Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

State Secretariat for Education, Research and Innovation SERI
Swissnex in Japan
Innosuisse
Swiss Federal Office of Energy SFOE
Swiss Academies of Arts and Sciences

Switzerland.

Science-Switzerland, December 2024 – January 2025

News on Swiss science, technology, education and innovation

Table of Contents

Head of AI Research at Apple Appointed Professor at EPFL

(RTS Info, December 06, 2024)

Dr. Samy Bengio, currently Apple's Senior Director for AI and Machine Learning Research, has been appointed as a full Professor at EPFL, where he will co-lead a prominent research group alongside Dr. Emmanuel Abbé, Professor of mathematics and computer science. Together, they will focus on the foundations of intelligence and reasoning in artificial intelligence. This partnership centers on advancing AI research, particularly in evolving future AI models and addressing the limitations of language models like ChatGPT. Most importantly, EPFL and Apple have agreed to openly publish all resulting research, enhancing contributions to the global AI community.
/web/2024/12-241206-75

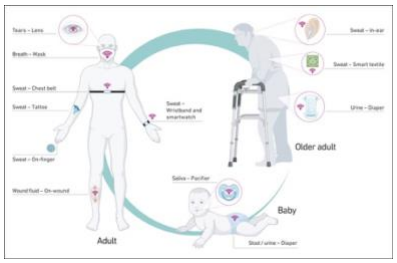
Inauguration of Europe's Most Powerful Research Centrifuge

(ETH Zurich, January 22, 2025)

ETH Zurich has inaugurated Europe’s largest capacity research centrifuge. Under the leadership of Professor Ioannis Anastasopoulos, this tool will enable researchers to study the behavior of buildings and civil engineering structures when subjected to natural forces through the creation of reduced-scale models. By using this state-of-the-art centrifuge, researchers can replicate in hours what takes years to occur in reality. This research is crucial for developing innovative solutions that lessen the carbon footprint and reduce the costs associated with foundation retrofits while enhancing seismic safety.
/web/2025/00-250122-95

Sensors for the Future of Health

(ETH Zurich, December 06, 2024)



ETH Zurich researchers Dr. Noe Brasier and Prof. Dr. Jörg Goldhahn, have published an overview of what is currently possible with wearable sensor technology. Their research presents sensors that can continuously and non-invasively measure biochemical data from body fluids, providing continuous, minimally invasive, and non-invasive monitoring of biomarkers throughout various life stages The paper also showcases key aspects of device development, such as the importance of patient involvement and proper data validation and interpretation. Next generation wearable sensors have the potential to transform healthcare delivery by enabling continuous health monitoring and reducing the frequency of doctor visits.
/web/2024/11-241206-fa

1. Policy

Discovery of a Serious Side Effect of Using CRISPR-Cas Gene Scissors

(ETH Zurich, December 05, 2024)

Researchers from ETH Zurich, led by Prof. Dr. Jacob Corn with first author Dr. Grégoire Cullot, have uncoered a significant setback in CRISPR-Cas9 gene editing techniques. Their breakthrough discovery reveals that the molecule AZD7648, previously thought to be promising, causes unwanted and catastrophic side effects, resulting in massive genetic changes in edited cells. The study involved a meticulous analysis of DNA sequences at and around the edited sites. While AZD7648 is currently in clinical trials as a potential cancer treatment, the findings suggest that additional testing is needed to fully understand the potential damage. These results highlight the need for new approaches and regulatory measures to assess and minimize risks associated with CRISPR-Cas9 technologies.
/web/2024/01-241205-0f

The Policies that Will Lead to a Clean Energy Future

(University of Basel, January 06, 2025)

Researchers Dr. Mart van der Kam and Professor Ulf Hahnel from the University of Basel and the University of Geneva have published research that identifies crucial political measures needed to encourage the adoption of solar panels, electric vehicles, and heat pumps, especially among renters in Switzerland. Using an interdisciplinary approach, the researchers combined household survey data with a dynamic societal decision-making model, analyzing nearly 1,500 Swiss households. This method enabled them to test various policy measures to find the most effective strategies for promoting eco-friendly technology adoption. The study's significant implications lie in its exploration of how a blend of political measures can spur the energy revolution in Switzerland, targeting the largely untapped renter demographic, instead of depending solely on individual incentives.
/web/2025/01-250106-2b

2. Education

Global Trust in Science Remains Strong

(University of Zurich, January 31, 2025)

Researchers from the University of Zurich and ETH Zurich, led by Dr. Viktoria Cologna and Niels G. Mede, have found that people worldwide continue to trust scientists and want them involved in shaping society and politics. Their findings come from a large global survey involving 241 researchers from 179 institutions, who collected views from 71,922 people across 68 countries. This extensive study aimed to explore public trust in scientists, societal expectations, and desired research priorities in the aftermath of the pandemic. The study not only emphasizes the importance of science communication but also urges scientists to better align their work with public expectations and societal needs. By engaging more with the public and integrating societal priorities into their research agendas, scientists can ensure their work is more relevant and attracts greater public support.
/web/2025/02-250131-26

3. Life Science

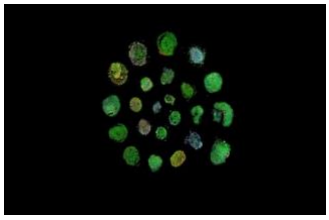
Luminous Wood: A New Biohybrid Material

(EMPA, December 04, 2024)

Spearheaded by fungal researcher Dr. Schwarze Francis at Empa's Cellulose & Wood Materials lab, a study has led to the creation of luminous wood. This innovative composite material is forged by introducing a parasitic fungus that permeates wood with the natural substance luciferin, resulting in a captivating green glow. The research involved using the ringless honey fungus (Desarmillaria tabescens) to degrade lignin in balsa wood samples, effectively inducing and controlling the bioluminescence process. By analyzing the genetic code of naturally glowing mushrooms and refining laboratory conditions, researchers successfully enhanced the wood's luminosity. This new material could see applications in environmental sensors, green electronics, designer furniture, and jewelry.
/web/2024/03-241204-1d

New Cancer Models Could Help Personalize Lymphoma Treatments

(EPFL, January 06, 2025)



Scientists from EPFL and the University of Lausanne, led by Associate Professor Elisa Oricchio, have made a groundbreaking advancement in cancer modeling. They developed 'lymphomoids,' patient-derived models that maintain the original structure and multicellular composition of lymphoma tumors in the lab. The innovative research employed these lymphomoids to effectively replicate tumor architecture, offering a novel method to test lymphoma treatments and predict patient-specific responses more accurately. These findings could fundamentally enhance personalized lymphoma treatment, offering a more accurate alternative to traditional cancer modeling approaches.
/web/2025/03-250106-31

Antibody Therapy Leads to Enhanced Motor Function

(University of Zurich, January 09, 2025)

Scientists at the University of Zurich, led by Prof. Martin Schwab, Prof. Armin Curt, and Prof. Norbert Weidner, have developed an antibody that enhances nerve regeneration for patients suffering spinal cord injury. The research included specialized centers across Germany, Switzerland, Spain, and the Czech Republic. The initial clinical findings show promise for patients with acute tetraplegia, and could improve patient independence in daily activities.
/web/2025/03-250109-b6

Innovative Treatment for Muscle Spasms in Paraplegics

(EPFL, January 10, 2025)

A study led by Simone Romeni from EPFL, and Università San Raffaele. has revealed a novel approach to treating muscle spasms in paraplegics. Coordinated by Prof. Pietro Mortini and Prof. Silvestro Micera, this research introduces high-frequency spinal cord stimulation to manage overreactive sensory-motor circuits without causing discomfort to patients. This breakthrough is particularly significant as it provides new hope for individuals with severe spinal cord damage to regain movement. The study indicates not only a promising treatment for paraplegics but also suggests that this surgical procedure could benefit a diverse array of clinical conditions.
/web/2025/03-250110-9b

Advancing Treatment for Stargardt Disease

(University of Basel, January 10, 2025)

A remarkable breakthrough in gene therapy for Stargardt disease has been achieved by a research team led by Professor Bence Gyorgy and Professor Botond Roska at the Institute of Molecular and Clinical Ophthalmology Basel (IOB) and the University of Basel. The study, with doctoral student Alissa Muller as the first author, promises new treatments for this inherited retinal disorder. Using a cutting-edge technique known as "base editing," the researchers targeted the nucleotide adenine at a critical site in the genome, using modified viral vectors to deliver this therapy to retinal cells. Their groundbreaking work demonstrated effective correction of the most common mutation associated with Stargardt disease in human tissue, achieving impressive gene correction rates of 75% in cone cells and 87% in retinal pigment epithelial cells.
/web/2025/03-250110-a4

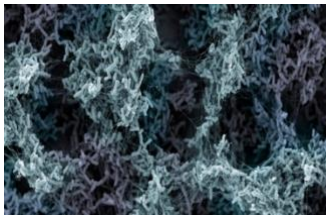
Predicting Human Response to Surprise and Novelty

(EPFL, January 14, 2025)

At the forefront of neuroscience and computational science, an EPFL team led by Dr. Alireza Modirshanechi and Professor Wulfram Gerstner, has developed an algorithm that can effectively predict how surprise and novelty influence human behavior. The algorithm was rigorously tested against real-life human behavior with assistance from EPFL's Laboratory of Psychophysics, directed by Dr. Michael Herzog. Impressively, it predicted 60% to 80% of participants' decisions, shedding light on the brain's response to unexpected stimuli. This significant breakthrough enhances our comprehension of how the brain processes surprise and novelty, paving the way for advanced understanding in cognitive neuroscience.
/web/2025/03-250114-36

Discovery of Sophisticated Early Warning Defense Mechanisms in Bacteria

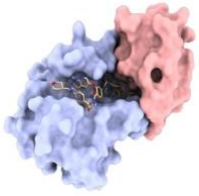
(University of Basel, January 20, 2025)



Prof. Dr. Knut Drescher and his team at the University of Basel, with Sanika Vaidya as the first author, have discovered that bacteria can sense threats in advance through a general danger signal provided by specific bacterial cell wall fragments released when bacteria are killed by phages or antibiotics. The research revealed that these fragments serve as an early warning system, prompting bacteria to form protective biofilms as a survival strategy when nearby cells are dying. This discovery enhances our understanding of bacterial communication and response to threats, with significant implications for combating infections.
/web/2025/03-250120-a2

A Deep Learning Pipeline for Controlling Protein Interactions

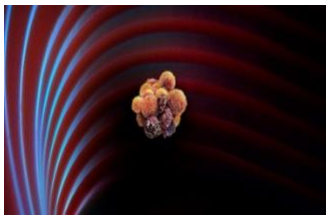
(EPFL, January 22, 2025)



Scientists from EPFL and the Austrian Academy of Sciences, led by Bruno Correia, have achieved a remarkable breakthrough in protein design. PhD student Stephen Buckley and LPDI scientist Anthony Marchand, PhD led the effort to leverage deep learning and MaSIF technology to create new proteins that can bind to known protein complexes involving small molecules, such as drugs or hormones. The research uses the MaSIF deep-learning pipeline to rapidly analyze millions of proteins, identifying optimal matches based on chemical and geometric surface properties. This advancement is pivotal as it introduces new pathways in the computational design of molecular interactions, enhancing the safety and efficacy of cell-based therapies.
/web/2025/03-250122-8e

Dissolving Clusters of Cancer Cells to Prevent Metastases

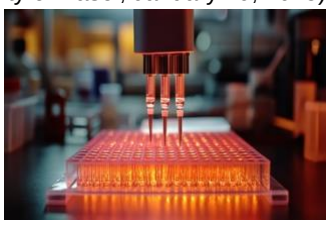
(ETH Zurich, January 27, 2025)



Researchers from ETH Zurich, in collaboration with University Hospitals of Basel and Zurich, and the Basel-Land Cantonal Hospital, have made a new discovery in the treatment of metastatic breast cancer. Led by Dr. Christian Kurzeder and first author Dr. Bich Doan Nguyen-Sträuli, their study highlights the use of digoxin to reduce the size of circulating tumor cell clusters, marking a significant advancement in cancer treatment. The team systematically tested over 2,400 substances in cell cultures to identify effective agents against these tumor cell clusters. This discovery could potentially prevent metastasis formation, significantly lowering metastatic breast cancer risks. PAGE Therapeutics AG, an ETH spin-off, is advancing this research by developing new molecules based on digoxin to enhance its effectiveness. Furthermore, the researchers are also working on creating new digoxin-based molecules to enhance efficacy and are extending their studies to include other metastatic cancers like prostate, colorectal, and pancreatic cancer, as well as melanoma.
/web/2025/03-250127-89

Testing the Effect of Thousands of Compounds on Cellular Metabolism

(University of Basel, January 29, 2025)

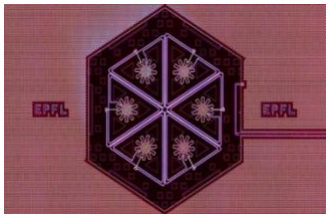


Researchers at the University of Basel, led by Dr. Laurentz Schuhknecht and Professor Mattia Zampieri, have developed a new method to simultaneously test the metabolic effects of thousands of substances. Using a high-throughput metabolomics approach, they grew cells in numerous tiny wells, exposed them to a vast library of compounds, and then measured the impact on over 2000 metabolites with mass spectrometry. This process, combined with computer analysis, revealed new actions of common drugs, such as tiratricol's specific effect on nucleotide production. This discovery accelerates medication development by providing detailed insights into the metabolic changes caused by active substances. It can predict potential side effects and drug interactions more effectively. Moreover, this method opens new therapeutic avenues, like repurposing tiratricol for cancer treatment to inhibit tumor growth. The University of Basel's technique greatly enhances drug design precision, aligning disease-specific metabolic profiles with the metabolic interference of drug candidates, thus improving the effectiveness of personalized medicine.
/web/2025/03-250129-6e

4. Nano / Micro Technology / Material Science

Macroscopic Oscillators Move as One at the Quantum Level

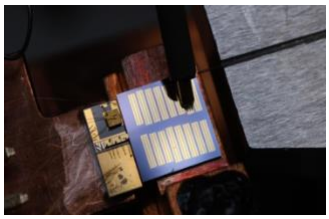
(EPFL, January 07, 2025)



Scientists at EPFL have achieved a breakthrough by making six mechanical oscillators work together at the quantum level, marking an important advance in quantum technology. Using the sophisticated technique of sideband cooling, the team led by Mahdi Chegnizadeh reduced the energy levels of oscillators to their quantum ground state, allowing them to act as a single, unified entity rather than separate components. This precision work is significant as it has the potential to revolutionize industries with innovations such as ultra-sensitive sensors and components critical for quantum computing.
/web/2025/04-250107-0d

Compact Comb Lights the Way for Next-gen Photonics

(EPFL, January 29, 2025)



EPFL researchers, led by Prof. Tobias Jan Kippenberg, have developed an electro-optic frequency comb generator that extends its spectral coverage to an impressive 450 nm, featuring over 2000 comb lines. They achieved this by using a novel "integrated triply resonant" design that synchronizes two optical fields with one microwave field, drastically reducing the microwave power needed by nearly 20 times. This was possible through a co-designed system that combines monolithic microwave circuits with photonic components on lithium tantalate photonics integrated circuits, improving microwave confinement and energy efficiency. This innovation paves the way for compact, durable devices with wide-ranging applications, from precise laser ranging in robotics to accurate gas sensing for environmental monitoring.
/web/2025/04-250129-1b

5. Information & Communications Technology

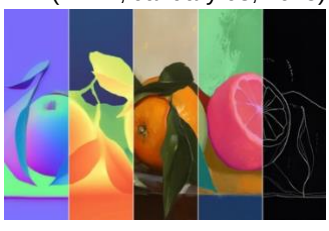
ChatGPT Could Get an Engineering Degree

(EPFL, December 02, 2024)

Researchers at EPFL, led by Assistant Professor Dr. Antoine Bosselut, have conducted a compelling study evaluating the performance of language models in university courses. The investigation, spanning 50 courses across nine different programs, encompassed disciplines such as computer science, mathematics, biology, chemistry, physics, and materials science. The research discovered that AI systems like ChatGPT could correctly answer 85% of university test questions, given prior training. This showcases the potential for AI to serve as an accurate evaluator of course performance and indicates that current AI technology would likely yield even higher accuracy today.
/web/2024/05-241202-81

An Open-source Training Framework to Advance Multimodal AI

(EPFL, January 08, 2025)



Researchers at EPFL have developed 4M, a cutting-edge framework designed to train versatile and scalable next-generation multimodal foundation models, addressing the limitations of current large language models. Supported by Apple, this research initiative focuses on creating a single neural network capable of handling diverse tasks and modalities, including images, video, and sound. led by Assistant Professor Amir Zamir the team aims to continue refining 4M as an open-source, generic architecture, that can be adapted for specific needs in various fields such as climate modeling and biomedical research.
/web/2025/05-250108-96

Understanding Trust in AI Chatbots

(University of Basel, January 17, 2025)

University of Basel researchers Dr. Fanny Lalot and Anna-Marie Bertram have conducted a study on the factors influencing trust in AI chatbots which focused on text-based systems, such as ChatGPT, uncovering key insights into the elements of trust in artificial intelligence. By exposing participants to interactions with a chatbot named Conversea, the study discovered that both competence and integrity are pivotal in establishing trust. Interestingly, integrity emerged as a more crucial factor than benevolence. This research also warns of the potential risks tied to over-reliance on AI friendship apps, particularly for individuals who are lonely and vulnerable.
/web/2025/05-250117-85

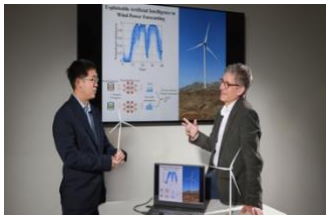
Automatic Speech Recognition on Par with Humans in Noisy Conditions

(University of Zurich, January 29, 2025)

Researchers Eleanor Chodroff and Dr. Chloe Patman from the University of Zurich and the University of Cambridge have demonstrated that OpenAI's Whisper large-v3 ASR system surpasses human listeners in recognizing speech under noisy conditions. Their study compared Meta's wav2vec 2.0 and OpenAI's Whisper to native British English speakers, testing speech recognition in environments with pub noise, and when speakers wore cotton face masks. Whisper, trained on the equivalent of over 500 years of speech data, showed a remarkable ability to understand speech amidst noise.
/web/2025/05-250129-5e

Enhancing Wind Power Forecasts with AI

(EPFL, January 31, 2025)



Researchers at EPFL, led by Dr. Wenlong Liao, have significantly improved wind power forecasts using explainable artificial intelligence (XAI), a branch of AI that helps users peek inside the black-box of AI models. The team trained a neural network on key variables like wind direction and speed, then applied four specific XAI techniques to make AI predictions transparent. This advancement allows for more reliable wind power integration into the power grid, positioning wind as a stronger competitor among energy sources.
/web/2025/05-250131-7a

6. Energy / Environment

Biodegradable Fungal Batteries: A Game-changer in Sustainable Energy

(EMPA, January 10, 2025)

Researchers at Empa, led by Dr. Carolina Reyes and Dr. Gustav Nyström, have developed a 3D-printed, biodegradable fungal battery capable of powering sensors used in agriculture and remote research. The team's multidisciplinary approach, integrating microbiology, materials science, and electrical engineering, allowed them to create a battery using fungal cells that use cellulose as a nutrient. Remarkably, these batteries can be preserved in a dried state and activated onsite by adding water and nutrients. This breakthrough represents a significant leap towards environmentally friendly power, highlighting the potential of fungi in materials science.
/web/2025/06-250110-8c

Breakthrough in Arsenic Detection in Clouds

(ETH Zurich, January 10, 2025)

At ETH Zurich, directed by Winkel Lenny, a groundbreaking study has advanced our understanding of arsenic in the atmosphere. By conducting an extensive measurement campaign at the Pic du Midi research station in the Pyrenees, the researchers identified that clouds contain significantly more arsenic than rainwater. Using a sophisticated model of air mass movements alongside chemical analyses, the team detected arsenic at remarkably low levels of 1 to 2 nanograms per liter — up to twenty times beneath the limits of previous methodologies. This innovative approach enabled the identification of transport patterns and origins of arsenic for each sample.
/web/2025/06-250110-6d

Stress Tests for the Swiss Power System

(ETH Zurich, January 15, 2025)

ETH Zurich is leading the charge in supporting Switzerland's energy transition with key research initiatives in Switzerland's transition to a fossil-free energy supply emphasizing renewable and sustainable energy sources. Conducted by the Energy Science Center at ETH Zurich, the study explores a blend of technologies including reserve power stations, photovoltaic systems, wind power plants, storage technologies, and new nuclear facilities. By incorporating estimated investment and operating costs, the research assesses viable pathways for energy transition. Swiss reservoirs, like Lake Grimsel, are highlighted for their key role in enhancing the resilience of the Swiss electricity system. With a focus on reaching net-zero greenhouse gas emissions by 2050.
/web/2025/06-250115-26

The Cost of Climate-neutral Aviation in the Future

(ETH Zurich, January 17, 2025)

Researchers from ETH Zurich and the Paul Scherrer Institute, led by Dr. Nicoletta Brazzola at ETH Zurich, predict that airfares could increase by 50% if synthetic fuels completely replace fossil fuel kerosene by 2050. By assessing the environmental impact of aviation, including the release of soot particles, nitrogen oxides, and CO emissions, the research highlighted the challenges of transitioning to sustainable aviation fuels, and predicted a potential 50% fare increase. The findings also emphasized the need for large solar energy initiatives globally, and offered further insights into the developing market for synthetic fuels and the steps toward climate-neutral aviation.
/web/2025/06-250117-4e

Transformative CO2 Capture in Building Materials

(EMPA, January 29, 2025)

Empa researchers, led by Prof. Dr. Pietro Lura, have developed a method to significantly reduce atmospheric CO_2 by incorporating it into building materials, with predictions showing a potential for up to 400 billion tons of carbon capture by 2150. Their approach relies on futuristic calculations that assume an abundance of renewable energy after 2050, which would enable the efficient removal of CO_2 from the atmosphere. This method takes into account global material usage and unavoidable emissions, offering a possible route to large-scale carbon capture. Empa's breakthrough paves the way for the practical use of carbon-negative building materials, which could revolutionize the construction industry and greatly aid in combating climate change.
/web/2025/06-250129-22

7. Engineering / Robotics / Space

How Cryogenic Microscopy Could Help Strengthen Food Security

(EPFL, January 16, 2025)

A collaborative study between EPFL and the University of Lausanne, led by Dr. Priya Ramakrishna from EPFL's Laboratory for Biological Geochemistry, has uncovered insights into how plants manage sodium under salt stress. This breakthrough offers a fresh perspective on plant resilience and adaptation. Using the innovative CryoNanoSIMS instrument, researchers were able to achieve chemical imaging of biological tissues at an unparalleled resolution of 100 nanometers. This cutting-edge technology allowed them to meticulously observe sodium transport and accumulation in plant roots, uncovering previously unseen mechanisms. These findings have advanced our understanding of plant defense against environmental threats like heavy metal pollution and microbial attacks.
/web/2025/07-250116-e4

Not All Hot Jupiters Orbit Solo

(University of Geneva, January 23, 2025)

Researchers from the University of Geneva, University of Bern, and University of Zurich, led by Dr. Nolan Grieves, Prof. François Bouchy, Dr. Solène Ulmer-Moll, and Prof. Ravit Helled, have discovered an outer cold giant planet and an inner Super-Earth in the WASP-132 system, expanding our understanding of planetary systems. This intricate study was conducted through intensive observation campaigns using the HARPS spectrograph and optimized signal processing to accurately determine the mass, density, and composition of these planets. The findings challenge the conventional hypothesis of planet migration through dynamical perturbation, providing valuable insights into planet formation.
/web/2025/07-250123-c0

8. Physics / Chemistry / Math

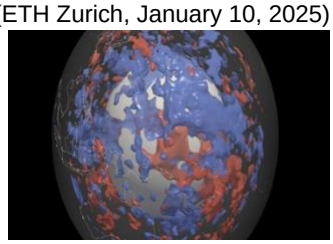
Unlocking the Journey of Gold through Magmatic Fluids

(University of Geneva, January 06, 2025)

Dr. Stefan Farsang and his team at the University of Geneva have developed a refined method to track gold's movement through magmatic fluids, using precise control of redox conditions. The team conducted their research by placing a quartz cylinder and a magmatic fluid-like liquid in a sealed gold capsule, then exposing it to pressures and temperatures akin to those in the Earth's upper crust. This novel experimental setup has opened new doors for understanding gold formation and migration, with significant implications for mineral exploration and resource management.
/web/2025/08-250106-39

Uncovering the Mysteries of Earth's Lower Mantle

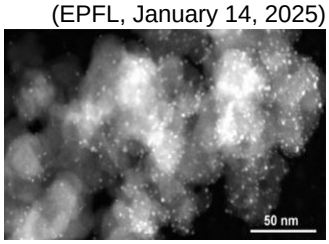
(ETH Zurich, January 10, 2025)



Geophysicists at ETH Zurich, led by Professor Andreas Fichtner, have discovered anomalies in the Earth's lower mantle. Employing a high-resolution model, they identified zones where rock behavior deviates from previous assumptions, challenging the existing understanding of plate tectonics. The study, spearheaded by lead researcher Thomas Schouten, reveals diverse origins of lower mantle positive wave speed anomalies. By locating where sunken plate material resides within the Earth's interior, the research uncovered unexplored zones beneath the western Pacific, prompting a re-evaluation of current theories.
/web/2025/08-250110-09

Carbon Dioxide to Acetaldehyde: A Green Revolution

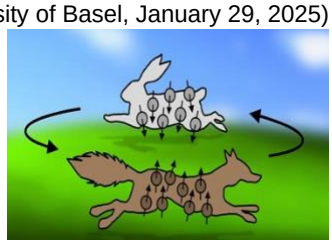
(EPFL, January 14, 2025)



Scientists from EPFL, University of Copenhagen, and Shanghai University, led by Cedric Koolen, Professor Andreas Züttel, Jack Pedersen, and Wen Luo, have achieved a groundbreaking advancement in industrial chemistry: they have developed a copper catalyst that efficiently converts carbon dioxide into acetaldehyde, offering a sustainable alternative to traditional fossil-fuel-based production processes. The research used spark ablation to synthesize tiny clusters of copper particles, which were then immobilized on carbon supports, creating a stable and reusable catalyst. This innovative method not only offers a more sustainable means of producing acetaldehyde but also promises versatility, as the process can be applied to other catalyst systems. By reducing reliance on petrochemicals, this breakthrough holds significant potential for transforming industrial chemistry towards more environmentally friendly practices.
/web/2025/08-250114-27

Antagonistic Interactions Mirror Natural Predator-prey Dynamics

(University of Basel, January 29, 2025)

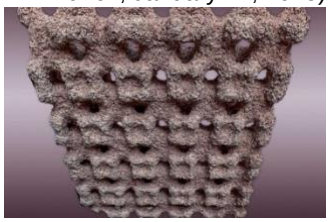


Researchers at the University of Basel, led by Tobias Nadolny, Prof. Christoph Bruder, and Dr. Matteo Brunelli, have discovered that quantum particles can engage in antagonistic interactions similar to predator-prey dynamics in nature. This finding stems from theoretical calculations in open quantum systems powered by external light sources. By using laser-driven atoms connected via waveguides that allow unidirectional light flow, the team showed that atomic spin phases can interact non-reciprocally, challenging the traditional view of reciprocal interactions in quantum physics. This breakthrough sets the stage for the creation of time crystals, which can move continuously without energy input by breaking time symmetry. It marks a new chapter in quantum physics, opening up fresh perspectives on nonreciprocal interactions and their potential for scientific innovation. The University of Basel's pioneering work promises to advance the development of more precise and robust atomic clocks by leveraging these antagonistic interactions.
/web/2025/08-250129-5d

9. Architecture / Design

Sustainable Building Components Create a Good Indoor Climate

(ETH Zurich, January 14, 2025)



A team of researchers at ETH Zurich, led by building physicist Magda Posani, have made a remarkable breakthrough in sustainable construction. The study focuses on a new, moisture-binding material designed to reduce indoor humidity, promising to revolutionize wall and ceiling design for better and sustainable indoor environments. This innovative material, crafted from mineral waste and produced via 3D printing, efficiently manages humidity in heavily used spaces, eliminating the need for mechanical ventilation systems. This achievement not only enhances indoor comfort but also marks a significant step towards climate-friendly building solutions. Based on the doctoral theses of materials scientist Vera Voney, the project underscores the potential of integrating sustainable materials with advanced technologies like 3D printing in the construction industry.
/web/2025/09-250114-21

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

Stimulating Hypothalamus Restores Walking in Paralyzed Patients

(EPFL, December 03, 2024)

Researchers from EPFL, Lausanne university hospital, and the University of Lausanne, guided by lead researcher Dr. Jordan Squair and Prof. Dr. G. Courtine, have uncovered a remarkable finding: stimulating the lateral hypothalamus through deep brain stimulation (DBS) can restore walking in paralyzed patients, delivering both immediate and sustained improvements, even after the stimulation is turned off. Using an advanced imaging platform at the Wyss Center for Bio and Neuroengineering, detailed brain-wide maps were created to identify the lateral hypothalamus's crucial role in walking recovery. The study applied DBS therapy to precisely target this brain region, demonstrating a pivotal therapeutic pathway for spinal cord injury recovery. Integrating fundamental neuroscience and precise neurosurgical techniques, the research suggests a reorganization of residual nerve fibers, bolstering long-term neurological recovery. A game-changer, this breakthrough is poised to revolutionize paralysis care.
/web/2024/11-241203-89

New Protective Coating Can Improve Battery Performance

(Paul Scherrer Institute, January 10, 2025)

The Paul Scherrer Institute has developed a new sustainable process to enhance the electrochemical performance of lithium-ion batteries. Led by Dr. Mario El Kazzi, the team developed a cathode surface coating that permits operating voltages up to 4.8 volts, a development that could significantly boost the efficiency of batteries, particularly in electric vehicles. The new coating could mean batteries that last longer and store more energy, making electric vehicles more practical and efficient for everyday use.
/web/2025/11-250110-f7

Injectable Hydrogel Revolutionizes Bone Therapy

(EPFL, January 28, 2025)

Researchers at EPFL, in partnership with flowbone SA and Schulthess klinik Zurich, and led by Dr. Dominique Pioletti and Dr. Vincent Stadelmann, have created an injectable hydrogel that significantly boosts bone density in rats when used with osteoporosis drugs. This hydrogel, made of hyaluronic acid and hydroxyapatite nanoparticles, directly targets areas of bone loss. By combining this local treatment with systemic administration of drugs like parathyroid hormone and Zoledronate, the team has seen marked improvements in bone density. This innovation opens up new avenues for treating osteoporosis by focusing on local bone density enhancement to prevent fractures. The hydrogel, coupled with drug treatment, offers a promising solution for rapid bone strengthening, potentially aiding in implant support or fracture prevention. EPFL's approach introduces a targeted, efficient strategy for bone densification, moving us closer to effective preventive treatments for osteoporotic fractures.
/web/2025/11-250128-6b

Preventing Urinary Tract Infections with a Vaccine

(ETH Zurich, January 30, 2025)

Researchers at ETH Zurich, led by Dr. Giorgia Greter, are developing a vaccine designed to prevent UTIs caused by E. coli. The team used a glycoconjugate vaccine, combining bacterial polysaccharides with a protein that stimulates the immune system. This method has successfully made E. coli identifiable and vulnerable to attack by the immune system in mouse trials. Greter's newly founded startup, Baxiva, offers a new way to combat UTIs, especially those resistant to antibiotics, addressing a critical public health challenge. By providing an alternative to antibiotics, this vaccine could significantly reduce UTIs and their treatment costs, marking a key advance in the fight against antibiotic resistance.
/web/2025/11-250130-5f

12. General Interest

Exercise Your Balance to Counter the Ill Effects of Aging

(University of Fribourg, January 24, 2025)

Physical activity and good balance may help prevent age-related changes in brain chemicals, according to research by Dr. Yves-Alain Kuhn and his team from Switzerland and Germany. The research involved a six-month study with healthy elderly participants, where one group performed physical exercises, such as walking on unstable surfaces, while the other group did not engage in these activities. The study revealed that the exercise group showed notable improvements in balance compared to the control group. This finding is crucial as it suggests that specific physical activities can restore neurotransmitter function, even in older adults. These insights could enhance the quality of life for the aging population.
/web/2025/12-250124-16

Bones Respond Positively to External Forces

(ETH Zurich, January 28, 2025)

Led by Dr. Neashan Mathavan and Dr. Ralph Mueller from ETH Zurich explored how bone cells respond to external forces. This research marks a significant stride in understanding the mechanisms behind bone healing processes. The study examined gene activity within healing bones of mice, and emphasized the impacts of vibration therapy. By determining the spatial resolution of gene activity and using computer simulations, researchers calculated forces acting on various bone locations. This pivotal work is crucial in devising new therapeutic strategies aimed at preventing and delaying bone fractures, especially in older individuals.
/web/2025/12-250128-56

Relaxation as Key to Recovering from Depression

(University of Fribourg, January 30, 2025)

Researchers at the University of Fribourg, led by Prof. Dr. Gregor Hasler, have found that deep relaxation, more than the psychedelic experience itself, is crucial for the success of psychedelic-assisted therapy (PAT) in treating severe depression. By comparing data from patients using LSD and psilocybin in a Swiss medical program to a control group, they highlight the role of relaxation in significantly improving depression symptoms. This study also evaluates the treatments' efficacy, safety, and side effects. The University of Fribourg's research suggests a new way to enhance the effectiveness of psychedelic therapies, focusing on relaxation to achieve better therapeutic outcomes and ensure long-term benefits for patients.
/web/2025/12-250130-2d

Upcoming Science and Technology Related Events

Swiss Hydrogen Summit
February 20-21
https://h2-summit.ch/
Scientific, Research & Development
The Dolder Grand Zurich

1st International Humanoid Forum
February 20-21
https://www.humanoid-forum.com/
Human Resources, Education & Training, IT, Web & Electronic, AI
Switzerland Innovation Park Biel/Bienne

AMR Conference
February 25-25
https://amr-conference.com/
Pharmaceutical & Biotechnology
Congress Center Basel

6th Annual European HealthTech CEO Forum
February 25
https://www.sachsforum.com/
Life Sciences, Health Care & Medical
Hotel Hilton Zurich Airport, Opfikon

18th Annual European Life Sciences CEO Forum
February 26-27
https://www.sachsforum.com/
Life Sciences, Health Care & Medical, Pharmaceutical & Biotechnology
Hotel Hilton Zurich Airport, Opfikon

RNA Leaders World Congress
March 4-6
https://informaconnect.com/rna-leaders-europe/
Life Sciences, Health Care & Medical, Pharmaceutical & Biotechnology
Congress Center Basel

9th Zurich Immuno-Oncology Symposium
March 7
https://is.gd/2LR1AD
Life Sciences, Health Care & Medical
University Hospital of Zurich

World Information Architecture Day
March 8-9
https://wiadswitzerland.org/
IT, Web & Electronic, AI
Volkshaus Zürich

Women's Leadership Conference
March 11
https://myphy.com/event/wlc25/
Business & Economy, Human Resources, Education & Training
Restaurant Hôtel du Parc des Eaux-Vives, Geneva

Start Hack
March 19-21
https://www.startglobal.org/start-hack/home/
Business & Economy, IT, Web & Electronic, AI
Olma Messen St. Gallen

The **Science-Switzerland** newsletter is a bimonthly electronic publication keeping you updated on all the latest news on Swiss science, technology, education, innovation and the arts. It is an official publication in English from a single source, with executive summaries of top-highlights on education, of new discoveries in science, and of the latest top-of-the-line technologies and innovational strengths of Switzerland. The Science-Switzerland Newsletter is produced by Swissnex in Japan in collaboration with the Swissnex network.

Science-Switzerland Back Numbers: www.swissinnovation.org/Science-Switzerland