

# Science-Switzerland, April – May 2023

News on Swiss science, technology, education and innovation



## Table of Contents

3. Life Science .....	3
4. Nano / Micro Technology / Material Science .....	8
5. Information & Communications Technology .....	9
6. Energy / Environment .....	10
7. Engineering / Robotics / Space .....	13
8. Physics / Chemistry / Math .....	16
9. Architecture / Design .....	17
10. Economy, Social Sciences & Humanities .....	17
11. Start-ups / Technology Transfer / IPR / Patents .....	19
12. General Interest .....	19
Upcoming Science and Technology Related Events .....	20



## Former NASA Science Director Joining ETH Zurich

(ETH Zurich, May 25, 2023)

ETH Zürich recently announced Dr. Thomas H. Zurbuchen as the new director of ETH Zurich Space. Appointed for an initial period of three years, he aims to create an interdisciplinary master's program in space science and to strengthen bonds in the space industry, not only at ETH but also in Switzerland and Europe. His vast experience, ample network, and sharp leadership make him ideal for this role. Thomas H. Zurbuchen is a Swiss-American astrophysicist. Between 2016 and 2022, he served as NASA - National Aeronautics and Space Administration's Head of Science – the longest anyone has held that position continually. He earned his PhD from the University of Zurich of Bern. Aside from scientific pursuits, Dr. Zurbuchen also co-founded the University of Michigan Center for Entrepreneurship (CFE), regarded as the largest Entrepreneurship program at American Universities.

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## Solar Hydrogen System Co-Generates Heat And Oxygen

(EPFL, April 15, 2023)

EPFL researchers have developed a new solar reactor that can generate hydrogen, oxygen, and heat with unprecedented efficiency. The system uses a parabolic dish to concentrate sunlight onto an integrated photoelectrochemical reactor, which splits water molecules into hydrogen and oxygen. The heat generated by the process is also recovered and used for ambient heating or other applications. The system has already been deployed at EPFL's campus in Switzerland, where it produces around half a kilogram of solar hydrogen per day. The team is now working on scaling up the system for industrial applications, as well as exploring new avenues such as splitting carbon dioxide instead of water to yield useful materials like syngas for liquid fuel or ethylene for green plastic production.

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## Thought-Controlled Walking Again After Spinal Cord Injury

(EPFL, May 24, 2023)

Scientists from EPFL, CHUV, Université de Lausanne, CEA, CHU Grenoble Alpes, and Université Grenoble Alpes have made a major breakthrough by allowing a person suffering from paralysis to walk again using a digital bridge between the brain and spinal cord. This wireless bridge was implanted through two electronic devices, one on the brain and one on the spinal cord, and was developed by neuroscientists Grégoire Courtine and Jocelyne Bloch alongside CEA's Brain-Computer Interface program head Guillaume Charve. Remarkable improvements in sensory perception and motor skills were recorded during the tests and, even when the bridge was switched off, new nerve connections had still been developed. This digital bridge could be applied to other clinical indications such as paralysis due to stroke and the research team aims to make the technology available worldwide.

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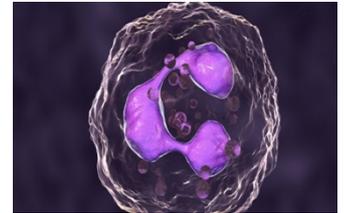


### 3. Life Science

#### Allies Or Enemies Of Cancer: The Dual Fate Of Neutrophils

(University of Geneva, April 04, 2023)

New research conducted by an international team of scientists from the University of Geneva (UNIGE), Harvard Medical School, and Ludwig Cancer Center has discovered that neutrophils, a type of immune cell, play a dual role in cancer immunotherapies. Neutrophils are usually associated with treatment failure in cancer patients, but the study found that there are different types of neutrophils with distinct markers on their surface that can either promote tumor growth or fight against tumors and contribute to the success of immunotherapies. By understanding and manipulating the different types of neutrophils, researchers hope to develop more advanced treatments to improve the effectiveness of current immunotherapies.



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#### Diagnosing Alzheimer's Disease With Blood Biomarkers

(University of Geneva, April 04, 2023)

Researchers from the University of Geneva and the HUG have made significant progress in diagnosing Alzheimer's disease using blood biomarkers. The team found that some blood-based biomarkers (amyloid and tau) showed a strong correlation with the current biomarkers used for diagnosing Alzheimer's disease. These blood biomarkers also exhibited high accuracy in distinguishing between normal and non-normal status of the amyloid and tau biomarkers. Compared to traditional biomarkers, blood-based biomarkers are less invasive and expensive, which could streamline the diagnostic process for Alzheimer's disease and potentially reduce costs by up to 49%. This breakthrough could greatly improve early detection and monitoring of the disease's progression, bringing hope to patients and caregivers alike.



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#### Nanoplasmonic Imaging Reveals Real-Time Protein Secretion

(EPFL, April 11, 2023)

EPFL researchers have developed a nanoplasmonics approach that allows for the real-time observation of cell secretions, including proteins and antibodies. This breakthrough could aid in the development of cancer treatments, vaccines, and other therapies. The method uses a nanostructured gold-plated chip with microscopic wells to place individual cells into. By inducing plasmonic resonance on the chip's surface, researchers are able to map secretions as they are being produced, while observing cell shape and movement. This method has tremendous potential for pharmaceutical development as well as fundamental research. It provides an unprecedentedly detailed view of how cells function and communicate, and could be used to understand how cells respond to different therapies at the individual level, aiding in the development of immunotherapies.

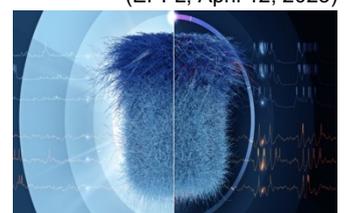


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#### New Circuit Model Offers Insights into Brain Function

(EPFL, April 12, 2023)

Scientists from the Blue Brain Project at EPFL have developed a groundbreaking computational model of the thalamic microcircuit in the mouse brain, offering new insights into the role this region plays in brain function and dysfunction. The researchers captured the complex shapes and biophysical properties of 14,000 neurons connected by 6 million synapses. The model can be used to explore the structural and functional complexity of neural circuits. The model also replicates multiple independent network-level experimental findings across different brain states, and provides a novel unifying cellular and synaptic account of spontaneous and evoked activity in both wakefulness and sleep.



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## How Do We Perceive Our Own Movements?

(University of Fribourg, April 17, 2023)

Scientists at the University of Fribourg have made a breakthrough in understanding proprioception – how we are able to lift a bottle of water to our mouths, even with our eyes closed. Through studying mice performing perceptual tasks, they found that proprioceptive neurons encode limb proprioception in terms of movement direction rather than spatial location or posture. Using two-photon microscopy, the researchers observed that different neurons are activated based on the specific direction a limb moves in, and that all directions are not equally represented. The findings suggest that stimulation paradigms for neuroprosthetics ought to be based on how the prosthetic arm moves relative to behaviorally relevant targets such as the patient's own body. This research can help improve neural prostheses and give us a better understanding of proprioceptive disorders.

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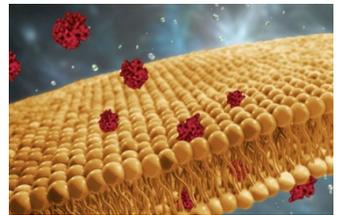


## How Drugs Get Into The Blood

(ETH Zurich, April 17, 2023)

Scientists at ETH Zurich, led by Prof. Sereina Riniker have uncovered new details about how cyclic peptides, a promising class of molecules with potential medicinal applications, can penetrate cell membranes. Cyclic peptides are larger molecules than those used to make most current drugs. To understand how these molecules cross cell membranes, researchers used computer modeling and supercomputers to observe individual molecules crossing a membrane. The simulations showed that the molecule changes its three-dimensional shape while passing through the membrane. Using these findings, researchers developing new drugs can from the get-go look for molecules likely to penetrate cell membranes. This is crucial for these new drugs to be able to be taken in tablet form.

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## Fungi's Beneficial Effects On Coral Not Yet Fully Understood

(EPFL, April 18, 2023)

A new study conducted at EPFL shows that fungi could play a crucial role in protecting coral reefs from the effects of climate change. The research suggests that these fungi could help support coral health by producing antimicrobial compounds to ward off pathogens and recycling nutrients for both coral and algae. The research team, led by marine biologist Claudia Pogoreutz, used terrestrial fungi as a model to understand the potential roles of marine fungi. This knowledge could help in restoring the health of stressed corals, as well as lead to new pharmaceuticals or industrial applications. The findings from this study are an important step towards understanding how we can protect our fragile marine ecosystems from climate change.

[/web/2023/03-230418-31](#)



## How Music Can Prevent Cognitive Decline

(University of Geneva, April 18, 2023)

A new study from the University of Geneva, HES-SO and EPFL has found that musical activities can help to counteract the effects of brain aging. The study followed over 100 retired people who had never taken music lessons before. They were enrolled in either piano or music awareness training for six months. At the end of the study, researchers found that both groups experienced an increase in gray matter volume in four brain regions involved in high-level cognitive functioning. This was associated with a 6% improvement in performance on working memory tests. These results suggest that practicing and listening to music can promote brain plasticity and cognitive reserve, potentially helping to delay age-related decline. The team is now looking into whether these interventions could be beneficial for people with mild cognitive impairment as well as healthy seniors.

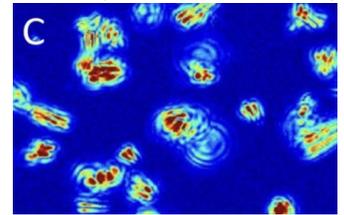
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## Fast, Cheap, Easy Antibiotic Resistance Test

(EPFL, April 30, 2023)

A team of scientists from EPFL (École polytechnique fédérale de Lausanne) and Vrije Universiteit Brussel have developed a novel and highly efficient method for rapid antibiotic susceptibility testing using optical microscopy. The technique, called Optical Nanomotion Detection (ONMD), is extremely rapid, single-cell sensitive, label-free, and requires only a basic traditional optical microscope equipped with a camera or mobile phone. It can detect the sensitivity of numerous bacteria to antibiotics in less than two hours – significantly faster than existing methods. ONMD monitors nanoscale vibrations, a sign of life, of single bacteria before and while being exposed to antibiotics. This breakthrough has significant implications for clinical applications as it can be applied to a wide range of bacteria. The research was led by Dr Sandor Kasas at EPFL (École polytechnique fédérale de Lausanne) and Professor Ronnie Willaert at Vrije Universiteit Brussel.



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## How Cells Are Influenced By Their Environment As Tissues Grow

(ETH Zurich, May 03, 2023)

ETH researchers Viola Vogel and Mario C. Benn have improved a new tissue-culture system to study the interactions between human cells and their extracellular matrix. Their research has shown that cells are capable of sensing mechanical stimuli from this matrix, which can influence tissue growth. This could lead to improved diagnosis and treatment of wound-healing disorders, fibrosis, cancer and other connective-tissue diseases in the future. The team has also been able to replicate myofibroblast transformation in vitro, showing how rapidly changing ECM is one of the triggers for reversion back into fibroblasts. The findings may also pave the way for mechano-medicine - a medical application of insights from mechanobiology - which could replace animal testing in biomedical research.

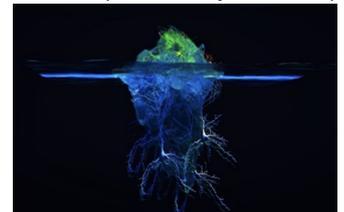


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## Predict What A Mouse Sees By Decoding Brain Signals

(EPFL, May 04, 2023)

A research team from EPFL has developed a novel machine-learning algorithm called CEBRA that can uncover the hidden structure in data recorded from the brain. The algorithm can predict complex information such as what mice see, and it has been tested by decoding movie frames directly from brain signals. It also works for predicting the arm movements of primates and reconstructing the positions of rats as they move around an arena. The algorithm is based on contrastive learning, which learns how high-dimensional data can be arranged in a lower-dimensional space so that similar data points are close together. Led by Mackenzie Mathis and co-authored by Steffen Schneider, this study could have potential clinical applications, as well as provide insight into how the brain processes information and discovering new principles in neuroscience by combining data across animals and species.



[/web/2023/03-230504-07](#)

## Engineering Molecular Interactions With Machine Learning

(EPFL, May 08, 2023)

Researchers at EPFL have developed a machine learning-driven method for designing novel protein binders that can attach to key therapeutic targets, including the SARS-CoV-2 spike protein. The method, known as MaSIF, uses deep learning-generated 'fingerprints' to characterize millions of protein fragments and identify optimal matches. The researchers, led by Bruno Correia and PhD student Anthony Marchand, were able to generate four binders that displayed excellent affinities for their targets. The success rate of the method, combined with its speed and ability to produce high-quality site-specific designs, demonstrate its therapeutic potential. This tool could be used as a pipeline to quickly develop innovative therapies to benefit patients.



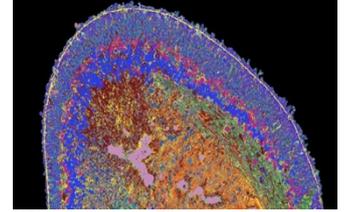
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## Detailed Image Of The Human Retina

(University of Basel, May 08, 2023)

Researchers from ETH Zurich, the University of Basel and the Institute of Molecular and Clinical Ophthalmology Basel (IOB) are creating a high-resolution atlas that depicts the development of the human retina. The researchers used organoids derived from stem cells to map the development of the human retina. The mapping technique used is called 4i technology, or iterative indirect immunofluorescence imaging. It uses fluorescence microscopy to visualise several dozen proteins in a thin tissue section at high resolution. This atlas will help scientists better understand diseases such as retinitis pigmentosa. This approach could also be applied to other tissue types, such as different sections of the brain or tumor tissues.



[/web/2023/03-230508-74](https://www.epfl.ch/newsroom/2023/03-230508-74)

## Deployable Electrodes For Minimally Invasive Craniotomy

(EPFL, May 15, 2023)

EPFL scientists have developed new electrode technology for providing minimally invasive solutions for epileptic patients. The electrode array, which can be funneled through a small hole in the skull and deployed over a large surface of the brain's cortex, is based on soft robotics actuation and compliant electrodes that adapt to a moving body. The technology was developed by Stephanie Lacour's team at EPFL Neuro X Institute and is published in Science Robotics. It consists of an electrode array that fits through a hole 2 cm in diameter, but when deployed, extends across a surface that's 4 cm in diameter. The technology has been successfully tested in mini-pigs and will now be scaled by Neurosoft Bioelectronics for clinical translation.

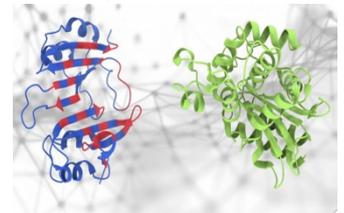


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## PeSTo: A New AI Tool For Predicting Protein Interactions

(EPFL, May 15, 2023)

EPFL scientists have developed a new AI model, PeSTo, that accurately predicts the binding interfaces of proteins when they interact with other proteins, nucleic acids, lipids, ions and small molecules. The model is based on transformer technology and uses self-attention mechanisms to weigh the importance of different parts of the input sequence and make predictions. PeSTo is faster, more robust and more general than current methods as it eliminates the need for pre-computing molecular surfaces and additional properties. The researchers have made PeSTo available free of charge in a user-friendly web server. This powerful tool opens up opportunities for new biological discoveries by enabling faster discovery of unseen protein interactions.



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## High Efficacy Human Parasitic Worm Infection Treatment

(University of Basel, May 16, 2023)

Researchers at the Swiss Tropical and Public Health Institute have discovered a compound previously used in veterinary medicine that could greatly improve the treatment of parasitic worm infections in humans. The drug, called emodepside, showed high cure rates for all three soil-transmitted helminths tested – whipworms, hookworms and roundworms. In particular, the lowest tested dose cured 83% of whipworm infections, for which currently available medicine only has 17% efficacy. Higher dosages reached 100% curing efficiency. The Swiss TPH will now join forces with Bayer to further develop the drug and make it available to patients in need.



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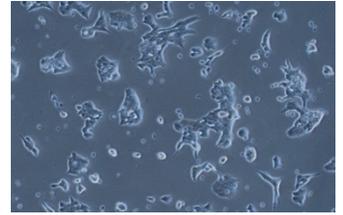


## Mystery Of Important Blood Pressure Drugs Solved

(University of Bern, May 16, 2023)

Thiazide diuretics are widely used to treat high blood pressure, but they also increase the risk of developing diabetes. Researchers at the University of Bern and Inselspital have now pinpointed the cause of this side effect: thiazides inhibit a specific enzyme, called carbonic anhydrase 5b, which plays an important role in insulin secretion. This leads to less insulin in the blood and thus increased blood sugar levels. The study, led by Prof. Daniel Fuster, provides new insights into how insulin is secreted and could lay the foundations for new treatments for diabetes. It also solves the long-known mystery of why thiazides increase diabetes risk.

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## Genetically Transforming Scales into Feathers

(University of Geneva, May 17, 2023)

Scientists from the University of Geneva have found how to permanently transform the scales that normally cover the feet of chickens into feathers, by specifically modifying the expression of certain genes. By injecting a molecule that activates the Shh pathway directly into chicken embryos, they observed abundant juvenile down-type feathers in areas normally covered with scales. This indicates that an evolutionary leap from scales to feathers does not require large changes in genome composition or expression, but rather a transient change in one gene. These results open new perspectives for understanding evolutionary mechanisms generating animal form diversity. The research was led by Michel Milinkovitch and co-authored by Rory Cooper.

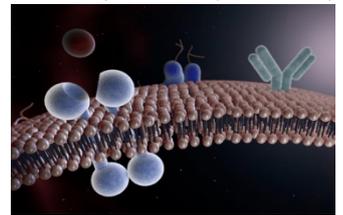
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## Designing Synthetic Receptors For Precise Cell Control

(EPFL, May 25, 2023)

Researchers at EPFL have developed a groundbreaking new technique for engineering biosensors that can sensitively detect specific biomolecules. These biosensors can be used to more precisely control cellular processes for a wide range of therapeutic applications, such as cancer treatments. The new method takes a flexible approach to sensing and can recognize structurally flexible molecules, which are more common in “real-life” biology. The researchers used their new method to create synthetic receptors that can sense and respond to multiple natural or engineered molecular signals, providing optimal sensing of flexible ligands and strong allosteric signaling responses. These biosensors could be used to improve the process of immune cell recruitment in the body, which is often suboptimal in certain diseases

[/web/2023/03-230525-26](#)



## New Production Process For Therapeutic Nanovesicles

(University of Basel, May 26, 2023)

Researchers at the University of Basel have developed a new method for the preparation of therapeutic nanovesicles, paving the way for further research into immunotherapy treatments for cancer. The method is highly efficient and can produce up to 100 times more particles per cell and hour than conventional methods. The resulting nano plasma membrane vesicles have a diameter of 120 nanometers, are biocompatible and show similar properties to exosomes, which are currently the most commonly used extracellular vesicles. The primary aim is to use them to stimulate the immune system, such as in cancer immunotherapies.

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## 4. Nano / Micro Technology / Material Science

### Scallop Eyes as Inspiration for New Microscope Objectives

(University of Zurich, April 03, 2023)

Scientists at the University of Zurich have developed a new type of microscope objective that takes inspiration from the eyes of scallops, using mirrors instead of lenses to focus light. The resulting objective is much more versatile than conventional microscope lenses, with the ability to image tissues and organs in a wider range of immersion media, including those used in clearing techniques. This new objective is, essentially, a Schmidt telescope such as those used in astronomy, filled with a liquid immersion medium and shrunk to the size of a microscope. The objective has already been used to study mouse brains, tadpoles, chicken embryos and cleared human brain samples, with image quality equivalent to or better than that achieved with conventional objectives.

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### Thread-Like Pumps Can Be Woven Into Clothes

(EPFL, April 06, 2023)

Researchers from the Soft Transducers Laboratory at EPFL have developed a revolutionary new pump that can be woven into textiles and clothing. The fiber-like pumps use charge injection electrohydrodynamics to generate a fluid flow without any moving parts, allowing for silent, vibration-free operation. This innovation could revolutionize wearable technology, allowing for soft supportive exoskeletons, thermoregulatory clothing, and immersive haptics to be powered from pumps sewn into the fabric of the devices themselves. The researchers are already looking to improve the performance of their device and scale up production. This study, supervised by Herbert Shea and led by Michael Smith, could be a game-changer for wearable technology.

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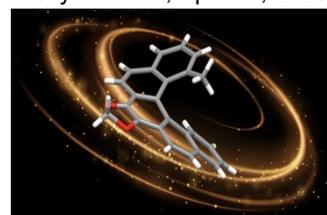


### Synthesis of Chiral Molecules for OLEDs

(University of Basel, April 11, 2023)

A team of chemists from the University of Basel has made a major breakthrough in the development of organic light-emitting diodes (OLEDs). The team has successfully synthesized helicenes – molecules with a helical structure made up of multiple benzene rings – while controlling their twisting direction, or chirality. The researchers, led by Professor Olivier Baudoin and including Dr. Shu-Min Guo and Soohye Huh, successfully synthesized these molecules. Researchers at Université Paris-Saclay then demonstrated that these products strongly absorb and emit circularly polarized light, an important characteristic for OLEDs. This new concept in synthesis could pave the way for more complex helicenes with improved characteristics, opening up possibilities for further development of OLED technology.

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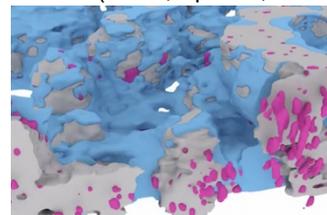


### Cryo-Imaging Lifts Lid On Fuel Cell Catalyst Layers

(EPFL, April 24, 2023)

EPFL researchers have made a breakthrough in understanding the nanostructure of platinum catalyst layers used in proton-exchange membrane fuel cells (PEMFC), which are used in electric vehicles. By combining cryogenic transmission electron tomography and deep learning, they have revealed the heterogeneous thickness of a porous polymer layer on the catalysts called ionomer. This could help manufacturers optimize their use of platinum, making PEMFCs more efficient and cost effective. The research team was led by Vasiliki Tileli from the School of Engineering at EPFL.

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## Circuit Boards From Renewable Raw Materials

Empa researchers Thomas Geiger and Claudia Som are part of a multinational EU project called "Hypelignum" which aims to develop biodegradable electronics. The project is looking to produce circuit boards from cellulose fibers, wood wool, wood pulp, and wood veneer as a way to reduce the ecological footprint of computers. Geiger has already produced experimental boards which were subjected to various mechanical tests and fitted with electronic components. Som will use material databases to calculate the ecological footprint of the eco circuit boards. At the end of the project, four demonstrators will show what has been achieved.

[/web/2023/04-230425-dc](#)

(Empa, April 25, 2023)



## New Antimicrobial Coatings For Bacteria-Free Surfaces

A research team from the University of Fribourg has developed an antimicrobial coating that can reduce bacterial populations on surfaces by up to 10,000-fold within minutes. The project has already met strong interest from manufacturers. The coating is based on ingredients that are only active on the surface and kill bacteria upon contact. It has been tested on cotton, nitrile rubber and glass surfaces in laboratory conditions and could help to contain the spread of infectious diseases. The sustainable synthesis of the antimicrobial coatings, without toxic solvents, is currently being integrated into industrial processes. The project, which has been filed for patent, was led by Prof. Stefan Salentinig from the Department of Chemistry at the University of Fribourg, together with the University Hospital Zurich and industrial partner Livinguard Technologies AG.

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(University of Fribourg, April 26, 2023)



## 5. Information & Communications Technology

### Detecting Stress In The Office From How People Type And Click

A new study from ETH Zurich has found that people's typing and mouse behavior in the office is a better predictor of how stressed they feel than their heart rate. Researchers developed a model that can detect stress from how people type and click, which could one day enable employees to prevent chronic stress in the workplace early on. The study observed 90 participants performing office tasks and recorded their mouse and keyboard behavior, as well as their heart rates, with half of the group also being interrupted with chat messages. They also regularly asked them to report on their perceived stress levels. The results showed that people who are stressed move the mouse pointer more often and less precisely, make more mistakes when typing, and take shorter but more frequent pauses when typing on a keyboard.

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(ETH Zurich, April 11, 2023)



### 30 Years Of A Free And Open Web

On April 30th, 1993, CERN made a historic announcement: the public release of the World Wide Web. This revolutionary tool, first proposed by Tim Berners-Lee in 1989, allowed scientists and institutes to share information quickly and accurately. Today, more than 5 billion people use the internet regularly for research, industry, communications and entertainment. CERN's decision to make the Web free and accessible to everyone has allowed it to become the giant it is today. The release reflects CERN's core values of open collaboration for the benefit of society which are now encapsulated in their Open Science Policy. It is clear that this momentous decision has had a lasting impact on our world.

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(CERN, April 30, 2023)



## Digital Ecosystem For Greenhouse Gas Information

Empa and digitalswitzerland have teamed up to develop WISER, an innovative digital ecosystem funded by Innosuisse as one of the first 15 Flagship projects. It will facilitate carbon footprint assessments by making information available in a transparent, cross-standards, user-friendly way. Led by Didier Beloin-Saint-Pierre (Empa) and Martin Kathriner (digitalswitzerland), the project covers a variety of topics, such as web-based storage of data sources, access to common GHG analysis tools, a consistent description of formats and standards, and the exchange of information between experts. The new website provides a description of eight sub-projects already underway to create and test the digital ecosystem. In the near future, users can expect to find information about events, examples on how to use the prototypes, and other news related to WISER.

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(Empa, May 08, 2023)



## Type Or Swipe? Text Input In Virtual Reality

Researchers from the University of Basel have developed a new way to input text in virtual reality. The swipe keyboard, which is based on the same principle as smartphone keyboards, allows users to type words with an effortless swipe gesture. Traditional typing in VR suffers from the lack of haptic feedback and precision. The system identifies the entered word by comparing it with a calculated graph and registering its real position on the keyboard. In a preliminary user study, participants gave the new input format positive ratings for user-friendliness. The swipe keyboard is available free of charge on GitHub and can be used by anyone looking for an easier way to type in virtual reality. It was developed by Florian Spiess, a doctoral candidate supervised by Professor Heiko Schuldt.

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(University of Basel, May 15, 2023)



## One Step Closer To Next-Generation Electronics

EPFL engineers have developed a new method for controlling the interactions between excitons, quasiparticles that may one day replace electrons in electronic devices. The team, including Fedele Tagarelli and Edoardo Lopriore and led by Prof. Andras Kis, created a device made of layers of insulating material, semiconductors, and metal. By applying an electric field to their device, they found they could control the excitons' repulsive interactions. This could lead to faster and more efficient data processing with less power loss. This discovery expands our toolkit for controlling excitons, potentially allowing us to create more environmentally responsible electronic devices in the future.

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(EPFL, May 15, 2023)



## 6. Energy / Environment

### Emissions Of Banned Ozone-Destroying Chemicals Increasing

New research from Empa has revealed an increase in emissions of five banned ozone-destroying chemicals, known as chlorofluorocarbons (CFCs), between 2010 and 2020. While their current emissions do not pose a significant threat to the ozone layer, they could become a significant contributor to total ozone-depletion chemicals if the current rate of increase continues. The study focused on CFCs whose production for most uses had been banned under the Montreal Protocol, but whose emissions occur during the synthesis of ozone-friendly alternatives. The researchers warn that these CFCs also have a significant greenhouse effect. This study was a collaboration between multiple research institutions, including Empa.

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(Empa, April 03, 2023)





## Atlantic Meridional Overturning Circulation More Stable Than Thought

(University of Bern, April 03, 2023)

A recent study by the University of Bern challenges previous assumptions about the stability of the Atlantic Meridional Overturning Circulation (AMOC), which provides a mild climate in Europe. The study shows that the AMOC was less sensitive to climate change during the last ice age than previously thought, but warns that this does not mean the current situation can be taken lightly. The authors suggest that further research is needed to understand the importance of other factors, such as melting sea ice, wind conditions, and a more intense water cycle, in the tipping points of the climate system. The study was conducted by a team of scientists from the University of Bern, led by Frerk Pöppelmeier.

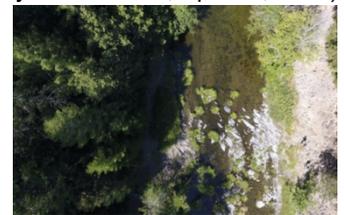


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## Roadmap For Integrating Species In Biodiversity Restoration

(University of Lausanne, April 05, 2023)

Scientists at the University of Lausanne have developed a "toolbox" to help environmental agencies, conservation program managers and other stakeholders integrate certain species, plants or animals into their biodiversity conservation projects. These species are known as ecosystem engineers, and can strongly modify the landscape and create new habitats for wildlife. The toolbox provides a comprehensive framework for predicting and measuring the influence of these species on ecosystems under different conditions. It also includes tools to assess the impact of any actions taken in order to adapt them if necessary. This roadmap aims to ensure that restoration projects are successful by taking a more global approach when introducing new species or plants into an environment.



[/web/2023/06-230405-9c](#)

## Wood: A Wild Card For The Energy Transition

(WSL, April 19, 2023)

Wood is a key resource for the energy transition, as it can be used to generate heat, electricity and fuels in an environmentally-friendly way. Swiss bioenergy researchers, led by Oliver Thees from WSL and Oliver Kröcher from PSI, have calculated that up to one third more energy could be obtained from wood than is currently being used. This could bridge gaps in solar and wind energy production, as it is available all year round. To make the most of this potential, wood should be used efficiently by using cascade use and large-scale conversion into fuels and electricity. Political measures such as incentives for efficient combustion plants can also help to steer its use.

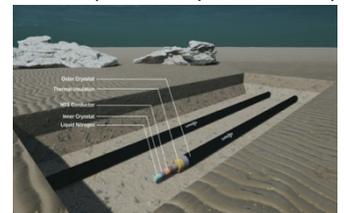


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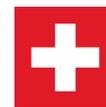
## SuperNode And CERN Collaborate On New Solutions For Renewable Energy Transmission

(CERN, April 22, 2023)

SuperNode and CERN have announced a collaboration to develop a novel type of insulation for superconducting cables, in an effort to improve energy transmission and accelerate the transition to renewable energy. The partnership will leverage CERN's expertise in cryogenics and vacuum technology, as well as its state-of-the-art test rig for the validation of scale prototypes. SuperNode specializes in the development of innovative energy transmission cables, harnessing the characteristics of superconductive materials. The collaboration is a significant milestone for SuperNode and will be critical in enabling a renewables-powered future. Paolo Chiggiato, leader of the Vacuum, Surface and Coating group at CERN, and John Fitzgerald, CEO of SuperNode are spearheading this project.



[/web/2023/06-230422-67](#)



## Progress In Alternative Battery Technology

Researchers at ETH Zurich have developed a new type of zinc battery that is more efficient, durable, safe and environmentally friendly than traditional lithium-ion batteries. This new technology could revolutionize the way we store energy from renewable sources such as wind and solar power. The researchers overcame challenges such as electrolyte depletion and zinc dendrite formation by optimizing the salt concentration in the water-based electrolyte. They also used environmentally friendly salts of acetic acid instead of toxic fluorine-containing salts. The result was a battery that can be charged and discharged quickly with minimal risk of explosion or damage. The next step for the team is to scale up their approach so that it can be used for larger batteries, such as those used in power grids or homes with solar energy systems.

[/web/2023/06-230424-f8](#)

(ETH Zurich, April 24, 2023)



## Best Practices for Photovoltaic Circularity

The EU research project CIRCUSOL aims to create a circular economy model for photovoltaic (PV) modules, to counteract the premature disposal of retired PV systems. Within this Horizon Europe project, researchers from Bern University of Applied Sciences BFH developed a database containing information on the condition of PV modules and batteries, as well as a simulation model that represents the complex interrelationships of various factors in a circular economy model. In order to facilitate secondary use of PV modules, they suggest adding them to the database upon manufacturing, so that information on their current state is always available. The project partners have developed recommendations and strategies to promote the establishment of circular business models for the solar power industry.

[/web/2023/06-230427-0e](#)

(Bern University of Applied Sciences, April 27, 2023)



## Five Technologies On The Way To Net Zero

Switzerland is aiming for zero net greenhouse gas emissions by 2050, and the use of negative emission technologies (NETs) is seen as one of the keys to achieve that goal. A study conducted by TA-SWISS evaluated five NETs that are relevant for Switzerland: storage of CO<sub>2</sub> as biomass in forests, storage in the form of humus in the soil, capture and storage of CO<sub>2</sub> during biomass combustion, extraction from the air and storage, and accelerated weathering of demolition concrete and rock. Taking into account aspects such as feasibility, climate effectiveness, costs, resource consumption and impact, they concluded that an overarching strategy is needed for NET deployment; further research is needed; CO<sub>2</sub> removal must be transparent; and most importantly, there should be separate targets for CO<sub>2</sub> emissions reduction and CO<sub>2</sub> removal.

[/web/2023/06-230502-07](#)

(Empa, May 02, 2023)

## Inequalities Of Low-Carbon Electricity

A team from the University of Geneva, led by Evelina Trutnevyte, has mapped out the socio-economic consequences of electricity decarbonisation for 296 regions in Europe by 2050. The results show that northern European regions would benefit from additional investment and job creation, while southern and south-eastern regions are more vulnerable. Sicily and Campania would experience an increase in electricity prices due to their geographical location. Switzerland's impact would be almost neutral as it has no fossil fuel power plants to close. The data can be used to create benefit and vulnerability indices for the different scenarios, which can then be integrated into energy transition strategies in the electricity sector. This could help ensure a fair and equitable energy transition with measures to compensate for regional inequalities.

[/web/2023/06-230502-72](#)

(University of Geneva, May 02, 2023)





## Switzerland's Path To The Net-Zero Target

(PSI, May 09, 2023)

The ETH Board just launched SCENE, the Swiss Centre of Excellence on Net-Zero Emissions, to help Switzerland reach its ambitious goal of zero greenhouse gas emissions by 2050. The initiative is a joint effort between six institutions, Empa, WSL, Eawag, ETH Zurich, EPFL, and PSI as the Leading House. SCENE will provide a platform for interdisciplinary, cross-institutional collaboration and research into pathways that lead to net-zero emissions. The project has identified six top-priority action areas. Additionally, SCENE plans to raise awareness about net zero emissions among young people through visits to schools across Switzerland. The project is funded by both the ETH Board and the participating institutions, with a total budget of 17.2 million Swiss francs over three years.

[/web/2023/06-230509-6b](#)

## Surveying Swiss Genetic Biodiversity

(ETH Zurich, May 15, 2023)

A new pilot study conducted by ETH Zurich researchers is looking into the genetic diversity of five native species in Switzerland: the Natterjack toad, Yellowhammer, False heath fritillary, Carthusian pink and Hare's tail cottongrass. Initial evaluations have revealed that some populations of the natterjack toad are genetically impoverished, likely due to a lack of contact with other populations. The study is part of a larger effort by Biodiversity Monitoring Switzerland to survey and monitor the diversity of species and habitats in a standardized way. The researchers are also comparing today's genetic variability with that present around 1900, using samples from herbaria and zoological collections. They plan to examine the genetic diversity of 50 species every five to ten years, including mammals, forest organisms, aquatic organisms and fungi.

[/web/2023/06-230515-54](#)



## Breath of Biodiversity in Intensive Palm Oil Culture

(University of Neuchatel, May 25, 2023)

A new study from the University of Neuchatel has found that planting islands of local trees in oil palm plantations on the island of Sumatra can significantly increase biodiversity without reducing productivity. This unique experiment, led by Clara Zemp, Professor of Conservation Biology, is part of a global effort to improve the environmental effects of oil palm cultivation. The research team found that the tree islands had a positive effect on water, carbon and nutrient cycles, microclimate regulation, soil quality, pollination and the control of biological communities and invasive species. The experiment also showed that the oil palm yields at plantation level did not decrease. The study provides evidence that ecological restoration in the context of oil palm plantations is not only possible, but profitable.

[/web/2023/06-230525-d3](#)



## 7. Engineering / Robotics / Space

### A New Measurement Could Change Our Understanding Of The Universe

(EPFL, April 04, 2023)

A new study from a research group at EPFL has achieved an unprecedented level of accuracy in calibrating Cepheid stars for distance measurements. This achievement not only provides the most precise, reliable calibrations of Cepheids as tools to measure distances to date; it also strengthens the first "rung" in the distance ladder of measurements used to determine the Hubble constant ( $H_0$ ). There is a significant discrepancy, known as the Hubble tension, between the values of  $H_0$  found using this method, and those found by interpreting the cosmic microwave background. This new study, led by Richard Anderson, supports this discrepancy, indicating that our understanding of the universe may be slightly off.

[/web/2023/07-230404-f0](#)





## Jupiter Mission To Explore Conditions Conducive To Life

(Paul Scherrer Institut, April 05, 2023)

The European Space Agency's JUICE mission to explore Jupiter and its three largest moons is set to launch soon, carrying on board the Radiation-hard Electron Monitor (RADEM) high-tech detector developed at the Paul Scherrer Institute PSI. RADEM is designed to detect high-energy particles in Jupiter's harsh environment. It will also be used to measure radiation within the solar system and determine how it relates to solar activity. The detector will help scientists better understand Jupiter's complex radiation belts, as well as gain insight into how solar activity affects Earth's radiation belts and magnetosphere.

[/web/2023/07-230405-34](#)



## How To Make Self-Folding Surgical Tools

(ETH Zurich, April 12, 2023)

ETH Zurich researchers have developed a new approach to minimally invasive surgical instruments, allowing large objects to be transported through a narrow catheter. The method consists in breaking down the device into semi-individual parts and then sliding them through the catheter in a row, like a string of pearls. At the end of the catheter, magnets built into the parts cause them to assemble themselves into a predefined shape. This expands the possibilities for designing minimally invasive surgical tools and allows for increased mobility when performing surgery on organs such as the intestine or stomach. The research was led by ETH doctoral student Hongri Gu.

[/web/2023/07-230412-47](#)



## Key Experiment For LIFE Space Mission

(ETH Zurich, April 18, 2023)

The LIFE initiative, led by ETH Zurich, is an ambitious project to detect traces of life on exoplanets. With the help of a future constellation of five satellites positioned at the L2 Lagrange point L2, the international team hopes to pick up infrared thermal radiation from Earth-like exoplanets and use it to deduce the composition of their atmospheres and the possible presence of life. Recently, the Swiss government has granted nearly three million euros in funding for laboratory experiment NICE (Nulling Interferometer Cryogenic Experiment), driven by Prof. Sascha P. Quanz, Dr. Adrian Glauser, Dr. Mohanakrishna Ranganathan, and Thomas Birbacher. This experiment will demonstrate the planned measurement method and help develop important technological foundations that are indispensable for realizing the LIFE space mission.

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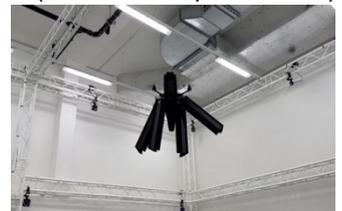


## Earpiece Speeds Up Recovery After Stroke

(ETH Zurich, April 19, 2023)

Stroke patients may soon have a new way to regain physical function faster and more effectively. Researchers at ETH Zurich have developed a smart earpiece that stimulates the vagus nerve in the ear, helping the brain rewire motor neural circuits to restore movement. The device is worn like an earpiece and emits electrical impulses that activate the nerve when triggered by a movement sensor. This helps stroke patients relearn physical actions faster and more easily than traditional methods, which require expensive surgery and long recovery times. The movement sensor works like a smartwatch. This reinforcement learning process helps the brain recall correct sequences of movements more quickly. The researchers plan to launch an ETH spin-off this summer, followed by tests on healthy people before proceeding with clinical studies on stroke patients.

[/web/2023/07-230419-19](#)





## Bio-Gliders: Sustainable Flying Sensors for Environmental Monitoring

(Empa, April 19, 2023)

Empa researchers have developed a new type of sustainable flying sensor that can monitor the condition of ecosystems in real time. Modeled on the gliding seeds of the Java cucumber, these bio-gliders are made from potato starch and wood waste. The sensors measure parameters such as soil moisture and acidity until they eventually decay and become one with the forest floor. The protective film around the sensor opens like a flower when exposed to moisture, then closes up again until the next rain. The sensor inside changes color to indicate the pH of its surroundings, which is recorded with an overhead drone. The researchers are now working on developing completely biodegradable drones that can measure more than just acidity.

[/web/2023/07-230419-4d](#)



## Celestial Monsters At The Origin Of Globular Clusters

(University of Geneva, May 15, 2023)

A team of researchers from the Universities of Geneva, Paris and Barcelona have found evidence that supermassive stars could be responsible for the heterogeneous chemical makeup observed in stars from the same globular cluster. Using data from the James-Webb Space Telescope, they discovered a trace of these supermassive stars in a distant galaxy 13.3 billion light-years away. The strong presence of nitrogen in the galaxy can only be explained by the combustion of hydrogen at extremely high temperatures, which only supermassive stars can reach. This strengthens their model as being the only one capable of explaining abundance anomalies in globular clusters. The team will now use James-Webb data to test their model on other globular clusters forming in distant galaxies.

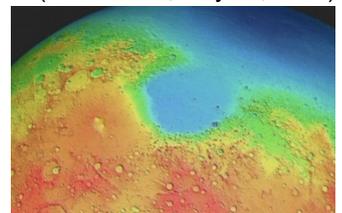
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## Thickness of Martian Crust Revealed by Surface Waves

(ETH Zurich, May 15, 2023)

ETH Zurich researchers, led by seismologist Doyeon Kim, have used data from a strong quake recorded by the NASA Mars InSight mission to determine the global average thickness of the Martian crust. The results show that it is much thicker than Earth's or the Moon's, and that the main source of heat from Mars is radioactive decay. The crust is also found to be similar in density in both northern and southern hemispheres, but with significant differences in thickness. This discovery provides insight into Mars' thermal history and indicates that there might still be melting processes taking place beneath the surface today.

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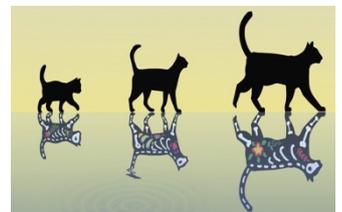


## New Inspection Drone Uses Wind To Lengthen Flight Times

(EPFL, May 17, 2023)

Elythor, an EPFL spin-off co-founded by Harry Vourtsis and Nathan Müller, has developed a revolutionary new inspection drone called Morpho. Its adaptive wings allow it to fly vertically or horizontally and adjust to wind conditions in real time, reducing energy consumption. This makes it perfect for inspecting power plants and other infrastructure like high-voltage power lines, wind turbines, gas pipelines and offshore oil platforms. It can cut the time and cost of a drone inspection by an average of 35%, while its embedded sensors and cameras let it fly just as well in enclosed spaces as in the open air. Elythor plans to get its drone ready for industrial production this year with a market launch slated for the end of 2020.

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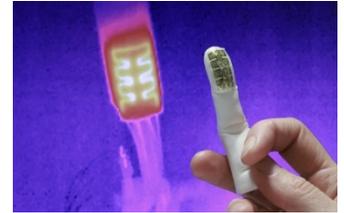


## Amputees Feel Warmth In Their Missing Hand

(EPFL, May 25, 2023)

Amputees are now able to sense the temperature of objects in their phantom hand, thanks to a new bionic technology developed by researchers at EPFL, Sant'Anna School of Advanced Studies and Centro Protesi Inail. This breakthrough is made possible through the discovery that temperature feedback can be projected into the phantom limb. Through non-invasive thermal electrodes (thermodes) placed against the skin on the residual arm, amputees can feel if an object is hot or cold and tell if they are touching copper, plastic or glass. The technology opens up new avenues for non-invasive prosthetics and provides amputees with a sense of reconnection to their missing hand. The researchers, Silvestro Micera and Solaiman Shokur, teamed up with Metaphysiks, an EPFL spin-off, which develops a neuro-haptic technology connecting the body with digital worlds.

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## 8. Physics / Chemistry / Math

### Turbulent Affairs: Scientists Enhance The Simulation Of Strong Flow Phenomena

(ETH Zurich, April 11, 2023)

Professor Siddhartha Mishra of ETH Zurich is working to enhance the simulation of highly turbulent flows, such as shock waves and sonic booms. He and his team have developed algorithms to represent these phenomena more accurately and efficiently in supercomputer simulations. They discovered that individual simulations do not converge when it comes to highly turbulent fluids, but statistical solutions of many simulations yield convergence with increasing resolution. They have tested their hypothesis on supercomputer "Piz Daint" and found that mean values, variance, probability distribution, and correlations all converge with higher resolution. Now they must rigorously prove the mathematics of this hypothesis and establish a formal theorem demonstrating their findings.

[/web/2023/08-230411-e0](#)



### Fat Quantum Cats

(ETH Zurich, April 20, 2023)

Researchers at ETH Zurich have created the heaviest Schrödinger cat to date, combining a crystal with a superconducting circuit. The cat is represented by oscillations in the crystal, while the decaying atom is emulated by a superconducting qubit. By putting the two oscillation states of the crystal into a superposition, they effectively created a 16 microgram Schrödinger cat - much heavier than atoms or molecules previously used for this purpose. This could lead to more robust quantum bits and help explain why quantum superpositions are not observed in everyday life. The experiment was led by Professor Yiwen Chu from ETH Zurich's Laboratory for Solid State Physics and her team of researchers.

[/web/2023/08-230420-58](#)

### Entangled Quantum Circuits

(ETH Zurich, May 15, 2023)

ETH Zurich researchers have successfully demonstrated that quantum mechanical objects that are far apart can be strongly correlated with each other, disproving the concept of "local causality". The experiment was conducted using superconducting circuits for the first time. The researchers built an impressive facility in the underground passageways of the ETH campus, connecting two cryostats containing superconducting circuits with a 30-meter-long tube cooled to a temperature just above absolute zero. After evaluating more than one million measurements, they showed with very high statistical certainty that Bell's inequality is violated in this experimental setup. This opens up interesting possible applications in the field of distributed quantum computing and quantum cryptography.

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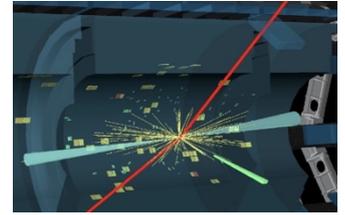




## LHC Experiments See First Evidence Of A Rare Higgs Boson Decay

(CERN, May 26, 2023)

The ATLAS and CMS collaboration recently established the first evidence of the rare process in which the Higgs boson decays into a Z boson and a photon, using data from CERN's second LHC run. This could provide indirect evidence of the existence of particles beyond those predicted by the Standard Model of particle physics. The Standard Model and some of the theories extending it predict different decay rates for this specific process. Measuring this decay rate provides valuable insights into both physics beyond the Standard Model and the nature of the Higgs boson. Using advanced machine-learning techniques, the ATLAS-CMS collaboration found evidence for this process, although their result's statistical significance is too low, for now, to claim an observation. This is the first step in a powerful test of the Standard Model.



[/web/2023/08-230526-5c](#)

## 9. Architecture / Design

### Aerogel Glass Bricks: Translucent And Insulating

(Empa, April 20, 2023)

A new type of glass brick with excellent insulation properties has been developed by an Empa team, allowing for the construction of aesthetically pleasing, translucent walls that reduce the need for artificial lighting. The aerogel glass brick combines the properties of strength, insulation and light transmission, making it suitable for a variety of applications, including libraries, galleries, museums, offices, residential buildings, and even greenhouses. This contrasts with previous translucent bricks that could be used in load-bearing walls and had poor insulation. The researchers, among which Jannis Wernery and Michal Ganobjak, have now filed a patent application for the aerogel glass brick and are looking for potential industrial partners. With this innovation, architecture now has new design possibilities for more daylight in buildings.



[/web/2023/09-230420-71](#)

## 10. Economy, Social Sciences & Humanities

### Better Framework Needed for Swiss Startups

(University of St. Gallen, April 11, 2023)

A new study by the University of St. Gallen has revealed that while Switzerland offers good conditions for start-ups, there are still some obstacles that need to be addressed in order to create a more conducive environment for entrepreneurs. The study found that the bureaucratic process of founding a company is too complex and lengthy in comparison to other countries. Specific challenges were identified in the MedTech and FoodTech sectors, where high levels of regulatory uncertainty and rigidity are hindering innovation. Another issue affecting all sectors equally is the possible classification of venture capitalists as commercial securities traders.

[/web/2023/10-230411-ed](#)

### Media Coverage Of Climate Change Research Does Not Inspire Action

(University of Lausanne, April 19, 2023)

A new study from the University of Lausanne has found that media coverage of scientific advances on climate issues is not activating the psychological mechanisms needed to trigger action in individuals and groups. The research shows that most of the research selected by the media is biased to natural sciences and does not focus on solutions. This could lead to denial and avoidance, rather than action. To effectively communicate climate change, researchers are advocating for a transversal and solution-oriented approach, as well as more cross-disciplinary coverage from journalists.

[/web/2023/10-230419-ac](#)



## Female Entrepreneurial Activities In Swiss Universities

(startupticker.ch, April 19, 2023)

A new report from Swiss Universities and the University of Applied Arts and Sciences Northwestern Switzerland (FHNW) has found that women are significantly underrepresented in science and technology fields in Switzerland. The FemSpin report, which is the first of its kind, highlights that women account for only 17% of spin-offs founded in 2021 and 11.9% of patents filed in 2022. The study also found that female students and staff are significantly outnumbered by males at Swiss universities. The report suggests measures to boost female entrepreneurship activities such as promoting role models, creating awareness and visibility on the topic, promoting support networks, enabling qualification for women, promoting female leadership, giving women more encouragement, funding their ventures and providing a foundation to reconcile work and family.

[/web/2023/10-230419-a7](#)



## Voting Rights Without A Passport: An Opportunity For Integration?

(University of Basel, April 25, 2023)

A team of researchers from the University of Basel, the Leibniz Centre for European Economic Research in Mannheim and the University of Malmö have recently investigated whether allowing immigrants to vote in regional elections without a Swedish passport affects naturalization numbers. The study found that for refugees and individuals from countries with a low standard of living, experience with voting seems to serve as an additional motivator to become naturalized. For individuals from countries with a higher standard of living, however, the right to vote reduces the urgency and appeal of the naturalization process. The findings could be relevant for Switzerland, as it currently debates whether foreign nationals should be allowed to take part in referendums or elections.

[/web/2023/10-230425-f3](#)



## Solidarity to Avoid Severe Energy Scarcity

(ETH Zurich, May 17, 2023)

According to a study from ETH Zurich, European countries should collaborate in solidarity to avoid a severe energy crisis due to a gas shortage. This could be done through signing bilateral agreements and voluntarily reducing gas consumption. Such collaboration would be far less painful than forcing a country to massively reduce its demand because there's no energy available. Additionally, Europe must invest in domestic energy supply, expand renewable technologies, pursue electrification efforts, and ensure electricity trading across Europe in order to reduce climate impact and dependence on foreign countries for its energy supply. This study was conducted by Jacob Mannhardt, Paolo Gabrielli, Giovanni Sansavini, and others.

[/web/2023/10-230517-5d](#)



## Almost CHF 25 Billion Dedicated To Research In Switzerland In 2021

(Federal Statistical Office, May 25, 2023)

Switzerland dedicated CHF 24.6 billion to R&D in 2021. This represents an average annual increase of 4% compared with 2019, the year of the last survey. These activities were mainly carried out within higher education institutions (28%) and private enterprises (68%) by almost 140 000 persons. In international comparison, Switzerland remains one of the most research-intensive economies. These are the main results of the Federal Statistical Office's (FSO) statistics on "research and development in Switzerland".

[/web/2023/10-230525-65](#)





## Low-Carbon Diets Reduce Global Ecological and Health Costs

(ETH Zurich, May 26, 2023)

A new study from ETH Zurich has found that a shift away from animal-sourced foods could reduce global health and ecological costs by up to \$7.3 trillion. The study found that for every dollar spent on food in 2018, \$2 of production-related external costs were embedded in it, leading to a total of \$14 trillion in externalities. These are the costs of damage to human health and ecosystems caused by the environmental impacts of food production. By switching to more plant-based diets, the health burden and ecosystem degradation caused by food production could be greatly reduced. The study also showed that omitting the production of food when assessing the health effects of dietary change underestimates the benefits of more plant-based diets.



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## 11. Start-ups / Technology Transfer / IPR / Patents

### Venture Kick Supports Green Startups with 40000 CHF

(Venture Kick, May 30, 2023)

Venture Kick recently awarded its second stage of financial and entrepreneurial support to three projects. Arrhenius, sallea, and SEPARATIC each received 40 000 CHF. Arrhenius develops and operates large-scale bioreactors for the production of microalgae where the carbon will be stored geologically. Sallea produces whole-cut lab-cultivated meat through the development of novel cell-growth scaffolds. SEPARATIC designed a novel membrane incorporating adsorbent material for CO<sub>2</sub> and flue gas capture direct from air sources. These projects have great potential to reduce environmental damage while producing enough food for a growing world population in an efficient way. Venture Kick's financial support will help them make their vision a reality.

[/web/2023/11-230530-10](#)

## 12. General Interest

### The Unexpected Contribution Of Medieval Monks To Volcanology

(University of Geneva, April 05, 2023)

An international team of researchers, led by the University of Geneva, have used medieval texts to accurately date some of the biggest volcanic eruptions in history. By examining hundreds of annals and chronicles from Europe and the Middle East, they were able to identify references to total lunar eclipses and their colouration. This allowed them to pinpoint when large eruptions occurred, and how they may have contributed to the Little Ice Age. The research team, led by Sébastien Guillet and Markus Stoffel, also drew on ice core and tree ring data to better understand how past volcanism affected climate and society during the Middle Ages.



[/web/2023/12-230405-20](#)

### New Compact Accelerator To Help Preserve Heritage Artworks

(CERN, April 18, 2023)

The Italian National Institute for Nuclear Physics and CERN have developed a compact, transportable accelerator for the non-destructive analysis of historical artifacts and artworks. MACHINA is based on a radio-frequency-quadrupole accelerating cavity designed at CERN. It is designed to be used in museums or conservation sites to analyze works of art in a non-destructive manner, using ion beam analysis techniques that would otherwise be impossible due to the fragility or size of the objects. The accelerator's superior radiation protection ensures a safe working environment, enabling it to be used with confidence in any location.



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## Upcoming Science and Technology Related Events

### Swiss Nano Convention

June 15-16, 2023

<https://is.gd/5MzRJq>

Nano-optics, -imaging, biosensors  
Neuchâtel

### UK-Swiss Life Sciences Innovation Forum

June 29, 2023

<https://is.gd/JNd8ko>

Biotech, Healthcare, Innovation  
Basel

### Swiss Conference on Data Science

June 22-23, 2023

<https://is.gd/0zj4gA>

Data science, business, innovation  
Zürich

### Female Future Festival Zurich

June 29, 2023

<https://is.gd/1AD6N3>

Innovation, Startups, Networking  
Zürich

### >>venture>> Award Ceremony 2023

June 26, 2023

<https://is.gd/il27a9>

Startups, Investors, Pitching  
Lausanne

### ETH Industry Day 2023

September 6, 2023

<https://is.gd/Pj68wD>

Industry, Investors, Networking  
Zürich

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