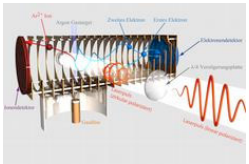
(EPFL, April 15, 2011)



Hydrogen is an abundant substance that can be used as a clean and efficient energy source. However, traditional methods for producing it are inefficient and unsustainable. For example, electrolysis in the presence of platinum is one method, but platinum is very expensive. Now, researchers at EPFL have discovered that molybdenum sulphides allow hydrogen to be easily and efficiently produced at room temperature. The catalyst is abundant, inexpensive, and robust to the quality of water used. The discovery was made by chance, but now the researchers are hoping to create a prototype hydrogen production unit.
http://www.swissinnovation.org/articles/2011/08-110415.html

Electron Correlation

(ETH Zurich, April 18, 2011)



Researchers at ETH Zurich have been studying the phenomenon of ionization of neutral atoms. Conducting this research requires the ability to measure single electrons on very short time scales on the order of femto and attoseconds, which the Institute for Ultra-fast Laser Physics has developed. The specific phenomenon they are measuring is double ionization, where two electrons leave the atom. Models predicted that the second electron follows four femtoseconds behind the first, but experiments now show that only two femtoseconds elapse. The use of circularly polarized laser light and their high-resolution "Attoclock" enabled these measurements. The researchers suspect that the two electrons communicate with each other and are correlated.
http://www.swissinnovation.org/articles/2011/08-110418.html

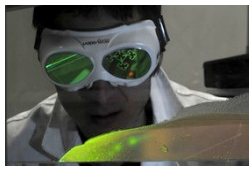
AMS To Depart on Endeavour Launch

(UNIGE, April 26, 2011)

When Space Shuttle Endeavour launches, it will deliver the Alpha Magnetic Spectrometer (AMS) to the International Space Station. AMS is designed to detect primordial anti-matter and other unusual matter, and gather evidence about the Big Bang and the beginning of the universe. It is designed to detect even the smallest traces of anti-matter reaching Earth. Over sixty institutions and 700 physicists, including a team from the University of Geneva, have collaborated to develop AMS. The instrument was assembled and tested at CERN in Geneva, before being delivered to the Kennedy Space Center for launch.
http://www.swissinnovation.org/articles/2011/08-110426.html

Complex Fluid Flow

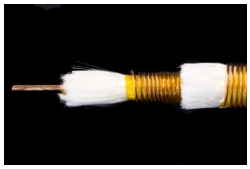
(EPFL, April 26, 2011)



Avalanches and torrential floods are two examples of complex, mixed-phase fluids. Avalanches have both snow and air particles, and floods have both water and rock particles. As a result, flows of these fluids can exhibit both liquid and granular-type flow, which is not well understood or easily predicted. For example, large particles can created channels for the rest of the flow and carry it very far downslope, even to less steep terrain. Researchers at EPFL are using a laser and camera system to follow individual particle trajectories in laboratory setups in hopes of building a model of complex fluid flows. In addition to the obvious fields, their research may also have application to rockets and the food industry.
http://www.swissinnovation.org/articles/2011/08-110426-2.html

Nuclear Fusion Sensors

(EPFL, May 30, 2011)



Researchers at EPFL are developing two specialized sensors for the ITER nuclear fusion reactor project. Nuclear fusion works by combining hydrogen atoms into helium in plasma hot enough to melt anything it touches. To contain the plasma, the reactor will use magnets, but it first needs to sense the position and magnetic orientation of the plasma. The sensors will measure these parameters to within a millimeter for the position and to within half a degree for the orientation, all in the extreme environment of the reactor. The sensors work by surrounding the plasma with electric coils and measuring the electric tension within these coils. The sensors will be installed and validated in 2013.
http://www.swissinnovation.org/articles/2011/08-110530.html

9. Architecture / Design

Urban Design Optimization

(EPFL, April 07, 2011)

EPFL's Laboratory of Architecture and Sustainable Technologies (LAST) is participating in the Ecoparc Forum, which brings together researchers, practitioners, and public figures to discuss questions about the sustainability of urban areas. Faced with the inefficiency of urban sprawl, development is often redirected towards existing urban areas. However, there are many issues to consider with such a policy, including environmental, economic, and sociocultural ones. Thanks to the breadth of the participants, the Ecoparc Forum is an ideal setting to discuss these issues.
http://www.swissinnovation.org/articles/2011/09-110407.html

New ETH Zurich Research Building

(ETH Zurich, April 12, 2011)

ETH Zurich has decided on a design for a new building that will house the new Department of Health Science and Technology, which is being created to focus on medical technologies, and related health topics. The design was chosen from fifteen candidates, and features a glass brick façade, flexible lab space, and ETH Zurich's largest lecture hall. Additionally, the building will have an inner courtyard, which will be promoted as a meeting place for students, teachers, and researchers. It will be built on the lot currently occupied by the facilities of the Laboratory of Hydraulics, Hydrology, and Glaciology, which will move to the Hönggerberg campus. Construction will begin in 2013 and finish in 2016.
http://www.swissinnovation.org/articles/2011/09-110412.html

10. Economy, Social Sciences & Humanities

Research Programs for Social Issues

(UNIL, April 07, 2011)

The Swiss National Science Foundation is sponsoring two new National Research Programs (PNR) on socially relevant topics, "Sustainable Use of Natural Resources: New Challenges" and "Healthy Foods and Sustainable Food Production". The first program aims to build a better multi-disciplinary understanding of the state of natural resources and the role of the ecosystem, and to support environmental protection legislation. The second program aims to develop a scientific basis for practical food production that is healthy, sustainable, and affordable. Both programs are funded at 13 million Francs with further funding to participate in related European efforts.
http://www.swissinnovation.org/articles/2011/10-110407.html

Swiss Philosophy Olympiad

(VSWO, April 07, 2011)

The 2011 Swiss Philosophy Olympiads recently finished, and Samuel Prenner and Theirry Schütz, both of Zurich, won the competition. They will represent Switzerland at the International Philosophy Olympiad. Prenner won for his essay arguing that it is impossible to be mistaken about one's own pain, and Schütz won for his clear analysis of the term "free trade". Over the course of the competition, the competitors participated in several workshops to discuss various philosophical topics and to discuss their essays from earlier rounds. The discussions were held in German, French, and English.
http://www.swissinnovation.org/articles/2011/10-110407-2.html

Public Concerns About Mental Health

(UNIGE, April 14, 2011)

Mental illness is expected to become the primary cause of death in Western societies in the next twenty years, which is why professors from the School of Medicine are trying to start a public discussion now about the future role of psychiatry and the government. If a clear role is not defined, psychological disorders may be taken advantage of by various political ideologies. The large grey area between normal and abnormal behavior further complicates the definition of the types and severity of mental disorders that need to be treated. For example, on the one hand there is the risk of discriminating against people without a real mental disorder, but on the other hand there is the risk of not treating people in need of treatment.
http://www.swissinnovation.org/articles/2011/10-110414.html

The Science of Crowds

(ETH Zurich, April 19, 2011)

Researchers at ETH Zurich have developed a new model of pedestrians based on psychological phenomenon rather than on physics-based rules. According to the new research, pedestrians assess their entire view and try to find gaps, rather than considering each other person individually. This cognitive model is much simpler than previous models. If crowd density exceeds a critical value, established traffic patterns, such as mutually exclusive lanes of opposite direction travel, can break down. Further increase in density can cause dangerous crowd quakes where force waves can travel through the crowd and people fall over. The model can hopefully be used to prevent future crowd disasters and improve planning algorithms for robots.
http://www.swissinnovation.org/articles/2011/10-110419.html

Science of Scientific Recognition

(ETH Zurich, May 06, 2011)

Sociology researchers at ETH Zurich developed a theory for how innovation plays a role in science and in creating paradigm shifts. Usually, the scientists with many citations receive more new citations than lesser-known citations, which leads to the often-cited works to become entrenched. Nevertheless, an innovative breakthrough can lead to an avalanche of publications and citations, possibly leading to a paradigm shift. This is called the 'boost' effect. Furthermore, earlier publications of the same author can also receive this boost. The researchers concluded that this 'boost' effect could potentially be used to predict Nobel Prize winners ahead of time.
http://www.swissinnovation.org/articles/2011/10-110506.html

Wisdom of the Masses

(ETH Zurich, May 19, 2011)

The wisdom of the masses is often thought to be superior to an individual's wisdom. However, ETH Zurich researchers have shown that social influences can cause groups to make incorrect decisions. When a person is supplied with information about his peers, he tends to change his opinion to be closer to that of his peers, thereby eventually bringing a group to consensus. However, this consensus can converge to an incorrect decision or solution. This could be possible due to several reasons, such as various social pressures to conform or to value the opinion of peers. Unfortunately, given today's interconnected world, it is nearly impossible to receive uninfluenced opinions from people.
http://www.swissinnovation.org/articles/2011/10-110519.html

Measuring Income Inequality

(UNINE, May 25, 2011)

Researchers at the University of Neuchatel have developed a more reliable statistical method to measure the income inequality in a population. Synthetic metrics are required to be able to compare the income inequality between countries or between time periods. Two often-used methods are the Gini index and the Quintile Share Ratio (QSR), the latter of which serves as the basis for the new method. The QSR is the ratio of the total income of the top 20% of earners to the total income of the bottom 20% of earners. The new method is designed to work well with complex sampling strategies and asymmetric sampling distribution, and will be put into practice by the Federal Office of Statistics.
http://www.swissinnovation.org/articles/2011/10-110525.html

11. Technology Transfer / IPR / Patents

IPR-free Flu Vaccine Manufacturing

(US Federal Administration, May 31, 2011)

The U.S. Department of Health and Human Services' Biomedical Advanced Research and Development Authority (BARDA) is providing three sets of grants to help expand the worldwide flu vaccine production capability. This development aid will help combat the spread of influenza. The University of Lausanne received one of the grants to develop adjuvants and other manufacturing technologies. The technologies will be free of intellectual property rights so that they can easily be transferred around the world. BARDA aims to develop manufacturing capabilities in developing countries through technology transfer and personnel training.
http://www.swissinnovation.org/articles/2011/11-110531.html

Swiss Federal Institute of Intellectual Property

https://www.ige.ch/en.html

Swiss Technology Transfer Association

http://www.switt.ch/html/home.php

12. General Interest

Swiss Best-Prepared for Catastrophe

(Tages Anzeiger, May 10, 2011)

According to a new UN study, Switzerland is the country best prepared for a catastrophe followed closely by economically strong countries in Europe. Natural disasters have caused more damage in the first few months of this year than in the entirety of the previous year, and, overall, most disasters are due to environmental causes. Despite better warning systems, infrastructure damage in developing countries continues to rise, though developed countries are also affected. Nevertheless, the worldwide risk of death due to disasters has decreased, even though the risk in developing countries may continue to increase.
http://www.swissinnovation.org/articles/2011/12-110510.html

13. Calls for Grants/Awards

Pan-European Research Programs

(UNIL, May 23, 2011)

"Joint Programming Initiatives" is a research framework created by the European Union to fund research on the big social problems facing Europe. One sub-program is "Joint Programming Neurodegenerative Diseases", and new solicitation will be released this May with proposals due in September. The program aims to combat diseases such as Alzheimer and Parkinson, which are becoming increasing important as life expectancy in Europe grows. The specific goals of this round is the optimization of biomarkers and the harmonization of their use in clinical centers. Research consortiums must comprise of at least four different research centers from four different countries.
http://www.swissinnovation.org/articles/2011/13-110523.html

Upcoming Science and Technology Related Events

Cleantech Event Polen-Schweiz 2011
June 20 , 2011
http://tinyurl.com/cleantech-event-2011
Energy
ETH Zurich

Information Security and Cryptography
June 20 – 24, 2011
Information Security and Cryptography
Fundamentals and Applications (Seminar 1)
Building Secure Software Systems (Seminar 2)
http://www.infsec.ch
Information security
Courtyard Zurich North, Zurich

European Fuel Cell Forum 2011
June 28 – July 1, 2011
http://www.efcf.com
Fuel cell
Kultur- und Kongresszentrum Luzern, Lucerne

ISREC Symposium 2011
September 7 – 10, 2011
http://isrec2011.epfl.ch/
Life Science
EPFL, Lausanne

World Resources Forum 2011
September 19 – 21, 2011
www.worldresourcesforum.org
Natural resources
Congress Center Davos

4th International Disaster and Risk Conference IDRC Davos 2012 "Integrative Risk Management in a Changing World"
August 26 – 30, 2012
http://idrc.info/pages_new.php/IDRC-Davos-2012/831/1/
Disaster/risk management
Congress Center Davos

Science-Switzerland Back Numbers

http://www.swissinnovation.org/Science-Switzerland_FebMar_2011.pdf
http://www.swissinnovation.org/Science-Switzerland_DecJan_2010-2011.pdf
http://www.swissinnovation.org/Science-Switzerland_OctNov_2010.pdf
http://www.swissinnovation.org/Science-Switzerland_AugSep_2010.pdf
http://www.swissinnovation.org/Science-Switzerland_JunJul_2010.pdf
http://www.swissinnovation.org/Science-Switzerland_AprMay_2010.pdf
http://www.swissinnovation.org/Science-Switzerland_FebMar_2010.pdf
http://www.swissinnovation.org/Science-Switzerland_DecJan_2009-2010.pdf
http://www.swissinnovation.org/Science-Switzerland_OctNov_2009.pdf

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