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Science-Switzerland, April – May 2025

News on Swiss science, technology, education and innovation

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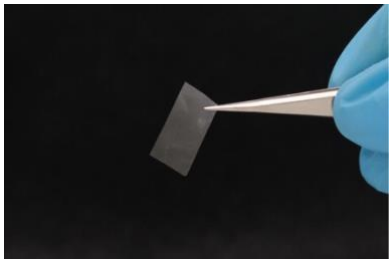
Grid Stability with Renewable Power

(ETH Zurich, April 18, 2025)

Researchers at ETH Zurich, led by Prof. Florian Dorfler, have made a breakthrough in renewable energy. They developed a control system for power converters that stabilizes the power grid during malfunctions. This innovation allows wind and solar power plants to support grid stability, previously reliant on large power stations, and greatly lowers blackout risks. The team created intelligent control algorithms for grid-forming converters. These algorithms enable converters to stay connected and operational during grid issues by continuously measuring grid parameters and adjusting in real-time. This advancement is crucial for the shift to renewable energy, allowing decentralized, renewable power plants to ensure grid stability. ETH Zurich's work marks a significant step towards a sustainable and flexible power supply system, reducing dependence on centralized power generators.
/web/2025/06-250418-34

Researchers Develop Living Material from Fungi

(EMPA, May 15, 2025)



Researchers at Empa, led by Dr. Ashutosh Sinha and Dr. Gustav Nyström, have developed an innovative biodegradable material from fungal mycelium. This material is not only tear-resistant but also highly versatile, offering a sustainable alternative to traditional plastics, and repreents a significant step forward in combating pollution and improving waste management. The team used the natural growth of the split-gill mushroom's mycelium, avoiding chemical treatments. By choosing a fungal strain high in schizophyllan and hydrophobin, they enhanced the material's properties. This process allows for customization to meet specific needs by altering growth conditions or using different fungal strains. Empa's work introduces potential uses in self-composting bags and biodegradable electronics, making living bioplastics a vital component in sustainable material and technology advancements.
/web/2025/00-250515-8a

ESA Centre of Excellence Opens in Switzerland

(Paul Scherrer Institute, May 28, 2025)

The Paul Scherrer Institute and the European Space Agency - ESA have launched the European Space Deep-Tech Innovation Centre (ESDI), the first ESA site in Switzerland, marking a significant step towards advancing deep tech research in Europe. This initiative aims to position Europe as a leader in quantum, data, and materials science research, creating commercial opportunities and strengthening the deep tech ecosystem. The partnership reflects a strong commitment to Swiss and European technological leadership and economic growth in the space and tech sectors. The creation of ESDI, through PSI and ESA's joint efforts, establishes a hub for innovation, facilitating cutting-edge research and development in essential deep technology areas. It also aims to support startups and encourage collaborations across academia, industry, and government. ESDI seeks to spur breakthroughs in quantum computing, space technology, and advanced materials, giving European ventures a competitive edge globally. This approach combines research excellence with business insight, establishing a new model for dynamic and sustainable innovation ecosystems.
/web/2025/00-250528-be

2. Education

Impact of Presence of Unfamiliar Person in Classroom on Children

(University of Fribourg, April 04, 2025)

An unfamiliar adult's presence can significantly slow down a child's test performance, particularly hindering younger children's focus and control during tasks. Aurélien Frick and Prof. Dr. Valérie Camos led a team from the University of Fribourg and the University of St Andrews, finding this effect most pronounced in 4-to-5-year-olds, impacting their cognitive control. This insight underscores the importance of considering social environments in educational and psychological evaluations to ensure accurate assessments of cognitive control. The study tested 123 children, aged between 4 to 5 and 8 to 9, in Beijing, under two scenarios: alone or with a stranger present, who watched them for 60% of the time. The findings show that an unknown adult's presence disrupts a child's proactive control, crucial for focus and decision-making tasks like reading or math.
/web/2025/02-250404-4f

3. Life Science

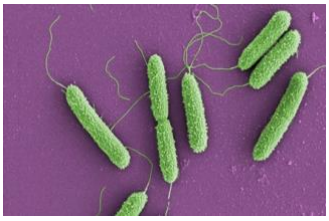
New Strategy Against Coronaviruses

(University of Bern, April 02, 2025)

Despite the rapid development of vaccines and treatments, coronaviruses remain a threat due to their mutation ability. Emilie Bäumlin, Dr. Evangelos D. Karousis, and their team at the University of Bern, ETH Zurich, and the National Centre of Competence in Research NCCR RNA & Disease have found that the coronavirus protein Nsp1 plays a dual role in infection. It blocks the cell's protein production and destroys its mRNA, a method not seen in all coronavirus types. This discovery opens paths for antiviral drugs that target these functions to stop the virus early on. The researchers studied how Nsp1 interacts with ribosomes, affecting protein production and mRNA destruction in coronaviruses like SARS-CoV-2 and MERS-CoV. They compared these interactions across coronavirus species and tested drugs that could block Nsp1. Their work suggests a new way to create broad-spectrum antiviral therapies.
/web/2025/03-250402-fa

New Sensors Against Superbugs

(EMPA, April 02, 2025)



Researchers from Empa, the Cantonal Hospital of St. Gallen, and ETH Zurich have created innovative diagnostic tools to quickly and accurately detect antibiotic-resistant bacteria such as Klebsiella pneumoniae and Pseudomonas aeruginosa. These bacteria cause serious pneumonia and wound infections and can now be identified in hours using fluorescent or UV light. This advancement marks a significant step in fighting antibiotic resistance. The team developed sensors using polymer particles containing a fluorescent dye that reacts to the enzyme urease from Klebsiella pneumoniae, allowing for swift identification. For wound infections, they embedded silica nanoparticles in a hydrogel to detect bacterial metabolites. Additionally, they used magnetic nanoparticles attached to proteins to identify Pseudomonas aeruginosa in urine. They analyze the bacteria's antibiotic sensitivity using chemiluminescence, drastically cutting down detection time from days to hours or even 30 minutes.
/web/2025/03-250402-0c

New Vaccine Strategy Outsmarts Superbugs in Gut

(ETH Zurich, April 04, 2025)

Researchers from ETH Zurich, University of Oxford, and University of Basel have developed a groundbreaking vaccine strategy that fights superbugs by combining vaccination with the introduction of beneficial bacteria into the gut. These good microbes outcompete harmful pathogens for nutrients, reducing their numbers and the spread of antibiotic resistance. This method shows promise in improving patient outcomes during surgeries and in high-risk set-tings. The team used a dual approach, administering both a vaccine and genetically engineered E. coli strains that compete with pathogenic bacteria in mice. This strategy proved more effective than vaccination or bacterial competition alone.
/web/2025/03-250404-7d

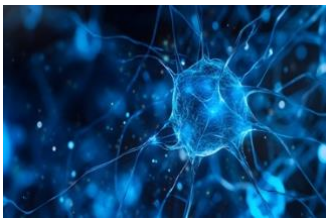
How Human Cells Repair Damaged DNA

(ETH Zurich, April 10, 2025)

Researchers at ETH Zurich, including Prof. Jacob Corn, Dr. John Fielden, and Sebastian Siegner, have discovered multiple new connections between common cancer mutations and molecular targets, paving the way for novel targeted therapies. This breakthrough reveals about 5,000 gene pairs whose inactivation leads to damage accumulation, highlighting potential weak spots in cancer cells for targeted treatment. By analyzing nearly 150,000 gene inactivation combinations critical for DNA repair, the team has highlighted the complex genetic interplay necessary for cell survival. This insight offers a new direction for developing therapies aimed at these specific gene interactions, marking a significant advancement in cancer treatment strategies.
/web/2025/03-250410-e8

Autism: The Neural Origin of the Social Bound

(University of Geneva, April 15, 2025)



A new method reveals a brain communication defect in Autism Spectrum Disorder (ASD), enhancing our understanding of social challenges. The team, including Assistant Professor Marie Schaer, Associate Professor camilla Bellone, Dr. Alessandro Contestabile, and Dr. Nada Kojović from the University of Geneva, pinpointed a malfunction in the pathway between the superior colliculus and the ventral tegmental area. Combining clinical and animal studies, researchers used tiny microscopes to track neuronal activity in mice and developed a new way to perform MRI scans on children.
/web/2025/03-250415-68

Fish Gelatin: A Leap in Artificial Skin Technology

(EMPA, April 17, 2025)

Empa researchers, led by Dr. Kongchang Wei, have created a 3D printable, non-swelling hydrogel from cold-water fish gelatin, marking a significant advance in artificial skin technology. This new material closely mimics human skin's layered and wrinkled structure, offering a promising tool for wound healing and a step forward in treating and understanding skin diseases. It serves as a biocompatible, immune-friendly alternative for wound dressings, potentially transforming personalized patient care. The team used gelatin from fish like cod, pollock, and haddock, cross-linking it to produce a stable hydrogel. By merging this with skin cells and applying 3D printing, electrospinning, and other polymer processing techniques, they successfully replicated human skin's complex structure, including the critical epidermal-dermal junction.
/web/2025/03-250417-6a

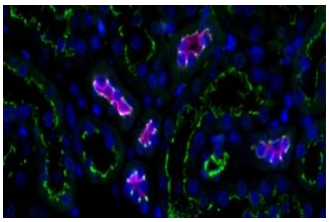
Effects of Pollen on Cognitive Performance: Debunking the Myth

(University of Basel, April 30, 2025)

Despite beliefs among allergy sufferers that pollen season hampers thinking, a new study shows no link between pollen and cognitive decline. Researchers, led by Dr. Marloes Eeftens and Baylee Corpening from the Swiss Tropical and Public Health Institute and the University of Basel, found that pollen counts don't affect cognitive abilities like attention and memory. This finding challenges the view that pollen negatively impacts brain function, suggesting other factors might influence these perceptions. The team tested 392 adults in the Basel area, 299 with confirmed pollen allergies, using skin prick tests to determine their allergy seasons and conducting daily online cognitive tests for ten days.
/web/2025/03-250430-71

A Renal Protein Reveals a New Mechanism in Hypertension

(University of Geneva, May 02, 2025)



Researchers at the University of Geneva, led by Prof. Sandra Citi, Prof. Feraille Eric, and Dr. Florian Rouaud, have shown that paracingulin plays a crucial role in the development of hypertension by affecting kidney signaling and sodium transporter activation. Their study found that mice lacking paracingulin were protected against angiotensin II-induced hypertension, marking a significant shift in understanding hypertension mechanisms. By creating a mouse model with the CGNL1 gene knocked out, the team investigated how this genetic alteration influences sodium transporter activation in the kidneys and the onset of hypertension in response to angiotensin II.
/web/2025/03-250502-94

One Gene Defines the Many Patterns of Snake Skin

(University of Geneva, May 02, 2025)

A single gene mutation leads to the striking diversity of skin patterns in corn snakes, revealing a new function for a gene previously associated with critical neuronal functions and diseases in humans and mice. Researchers from the University of Geneva, led by Dr. Athanasia Tzika and Prof. Michel Milinkovitch, have identified the CLCN2 gene as the key player in creating the diverse skin coloration patterns seen in corn snakes. Depending on its mutation or expression level, CLCN2 can lead to two distinct phenotypes: the Motley and the Stripe morphs.This breakthrough enables further exploration into the genetic basis of coloration patterns in animals, potentially impacting the study of evolutionary biology and genetic engineering.
/web/2025/03-250502-a3

A Leap Forward in Understanding AI Language Processing

(EPFL, May 13, 2025)

Unlocking artificial intelligence's language skills hinges on less than 1% of its neurons. Badr AlKhamissi and Prof. Martin Schrimpf from EPFL led a team that found key neurons in Large Language Models (LLMs) crucial for language processing, similar to the human brain's system. Turning off these units greatly reduces the model's linguistic abilities, enhancing our understanding of AI and linking artificial and human cognition. The team studied 18 LLMs using a neuroscience-inspired technique to identify these vital neurons. They compared unit activity during coherent sentence processing versus random words, uncovering so-called "language-selective units." Deactivating these units led to a significant drop in language performance, mirroring neuroscience methods of assessing brain area importance.
/web/2025/03-250513-bf

Understanding which Proteins Work Together

(ETH Zurich, May 13, 2025)

Researchers at ETH Zurich, led by Associate Professor Pedro Beltrao, have mapped protein interactions across eleven human tissues, revealing that about 25% of these interactions are unique to a single tissue. This discovery could dramatically improve drug discovery and specificity, offering insights into targeted disease gene therapy and the development of treatments specific to organs or tissues, thus reducing adverse effects. The team used bioinformatics to analyze proteome data from over 7,800 human biopsies, identifying tissue-specific protein interactions. This method reveals a complex network of protein interactions unique to each tissue, laying the groundwork for precise disease gene identification.
/web/2025/03-250513-5c

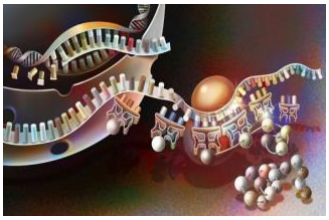
Slow-growing Bacteria Respond More Sensitively to their Environment

(University of Basel, May 13, 2025)

The discovery that a cell's growth rate affects its environmental sensitivity is crucial for battling antibiotic resistance. Researchers from the University of Basel, led by Professor Erik van Nimwegen and Dr. Thomas Julou, found that slow-growing bacteria are more sensitive to environmental changes than their faster-growing counterparts. This work combines theoretical analysis with experimental techniques like microfluidics and time-lapse microscopy to study E. coli behavior. Such insights could lead to new methods to fight antibiotic resistance, highlighting the significance of basic biological principles in understanding cellular responses to different environments.
/web/2025/03-250513-ec

Discovery of New Mechanism in Cancer Progression

(University of Bern, May 13, 2025)



Researchers from the University of Bern, Stanford University, EMBL, and NCCR RNA & Disease, led by Prof. Dr. Sebastian Leidel and Dr. Bastian Linder, have found a new cellular mechanism that controls messenger RNA (mRNA) stability through specific RNA modifications. This discovery points to a fresh target for cancer therapy by showing how disrupting this mechanism speeds up cancer cell growth. This process directly impacts gene activity levels essential for cancer progression. The recently founded company Umlaut.bio GmbH is actively working to translate these findings into patient benefits.
/web/2025/03-250513-d4

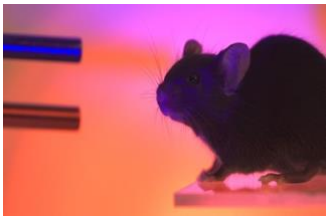
Cracking the Code of Amorphous Drugs for Diabetes Treatment

(EPFL, May 19, 2025)

For the first time, a team at EPFL, AstraZeneca, and the University of Gothenburg, led by Prof. Lyndon Emsley and Dr. Staffan Schantz, has mapped the atomic structure of amorphous drugs. Their technique shows how drug molecules create hydrogen bonds that stabilize their amorphous form, stopping crystallization and keeping them soluble. This innovation could lead to more effective oral medications for diabetes and obesity, affecting millions worldwide. The team used solid-state nuclear magnetic resonance (NMR) spectroscopy, supercomputer simulations, machine learning (via ShiftML2), and molecular dynamics simulations. This combination let them accurately predict chemical shifts, matching them with experimental data to identify the most likely structures.
/web/2025/03-250519-90

How the Brain Links Touch and Vision to Recognize Objects

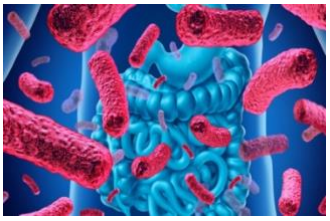
(University of Geneva, May 27, 2025)



Researchers at the University of Geneva, led by Dr. Giulio Matteucci, Prof. Sami El Boustani, and Dr. Maëlle Guyoton, discovered that the mouse brain's rostro-lateral (RL) area is essential for linking touch and sight. This finding highlights a key brain function in intelligence, paving new paths for medical and AI research. The team's work shows how the brain connects different sensory experiences, crucial for learning and perception. By combining behavioral experiments with advanced neuroscience, including single-cell activity mapping and RL area manipulation, the researchers demonstrated how activating the RL area allows mice to generalize sensory information across modalities. This breakthrough could lead to new treatments for sensory disorders and help create AI systems that emulate the brain's data integration capabilities.
/web/2025/03-250527-f9

Intestinal Bacteria Influence Aging of Blood Vessels

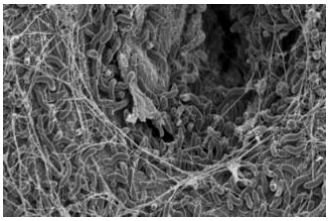
(University of Zurich, May 29, 2025)



Researchers at the University of Zurich have found that gut bacteria significantly influence the aging process of our heart and blood vessels. They identified a byproduct of intestinal bacteria, phenylacetic acid, as a key factor in cell aging and heart disease. This discovery paves the way for new dietary and medicinal methods to fight heart disease and increase lifespan by altering the microbiome. The team analyzed data from over 7,000 people and used a mouse model to study how changes in the microbiota with age affect the heart. They showed that diet plays a crucial role in how gut bacteria impact our health, suggesting ways to lower harmful phenylacetic acid levels. Their work highlights the possibility of using food and medicine to slow down the aging of the heart, marking a significant step forward in preventing and treating cardiovascular diseases by focusing on gut health.
/web/2025/03-250529-bb

How Cholera Bacteria Outsmart Viruses

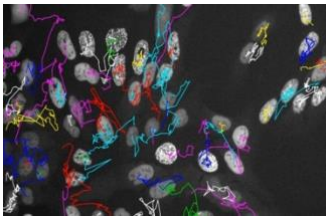
(EPFL, May 29, 2025)



Researchers at EPFL, led by Dr. David W. Adams and Prof. Dr. Melanie Blokesch, discovered that a cholera strain responsible for a massive outbreak in Latin America has advanced immune systems to fight off viruses, aiding its spread. This strain, part of the West African South American (WASA) lineage of Vibrio cholerae, caused an epidemic in the early 1990s by resisting various bacteriophages (phages), which helped it survive and proliferate. The team analyzed Peruvian cholera strains from the 1990s, focusing on their resistance to significant phages like ICP1. They pinpointed two key defense mechanisms in the WASA strain's genome: the WASA-1 prophage and the Vibrio seventh pandemic island II (VSP-II). By manipulating these genetic components, they showed how these systems protect against phage attacks. Their work sheds light on cholera's evasion tactics and opens new pathways for controlling and treating the disease, emphasizing the need to consider phage-bacteria interactions in infectious disease management.
/web/2025/03-250529-11

New Method Tracks Cancer Cell Evolution in Real Time

(University of Zurich, May 29, 2025)

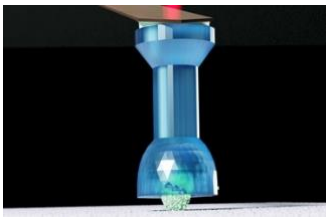


Researchers Dr. Andreas Panagopoulos and Merula Stout at the University of Zurich have unveiled a method that tracks cancer cell evolution in real time, offering a new perspective on how cells respond to stress and develop resistance to treatment. By marking proteins with fluorescent tags using CRISPR genome editing, the team can observe DNA replication and damage in successive generations under a microscope. This technique, enhanced by cell tracking and stress signal analysis, sheds light on the growth of cellular diversity and therapy resistance, potentially revolutionizing cancer treatment strategies. This innovation provides deep insights into cancer progression by combining genome editing with sophisticated imaging and data analysis. It marks a significant step forward in understanding tumor dynamics and paves the way for designing more effective cancer therapies.
/web/2025/03-250529-08

4. Nano / Micro Technology / Material Science

Rolling Particles Make Suspensions More Fluid

(ETH Zurich, April 08, 2025)



For the first time, ETH Zurich scientists Prof. Lucio Isa and Dr. Simon Scherrer measured the rolling friction of micrometer-sized particles, revealing how this friction changes the viscosity of materials like concrete and paint. This breakthrough offers unexpected insights into how these substances, challenging existing theories and setting the stage for advances in material production and application. Using a unique setup with an atomic force microscope, the team managed to directly manipulate and measure the forces on a single spherical particle as it rolled across a surface. They found that rolling friction is much lower than sliding friction, a revelation that promises to improve the prediction and manipulation of how suspensions behave. This is key for enhancing material efficiency in various industries, from construction to microelectronics, by optimizing the flow properties of materials such as concrete or solder paste.
/web/2025/04-250408-86

5. Information & Communications Technology

AI Revolutionizes Heart Disease Detection for Athletes

(University of Bern, April 08, 2025)

Up to 30 percent of unexpected deaths among young athletes are linked to coronary artery anomalies. An AI tool, developed by a team led by Prof. Dr. med. Christoph Gräni and Dr. Isaac Shiri from the University of Bern and associated hospitals, detects these conditions with unmatched precision. This breakthrough could save lives by enhancing early diagnosis of rare heart diseases, streamlining clinical workflows, and providing immediate insights to prevent severe outcomes like sudden cardiac death. The researchers created a two-stage deep learning algorithm that first identifies key anatomical features in cardiac CT angiography images, then classifies Anomalous Aortic Origin of a Coronary Artery (AAOCA) with high accuracy. They validated this method using external datasets and a public dataset, confirming its reliability and effectiveness. The University of Bern's work represents a major advancement offers new possibilities for analyzing large image datasets to better detect and treat coronary anomalies, potentially saving lives.
/web/2025/05-250408-1e

Small-model Approach Could be More Effective

(EPFL, April 09, 2025)

EPFL and Yale School of Medicine researchers have launched Meditron, the top open-source language model for medicine. Meditron excels in providing accurate medical diagnostics in remote areas with little to no internet, pushing the boundaries of personalized medicine and improving healthcare in under-served regions. It challenges big tech's proprietary models by offering an open-source alternative. Using Meta's Llama model and enriched with extensive medical data, the team trained Meditron to ensure reliability in real-world clinical settings, tested by medical professionals on smartphones.
/web/2025/05-250409-48

Trustworthy AI without Trusted Data

(EPFL, April 11, 2025)

Despite the effectiveness of AI systems when trained using federated learning, their reliance on data from multiple sources introduces risks that could undermine the safety of these systems and reliability in critical areas. EPFL and Inria researchers, led by Prof. Rachid Guerraoui, created ByzFL, a new federated learning tool that enhances defenses of AI systems against harmful data and threats. This innovation is vital for safely applying AI in essential services such as healthcare and transport. ByzFL trains AI models on decentralized devices, keeping data private and secure, and the team uses a Python library to assess and boost the resilience of federated learning models against corrupted inputs.
/web/2025/05-250411-7f

Earth-abundant Mineral Could Make Computers More Sustainable

(EPFL, April 28, 2025)

Hematite, known since ancient times, could pioneers sustainable technology. A team including Dr. Haiming Yu, EPFL alumnus, Dr. Lutong Sheng, and Dr. Anna Duvakina discovered that hematite exhibits new spin physics for high-frequency signal processing. This breakthrough could revolutionize digital data encoding and storage, reducing energy loss, and make it faster and more sustainable. The researchers discovered this by analyzing unusual electrical signals from a nanostructured platinum stripe on hematite. They used light scattering microscopy to confirm these signals came from interference between magnon modes. This finding challenges the old view of magnetic materials, which typically exhibit only one magnon mode, and shows hematite's superior performance over traditional materials like yttrium iron garnet.
/web/2025/05-250428-71

Tiny AI Models Rival Giants with New Algorithm

(EPFL, May 01, 2025)

Researchers at ETH Zurich have developed a new algorithm that allows AI models up to 40 times smaller to match the performance of the biggest and best AI models. The team, consisting of Jonas Hübotter, Sascha Bongni, Ido Hakimi, and Prof. Andreas Krause, designed a method that improves AI reliability by using only data relevant to the question at hand. This not only leads to more precise answers but also cuts down on the computational power needed, making cutting-edge AI technologies available for wider use. By carefully selecting data related to the questions asked, the team's algorithm enhances AI response reliability. This innovation enables the creation of smaller AI models that perform as well as larger ones, making AI more efficient and dependable for important areas like medicine.
/web/2025/05-250501-8a

Discovery of New Security Vulnerability in Intel Processors

(ETH Zurich, May 14, 2025)

Researchers at ETH Zurich, led by Dr. Sandro R., Dr. Johannes Wikner, and Assistant Professor Kaveh Razavi, have exposed a new class of vulnerabilities in Intel processors that let attackers exploit the CPUs' speculative execution to access information without authorization. This discovery affects millions of devices globally, compromising the data security of everything from personal computers to cloud servers over the last 6 years. The team exploited speculative execution technologies in CPUs, meant to boost processor speed, to reveal vulnerabilities by analyzing Branch Predictor Race Conditions (BPRC). They bypassed security measures, accessing a processor's entire memory.
/web/2025/05-250514-8f

AI Can Help Students Learn Better

(EPFL, May 19, 2025)

An astonishing 86% of students worldwide and 79% at EPFL now use AI tools like ChatGPT for their studies, marking a significant turn towards incorporating artificial intelligence in education. A team from EPFL, including Prof. Ola Svensson, Patrick Jermann, Prof. Francesco Mondada, and Assistant Professor Tanja Käser, found these tools greatly improve learning by automating tasks, tailoring experiences with specific feedback and exercises, and enhancing understanding of student learning methods. This innovation promises more engaging, personalized, and efficient educational methods, potentially reshaping how we acquire knowledge. The EPFL team developed a language model to help teaching assistants give effective feedback, used retrieval-augmented generation technology to improve responses with educational materials, and employed ChatGPT to clarify concepts for students.
/web/2025/05-250519-11

Image2Reg: Revolutionizing Disease Detection with AI

(Paul Scherrer Institute, May 20, 2025)

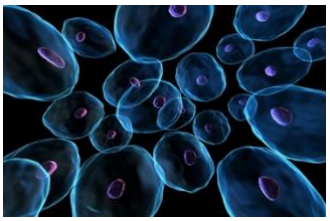


Image2Reg, developed by researchers from the Paul Scherrer Institute, Broad Institute of MIT and Harvard, and MIT, transforms cell images into insights about gene function, offering a new, non-invasive way to detect diseases early and develop targeted treatments. The team, including Prof. G.V. Shivashankar, Dr. Daniel Paysan, Dr. Adityanarayanan Radhakrishnan, Dr. Xinyi Zhang, and Dr. Caroline Uhler, uses an AI method to analyze cell images for genetic changes in chromatin structure, avoiding complex experiments. This innovation allows for the early detection of conditions like cancer, Alzheimer's, and autoimmune diseases by spotting gene regulation issues, promising quicker and cheaper diagnostic and therapeutic options. The researchers applied a convolutional neural network (CNN) to identify genetic disorder patterns in chromatin images. Image2Reg not only speeds up disease diagnosis and treatment but also paves the way for new insights into the genetic causes of previously incurable diseases like fibrosis.
/web/2025/05-250520-49

When Autonomous Mobility Learns to Wonder

(EPFL, May 20, 2025)

Researchers at EPFL and the University of Bern, led by Dr. Alexandre Alahi and Mariam Hassan, have created GEM, a model that predicts future events from a single image. This breakthrough enhances autonomous mobility by significantly improving the safety and efficiency of vehicles and drones through realistic future scenario simulations. GEM, trained on 4000 hours of diverse video data, including autonomous driving and drone footage, uses a comprehensive approach combining visual context, 3D structures, and object dynamics to accurately forecast future events. This collaboration among top Swiss institutions not only advances autonomous technologies but also promotes further innovation by making GEM and its datasets available to all, setting a new benchmark in predictive technology.
/web/2025/05-250520-12

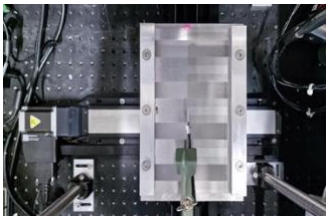
Could AI Understand Emotions Better than We Do?

(University of Geneva, May 27, 2025)

Generative AIs scored 82% in emotional intelligence tests, outperforming humans who scored 56%; these resutls are according to a recent benchmark that suggests that AI might surpass humans in understanding emotions. Researchers Dr. Katja Schlegel and Dr. Marcello Mortillaro, alongside their teams from the University of Bern, University of Geneva, and the Swiss Center for Affective Sciences (CISA) - UNIGE), found that Large Language Models (LLMs), including ChatGPT, excel in creating and passing emotional intelligence tests. These AIs can generate scenarios and tests that match the original in clarity and realism, showing they can understand, react to, and reason about emotions effectively. In a new study, six LLMs underwent five emotional intelligence tests to evaluate their emotion understanding, regulation, and management skills, surpassing human participants. ChatGPT-4 even developed new emotional intelligence tests, taken by over 400 people to confirm their reliability and realism. This advancement opens doors for AI in education, coaching, and conflict management, marking a potential shift in emotional intelligence training.
/web/2025/05-250527-2b

Machine Learning Simplifies Industrial Laser Processes

(EMPA, May 29, 2025)



Empa researchers, led by Dr. Giulio Masinelli and Dr. Chang Rajani, are transforming industrial laser processes with an innovative machine learning algorithm. This innovation streamlines and enhances laser-based metal processing, such as 3D printing and laser welding, by enabling real-time adjustments previously impossible. It not only broadens access to these technologies and boosts efficiency but also guarantees uniform quality across various materials, potentially altering industries dependent on laser processing. The team taught the algorithm to recognize the welding mode using data from optical sensors in laser machines, significantly reducing the need for extensive preliminary experiments. By employing a field-programmable gate array (FPGA) chip for rapid data processing and a PC to refine the algorithm's training, they achieved real-time optimization. This breakthrough simplifies advanced laser processing, making it accessible to novices and promoting sustainable, efficient manufacturing.
/web/2025/05-250529-cf

6. Energy / Environment

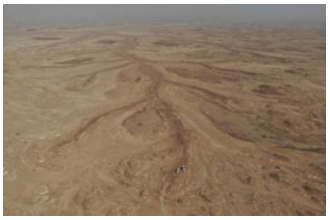
The Devastating Human Impact on Biodiversity

(University of Zurich, April 07, 2025)

Researchers led by Dr. François Keck from the Eawag and Prof. Dr. Florian Altermatt from the University of Zurich have shown that human activities have significantly reduced species numbers by about 20%. This drop, most notable in vertebrates like reptiles, amphibians, and mammals, underscores the urgent need for conservation efforts to stop the decline in species numbers and shifts in species communities, posing a serious threat to ecosystems worldwide. The team analyzed data from over 2,100 studies, comparing biodiversity at nearly 50,000 sites impacted by humans to an equal number of unaffected sites across terrestrial, freshwater, and marine environments. Their findings reveal the extensive damage caused by habitat changes, pollution, climate change, and other human activities on all organism groups.
/web/2025/06-250407-c9

The Lush Past of the World's Largest Desert

(University of Geneva, April 08, 2025)



The heart of the Arabian Peninsula once buzzed with life, challenging our views on deserts. Researchers from the University of Geneva, King Abdullah University of Science and Technology, led by Dr. Abdallah Zaki and Prof. Sébastien Castelltort, found that the Empty Quarter, the vast desert of the Arabian Peninsula, was full of lakes and rivers. These water sources supported grasslands and savannahs, helping human migration until a drought took over. By analyzing sediments and landforms over 1000 km, the team uncovered the "Green Arabia" era's climate history. They showed how the African monsoon moved north, bringing rains that turned the desert into a livable place.
/web/2025/06-250408-79

Breakthrough Improves Efficiency of Perovskite Solar Cells

(EPFL, April 09, 2025)

Harnessing the sun's power more efficiently has become a reality, thanks to a breakthrough by researchers from EPFL, Nanjing University of Aeronautics and Astronautics, and the National University of Singapore. The team, led by Dr. Lukas Pfeifer and Dr. Likai Zheng, has significantly enhanced solar cell performance by incorporating rubidium ions into perovskites through lattice strain. This innovation drastically reduces energy loss, setting the stage for solar panels that convert sunlight into electricity with unparalleled efficiency. Their work could transform global power production by accelerating the adoption of solar energy. The researchers achieved this by carefully distorting the atomic structure of perovskites to embed rubidium ions, using precise chemical composition adjustments and thermal processing. They employed advanced techniques, including X-ray diffraction and solid-state nuclear magnetic resonance, alongside computational modeling, to track the integration and interaction of rubidium atoms within the perovskite lattice. This rigorous methodology produced a material with minimal defects and a stable electronic structure, reaching an open-circuit voltage of 1.30 V, 93.5% of the theoretical maximum.
/web/2025/06-250409-f2

Biological Particles May be Crucial for Inducing Heavy Rain

(EPFL, May 08, 2025)

Biological particles such as pollen and bacteria critically shape our weather, as shown by an EPFL team led by Prof. Athanasios Nenes and Dr. Kunfeng Gao. These particles significantly aid cloud ice formation, crucial for rain and snow. This insight challenges current climate models, highlighting the need to include biological particles to improve weather and climate forecasts, particularly for extreme events like floods and snowstorms. The team collected air from Mount Helmos, Greece, examining the link between biological particles and ice formation using cloud radars, aerosol lidars, and UAVs. This method pinpointed the most effective particles for ice nucleation and their daily patterns, enhancing meteorological and climate prediction accuracy.
/web/2025/06-250508-aa

Heat Pumps Miss Efficiency Mark in Europe

(ETH Zurich, May 08, 2025)

Despite heat pumps being touted as eco-friendly heaters, a study shows a significant gap between their potential and actual efficiency. Dr. Tobias Brudermüller and Prof. Thorsten Staake from ETH Zurich, alongside the Swiss Federal Office of Energy SFOE and Zurich's utility provider EKZ, found that 17% of air-source heat pumps in Europe failed to meet efficiency standards due to setup errors. This discovery points to a chance for major energy savings and better climate target achievements through improved heat pump use. The team carried out the largest field study of its kind, analyzing real-time data from 1,023 heat pump units across ten European countries over two years. This allowed for specific improvements in heat pump configuration and monitoring, significantly reducing energy use.
/web/2025/06-250508-fc

Urban and Tech Cooling with Geothermal Energy

(EPFL, May 29, 2025)

Geothermal energy, innovatively harnessed by the team at EPFL's Laboratory of Soil Mechanics, led by Sofie ten Bosch and Prof. Lyesse Laloui, is setting new standards in cooling systems for metro stations and data centers. By replacing gas-fired boilers, this method could cut annual carbon emissions by 45%. The researchers developed precise models to analyze building shapes, ventilation needs, and the capacity for heat removal through geo-thermal use. They explored how train movements and passenger flow affect metro station air quality and examined server-generated heat in data centers.
/web/2025/06-250529-ef

New Insights in Soil Hydrology of Forests

(ETH Zurich, May 29, 2025)

Researchers at ETH Zurich, led by Dr. Marius G. Floriancic, have discovered that two-thirds of the water stored in forest soils at a depth of just ten centimeters is over three weeks old, challenging previous beliefs about forest water turnover. This finding reveals that soils mainly hold water for months or years, not just the "new water" from recent rainfall, highlighting the "old water's" crucial role in supporting forests and affecting water cycles. The team set up an outdoor lab in a forest near the ETH Hönggerberg campus and used custom equipment to track water dynamics. By placing sensors in trees, soil, and a stream and analyzing samples of stable isotopes in soil water weekly for five years, they uncovered new details about the age, source, and path of the water samples.
/web/2025/06-250529-c3

Save Twice the Ice by Limiting Global Warming

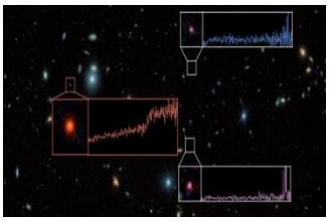
(ETH Zurich, May 30, 2025)

Stabilizing global temperatures at today's level of 1.2°C would still result in a 39% loss of global glacier mass, adding over 10 centimeters to sea-level rise. This grim prediction comes from a team led by Dr. Harry Zekollari and Dr. Lilian Schuster, showing that nearly 40% of glacier mass is already at risk due to current temperatures. Yet, capping global warming at 1.5°C could save twice as much glacier ice than if temperatures climbed by 2.7°C. This finding stresses the vital role of immediate climate policies, proving that even a slight increase in global warming has significant implications for glacier survival. Dr. Harry Zekollari, Dr. Lilian Schuster, and their colleagues used eight glacier models to forecast the future of over 200,000 glaciers worldwide, excluding those in Greenland and Antarctica. Their analysis under various temperature scenarios paints a clear picture of the dire consequences of current climate policies on glaciers. This work not only offers a more accurate prediction of sea-level rise but also underscores the necessity for prompt global climate action, setting a new benchmark in climate impact research through their collaborative efforts.
/web/2025/06-250530-04

7. Engineering / Robotics / Space

Galaxies Die Earlier than Expected

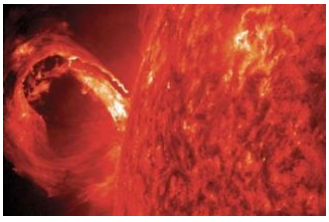
(University of Geneva, April 03, 2025)



Researchers at the University of Geneva and the Max Planck Institute for Astronomy, led by Dr. Andrea Weibel and Dr. Anna De Graaff, have identified the most distant Massive Quiescent Galaxy (MQG) found to date, named "RUBIES-UDS-QG-z7". This discovery reveals that the galaxy formed and stopped making stars within the first 600 million years after the Big Bang, challenging our previous beliefs about the early Universe. It suggests that such galaxies were over 100 times more common in the Universe's first billion years than we thought, forcing us to rethink our theories on early galaxy formation. Using the James Webb Space Telescope, the team accurately determined RUBIES-UDS-QG-z7's age, mass, composition, and formation process. This significant find allows astronomers to improve galaxy evolution models, altering our view on how the earliest galaxies stopped star formation and became quiescent. The methods employed by the researchers, integrating advanced spectroscopy with comprehensive modeling, establish a new benchmark for studying galaxies in the early Universe.
/web/2025/07-250403-5c

Predicting Solar Eruptions with New Math Breakthrough

(University of Geneva, April 03, 2025)



A leap towards protecting Earth from solar disturbances: researchers at the University of Geneva have developed a mathematical model that significantly improves the prediction of solar eruptions. This model, named PIROCK, combines different simulations to mimic the Sun's atmospheric dynamics accurately, offering a new level of precision and efficiency. Their work marks a major step in preventing the potential devastation of solar eruptions on our planet, echoing the importance of historical solar events. PIROCK stands out by integrating various simulations into one effective method, enabling precise forecasts of solar activity. This innovation could protect global supply chains, financial systems, and communication networks from solar-induced disruptions.
/web/2025/07-250403-cc

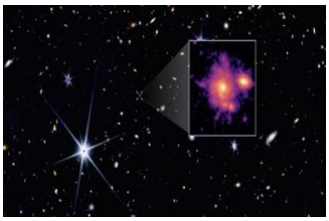
AI Revolutionizes Hunt for Earth-like Planets

(University of Bern, April 11, 2025)

Researchers at the University of Bern and NCCR PlanetS, led by Dr. Jeanne Davoult, Prof. Dr. Yann Alibert, and Romain Eltschinger, have developed a machine learning model that greatly improves the efficiency of finding planetary systems with Earth-like planets. This tool accelerates the search for habitable planets and enhances our understanding of life-supporting conditions in the universe, marking a key advancement in the quest for extraterrestrial life. The team's algorithm, built on the "Bern Model of Planet Formation and Evolution," meticulously evaluates planetary systems for signs of Earth-like planets. By analyzing characteristics, this method identified 44 systems likely to host such planets with a 99% accuracy rate, reducing the time and resources required for future explorations.
/web/2025/07-250411-0c

The Most Distant Twin of the Milky Way ever Observed

(University of Geneva, April 17, 2025)



Scientists discovered a galaxy similar to the Milky Way, formed just 1 billion years after the Big Bang, much earlier than previously thought. This galaxy, named Zhúlóng, presents a mature spiral structure that challenges our understanding of early universe capabilities for hosting advanced galactic formations. The discovery, led by Dr. Mengyuan Xiao, Associate Professor Pascal Oesch from the University of Geneva (UNIGE), and Dr. Christina Williams from NOIRLab, suggests that the universe's infancy might have been more conducive to complex structures than assumed, reshaping our views on the evolution of galaxies.
/web/2025/07-250417-0f

Unlocking the Secrets of Distant Worlds

(ETH Zurich, April 17, 2025)

The possibility that life does not exist on any exoplanets studied so far suggests that life may be extremely rare, perhaps unique to Earth. Researchers from ETH Zurich and NASA, led by Dr. Daniel Angerhausen, have designed two innovative space missions, LIFE (Large Interferometer For Exoplanets) and HWO (Habitable Worlds Observatory), to observe light and thermal radiation from potentially habitable exoplanets directly. This research could significantly alter our understanding of life's scarcity in the universe and increase our appreciation for life on Earth. LIFE will launch five satellites to create a space telescope focused on mid-infrared thermal radiation, while HWO will observe light from the ultraviolet to near-infrared range.
/web/2025/07-250417-c0

Flying Robots Unlock New Horizons in Construction

(EMPA, April 30, 2025)

Aerial drones are set to change construction by building emergency shelters in disaster areas and fixing high-rise buildings without scaffolding. Led by Dr. Yusuf Furkan Kaya and Prof. Dr. Mirko Kovac, researchers at Empa, EPFL, and Imperial College London have developed a drone autonomy framework. This framework moves from simple flights to full autonomy, allowing drones to adjust designs on the fly based on environmental analysis and error detection. This method could access hard-to-reach areas, cut material use, and improve safety on construction sites. The team combines robotics, materials science, and architecture to let drones autonomously build or repair structures. This innovation promises to aid construction and repair in remote or extreme conditions, offering new possibilities for disaster relief and inaccessible repairs.
/web/2025/07-250430-3a

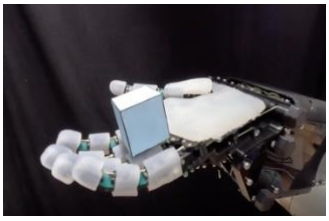
Eco-friendly Aquatic Robot is Made from Fish Food

(EPFL, May 12, 2025)

Researchers at EPFL, led by Shuhang Zhang and Prof. Dario Floreano, have created an edible aquatic robot. This innovative robot, powered by a safe, biodegradable chemical reaction between citric acid and sodium bicarbonate, zips across water surfaces to gather vital environmental data. Once its mission ends, it serves as nutritious fish food, thanks to its high-protein, low-fat composition. This invention marks a significant advancement in environmental monitoring, offering a sustainable alternative to traditional devices. The robot moves by generating carbon dioxide gas, which reduces water surface tension, propelling it forward. Its design ensures efficient data collection in delicate ecosystems and promotes aquatic life health.
/web/2025/07-250512-a8

Robotic Hand Moves Objects with Human-like Grasps

(EPFL, May 13, 2025)



The ADAPT robotic hand, developed by EPFL's Dr. Kai Junge and Assistant Professor Josie Hughes, can pick up 24 different objects with a 93% success rate. This hand mimics human grasps with 68% similarity, achieved not through complex programming but by using the mechanical intelligence of compliant materials like silicone. This breakthrough in robotic dexterity and adaptability could make robots far more adept in unpredictable environments, moving them closer to human-like performance without needing detailed environmental data or extensive programming. The ADAPT hand's design features a wrist, fingers, and spring-loaded joints, allowing it to spontaneously adjust its grip to various objects through self-organized grasps, controlled remotely with minimal motors. This ability to adapt its grip without specific programming or detailed environmental knowledge marks a major advancement towards intuitive, human-like robotics.
/web/2025/07-250513-dc

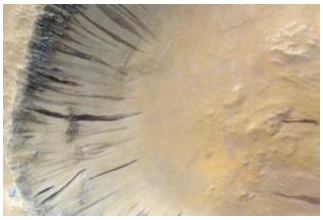
Venus More Tectonically Active Than Previously Thought

(University of Bern, May 20, 2025)

Researchers from the University of Bern, NASA, and NCCR PlanetS have discovered that Venus is tectonically active, challenging the previous belief that the planet was geologically dormant. Led by Dr. Anna Gülcher and Dr. Gael Cascioli, the team found over 740 coronae, evidence of active sub-surface processes similar to Earth's tectonics, including potential subduction. This discovery reshapes our understanding of Venusian geology and expands our view of planetary tectonics and offers new insights into Venus' geological activity, highlighting similarities and differences with Earth.
/web/2025/07-250520-28

Signs of Water on Mars may have been Caused by Wind, Not Water

(University of Bern, May 29, 2025)



Researchers from the University of Bern and Brown University, led by Dr. Valentin Bickel and Dr. Adomas Valantinas, have discovered that the mysterious streaks on Mars, once believed to be signs of water, may actually be the result of wind and dust. This revelation shifts the hunt for Martian life from moist to arid environments and alters our grasp of how the planet's surface interacts with its atmosphere. By analyzing over 86,000 high-resolution satellite images with a machine learning algorithm, the team identified more than half a million streaks and linked their formation to environmental factors like temperature and wind speed. This evidence refutes the previous belief in water-formed streaks, for guiding future missions.
/web/2025/07-250529-6e

8. Physics / Chemistry / Math

Revolutionizing Organic Synthesis with Sodium and Iron

(University of Bern, April 01, 2025)

For the first time, researchers have used sodium and iron to replace expensive metals like palladium in creating complex organic molecules. This method, developed by Prof. Dr. Eva Hevia and Dr. Andreu Tortajada Navarro at the University of Bern and the RIKEN Institute in Japan, offers a greener, more sustainable approach to chemical manufacturing. By using earth-abundant, non-toxic sodium and iron, this breakthrough reduces reliance on rare metals and lessens environmental impact, opening new paths for producing pharmaceuticals and agrochemicals. The team created a cross-coupling reaction that uses sodium and iron to make complex organic molecules in a more eco-friendly way. This method capitalizes on the reactivity of organosodium compounds and iron's catalytic power, challenging current chemical synthesis methods. This innovation could transform the manufacturing of essential compounds, setting a new standard in sustainable chemistry by demonstrating the power of combining abundant elements for effective results.
/web/2025/08-250401-cd

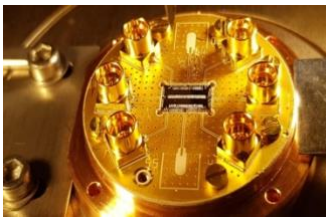
Scalable Graphene Membranes: A Leap for Carbon Capture

(EPFL, April 16, 2025)

Researchers at EPFL, led by Associate Professor Kumar Varoon Agrawal, have developed a scalable method to produce graphene membranes that efficiently separate CO2 from gas mixtures. This breakthrough reduces the costs and energy required for carbon capture and sets a new performance standard, marking a significant step towards sustainable industry practices. The team's innovation involves growing high-quality graphene on affordable copper foils and using an ozone etching process to create pores that selectively filter CO2. They also introduced a technique for transferring these membranes, reducing their fragility and failure rates. This development not only improves carbon capture but also enhances the separation of other gases, like hydrogen and oxygen, leading to more efficient and eco-friendly gas separation technologies.
/web/2025/08-250416-e2

Breakthrough in Compact Quantum Devices

(EPFL, April 18, 2025)



Researchers from EPFL and the University of Konstanz, led by Vincent Jouanny, Assistant Professor Pasquale Scarlino, Dr. Marco Scigliuzzo, and Prof. Oded Zilberberg, have introduced a new class of coupled cavity arrays (CCAs) made of niobium nitride (NbN). These CCAs are not only smaller but also show less frequency variation across cavities, leading to the development of more precise quantum devices. This advancement represents a major step forward in creating efficient, reliable quantum technologies and opens new paths for exploring quantum systems. The team used niobium nitride's high kinetic inductance to shrink cavity size and reduce frequency variation. Their approach resulted in a compact array of up to 100 high-quality cavities, resembling a photonic topological insulator. This innovation paves the way for scalable quantum computing and simulation platforms, potentially transforming our handling of complex quantum systems. The collaboration between EPFL and the University of Konstanz sets new benchmarks for quantum device precision and miniaturization, underlining the possibilities for significant progress in quantum technology.
/web/2025/08-250418-e1

Lead Turns to Gold at CERN

(CERN, May 13, 2025)

Scientists at CERN have turned lead into gold, achieving the alchemists' dream with the Large Hadron Collider, the most powerful particle accelerator. Dr. John Jowett's team produced "quark-gluon plasma," a state of matter from the universe's beginning, and witnessed lead's transformation into gold. This breakthrough not only deepens our understanding of the early universe but also fulfills ancient alchemy's mythical objective, proving modern physics' capability to change matter's fundamental elements. By colliding lead nuclei at high energies, the researchers showed how strong electromagnetic fields can remove protons from lead nuclei, effectively transforming lead into gold. This method, based on ultraperipheral collisions, offers a new way to alter atomic structures, and the discovery could revolutionize nuclear physics and materials science.
/web/2025/08-250513-cc

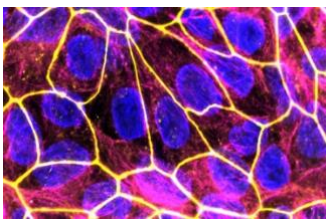
Remote Particle Measurement via Quantum Entanglement

(University of Geneva, May 19, 2025)

In a significant advancement for quantum physics, researchers from the University of Geneva, led by Dr. Alejandro Pozas Kerstjens, Dr. Jef P., Dr. Flavio Del Santo, and Prof. Nicolas Gisin, have shown it's possible to measure separate particles jointly without bringing them together, thanks to quantum entanglement. This breakthrough challenges traditional physics views and paves the way for advancements in quantum communication and computing by offering a new method for essential measurements. The team used quantum entanglement to connect separate particles, enabling the measurement of one particle to instantly reveal the property of another, no matter their distance apart. They also developed a catalogue to identify different measurement types and the needed number of entangled particles. This innovation could decentralize quantum computing and revolutionize information processing and sharing across quantum networks, offering a fresh perspective on quantum measurement and resource entanglement, significantly advancing the field.
/web/2025/08-250519-aa

Safe Medication for Mother and Child

(EMPA, May 21, 2025)



Pregnancy creates a medical dilemma where women often must forego necessary medications due to potential risks to their developing babies. An international team of researchers have now developed new synthetic compounds, called nanozymes, that could safely treat inflammatory conditions in pregnant women safely. This innovation could transform the management of complications such as pregnancy poisoning, diabetes, and the risk of premature birth, avoiding the health risks associated with traditional medications. The team included researchers from Empa, ETH Zurich, the Cantonal Hospital of St. Gallen, and Zhejiang University, and was led by Nikolaos Tagaras and Dr. Tina Buerki-Thurnherr. They conducted extensive safety studies on the nanozymes, using human placenta models and a placenta chip to mimic the placental barrier and embryo interactions. These studies confirmed that nanozymes do not adversely affect the placenta or embryo, showcasing potential new medication options for safer pregnancy complication therapies.
/web/2025/08-250521-7c

9. Architecture / Design

Revolutionizing Construction with AI-Optimized Wood Panels

(EMPA, April 11, 2025)

Researchers at Empa and ETH Zurich, led by Prof. Dr. Ingo Burgert and Dr. Mark Schubert, have created wood-based panels from split wooden sticks, optimized by AI for use in construction. This method uses lower-quality wood, reducing waste and improving the strength of the panels for load-bearing purposes. It represents a significant step toward sustainable construction, addressing climate change by efficiently using various wood types. The process combines traditional wood splitting with AI to select the best pieces for construction materials. An automated camera and machine learning algorithms evaluate wood properties, producing strong, durable panels. This innovation could transform the construction industry by enhancing sustainability and efficiency.
/web/2025/09-250411-37

Urban Greenery: An Antidote to Stress

(EMPA, May 01, 2025)

Researchers led by Dr. Claudia Kawai and Dr. Beat Schäffer from Empa and the Swiss Federal Institute for Forest, Snow and Landscape Research WSL have shown that urban green spaces greatly lower stress. They found that these areas provide significant relaxation and focus, especially when compared to cities lacking in greenery. The benefits are both immediate and lasting, with the calming sounds of forests and lakes standing out. This discovery highlights the need for green spaces in city planning to counter noise pollution and crowded living conditions. The team used virtual reality (VR) to simulate green and urban settings, measured stress through sweat production and cortisol levels, and conducted field studies with over 230 volunteers in Zurich. A survey also measured how green spaces help the Swiss population relax amidst urban noise. Empa and WSL's work suggests that this insight should guide noise laws and environmental protection, emphasizing the vital role of green spaces in enhancing urban living and well-being.
/web/2025/09-250501-6b

The World's Tallest 3D-printed Building Inaugurated

(ETH Zurich, May 21, 2025)

The Tor Alva, a nearly 30-meter-high white tower, marks a significant advancement in digital construction and architectural innovation as the world's tallest 3D-printed building. Built without traditional formwork, it employs a new concrete and reinforcement method, which not only expands the possibilities of digital fabrication but also provides a more sustainable, efficient alternative to conventional construction, potentially reshaping global building design and construction practices. This project was made possible by a team from ETH Zurich, in partnership with the Origen cultural foundation, led by Prof. Benjamin Dillenburger, Michael Hansmeyer, Prof. Robert Flatt, and Prof. Walter Kaufmann, in conjunction with the ETH spin-off Mesh and the company Zindel United. The team's method uses an additive manufacturing process where an industrial robot layers concrete in free-form elements without supportive casting moulds. They developed a unique concrete mix that bonds delicate structures yet quickly hardens for layer support. Additionally, a robot-assisted technique places ring-shaped reinforcements within the structure every 20 centimeters, enhanced by longitudinal rebars post-printing. Tor Alva stands as a beacon of cultural renewal and digital fabrication innovation, demonstrating how advanced construction techniques can create complex, sustainable structures.
/web/2025/09-250521-c8

10. Economy, Social Sciences & Humanities

Bonobos Combine Calls in Similar Ways to Human Language

(University of Zurich, April 07, 2025)

Researchers found that bonobos use complex call combinations similar to human language, indicating that linguistic abilities might be older and more common among species than we thought. The team from the University of Zurich and Harvard University, led by Dr. Mélissa Berthet, Prof. Dr. Simon W. Townsend, and Prof. Dr. Martin Surbeck, showed that bonobos create meaningful phrases by combining calls in ways akin to human language construction. This discovery challenges the belief that language construction is uniquely human and suggests it is an ancient, evolutionary trait shared with other primates. Using linguistic methods to analyze bonobo calls, the researchers developed a detailed dictionary of their vocalizations. They discovered that bonobos communicate complex information and emotions through call combinations. This insight into bonobo communication offers a closer look at the evolutionary origins of language, hinting at how our ancestors might have communicated millions of years ago.
/web/2025/10-250407-b2

AI Will be Decisive for Competitiveness

(ETH Zurich, April 11, 2025)

Despite rapid global AI progress, the DACH region (Germany, Austria, and Switzerland) significantly trails the US in adopting AI and developing ethical guidelines, highlighting a key improvement area for Europe's AI strategy. Prof. Stefano Brusoni's team at ETH Zurich and Zühlke Group found that DACH companies adopted AI slower and at lower rates than their US peers. Moreover, US firms mainly apply AI in research and development, not as much in customer-facing roles like marketing. This study underscores the urgent need for Europe to develop its AI technologies and ethics to catch up with the US and China. Researchers surveyed 633 companies across production, technology, healthcare, and finance in the DACH region, the UK, and the US, examining AI use. Their analysis revealed a significant AI adoption and ethical application gap in European firms. This finding clarifies the global AI landscape and could help Europe strengthen its AI strategies and ethical guidelines.
/web/2025/10-250411-58

The Obstacles to True Gender Equality

(University of Bern, April 30, 2025)

Despite high gender equality rankings in countries like Switzerland and Sweden, deep-rooted social norms still compel men to seek higher status over women, unveiling a hidden barrier to true gender equality. Researchers at the University of Bern's Institute of Psychology, led by Dr. Christa Nater and Prof. Dr. Sabine Sczesny, found that in these progressive countries, there's a strong societal expectation for men to maintain a higher status within their gender group. This contrasts sharply with less gender-equal nations, where society often discourages women from exhibiting dominant behavior. Their findings highlight the subtle forces that maintain traditional gender hierarchies in even the most forward-thinking societies, pointing to the intricate relationship between gender equality and social status competition. The team analyzed gender-specific stereotypes and their correlation with social status across 4,327 participants in seven countries, discovering that societal norms in gender-equal countries might unintentionally encourage a battle for high-status positions, power, and resources between genders, thereby obstructing the path to genuine equality.
/web/2025/10-250430-04

Current AI Risks More Alarming than Apocalyptic Future Scenarios

(University of Zurich, May 02, 2025)

Contrary to the fear of AI causing an apocalypse, people are more worried about immediate issues like bias and job loss. Research from the University of Zurich, led by Professor Fabrizio Gilardi and Dr. Emma Hoes, shows that individuals focus on the current risks of artificial intelligence, such as bias in AI decisions and job losses, rather than distant catastrophes. This finding contradicts the belief that the public only reacts to overblown threats, demonstrating a refined understanding of AI risks that distinguishes between real problems and hypothetical dangers. The team engaged over 10,000 participants from the USA and the UK in three extensive online experiments, presenting them with headlines that depicted AI as either a future catastrophe or highlighted current threats like discrimination and misinformation, along with possible benefits. This approach sheds light on how different narratives shape public perception of AI risks, paving the way for more informed AI governance and policy-making.
/web/2025/10-250502-43

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

Decoding our Thoughts to Restore Speech

(University of Geneva, April 14, 2025)

Researchers at the University of Geneva and Geneva University Hospitals, led by Dr. Kinkini Bhadra and Associate Professor Dr. Silvia Marchesotti, have made a significant breakthrough in using brain-machine interfaces to restore speech in individuals with aphasia. By training volunteers to control the interface through imagining syllables such as "fo" and "gi", and analyzing these signals with machine learning, the team showed that personalized training significantly improves control. This improvement correlates with increased EEG power in brain regions responsible for imagined speech, highlighting the potential for brain-machine interfaces in communication recovery. The study involved fifteen volunteers who underwent five days of training with a brain-machine interface, imagining specific syllables while connected to 61 electrodes that provided real-time feedback. This method stands out for its focus on personalized training and immediate feedback, essential for enhancing interface control.
/web/2025/11-250414-62

Revolutionizing Precision Carpentry with AR

(EPFL, April 14, 2025)

Augmented reality (AR) now enables novice carpenters to perform complex tasks with a precision once only possible with expensive robots. Dr. Andrea Settimi and his team at EPFL have created Augmented Carpentry, an AR system that guides carpenters in making accurate timber cuts without needing to measure or mark manually, greatly enhancing accuracy and minimizing errors in timber construction. The system uses advanced computer vision and sensors to identify the position and orientation of timber and tools in crowded spaces, and projects holograms to display cutting lines and instructions directly on the timber. This method offers real-time feedback, ensuring virtual overlays remain aligned with the actual pieces, even if they shift. Augmented Carpentry marks a major advancement in timber construction, making high-tech, manual construction methods more available and cost-effective, especially for small businesses and woodworkers in developing countries.
/web/2025/11-250414-ae

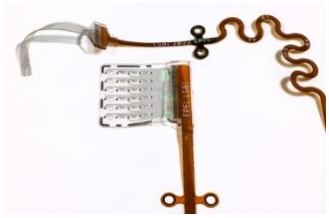
Revolutionizing Prostate Cancer Screening with New Urine Test

(University of Zurich, April 17, 2025)

Researchers at University Hospital Zurich, Ontrack Biomedical AG, and the University of Zurich, led by Prof. Dr. Daniel Eberli and Dr. Irina Banzola, have created a new urine test that detects early prostate cancer with 99.9% accuracy for negative results. This test distinguishes between no tumor, low-grade tumors, and cases that need a biopsy, offering a quick, non-invasive, and accurate screening method. It promises to reduce unnecessary procedures and improve early treatment outcomes. The team developed this test by identifying key biomarkers using mass spectrometry; they overcame urine's antibody-blocking issues with high-affinity, pH-resistant antibodies. Newly founded spin-off Ontrack Biomedical AG is now developing and refining the technology.
/web/2025/11-250417-8c

Breakthrough in Hearing Restoration with Flexible Brainstem Implants

(EPFL, April 21, 2025)



Researchers at EPFL, led by Dr. Stephanie Lacour, Dr. Alix Trouillet, and Dr. Emilie Revol, have developed a flexible auditory brainstem implant (ABI) that conforms to the brainstem, providing improved hearing for patients with severe cochlear nerve damage. This flexible ABI, embedding micrometer-scale platinum electrodes in silicone, offers enhanced comfort, reduced side effects, and clearer hearing by ensuring close contact with the brainstem. The team conducted behavioral experiments on macaques to test the implant's ability to simulate hearing by differentiating electrical stimulation patterns.
/web/2025/11-250421-ef

Ultrasound and Cilia to Clean Implanted Stents and Catheters

(ETH Zurich, April 30, 2025)

Urinary stents and catheters, essential for draining urine, often need frequent replacements due to blockages from biofilm and encrustation. A team led by Assistant Professor Daniel Ahmed and Dr. Francesco Clavica at ETH Zurich, the ARTORG Center for Biomedical Engineering Research, and Bern University Hospital, has developed a non-invasive method to clean these devices using ultrasound-activated microstructures. This breakthrough could significantly cut down on the need for replacements, reduce infections, and enhance patient quality of life by reducing invasive procedures. The team mimicked the architecture and flow conditions of stented ureters, showing that ultrasound-activated artificial cilia can effectively remove biofilms and encrustations through microfluidics experiments.
/web/2025/11-250430-a9

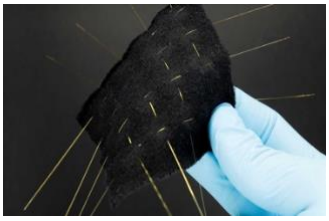
Robots Serve Up Fast-Food Future in California

(ABB, May 08, 2025)

Burgers, perfectly prepared by robots in just 27 seconds, are ushering in new innovations in the fast-food industry. A collaborative effort by ABB and startup BurgerBots, has introduced a novel restaurant concept where robots take charge of both preparing and serving burgers. This not only enhances efficiency and cleanliness but also addresses labor shortages and the demand for quick service, freeing human staff to focus on customer service. The partnership between ABB and BurgerBots has given rise to a robot-operated restaurant that delivers cooked burgers with added toppings and packaged meals in an astonishing 27 seconds. Customers enjoy the convenience of ordering through an app or in person, making the process smoother.
/web/2025/11-250508-f1

Using Sound Waves to Create a Smart T-shirt

(ETH Zurich, May 21, 2025)



SonoTextiles, a technology developed by a team at ETH Zurich including Dr. Yingqiang Wang, Dr. Chaochao Sun, and Assistant Professor Daniel Ahmed, could transform the smart fabric industry by using ultrasonic waves in glass fibers for real-time monitoring. Unlike traditional smart textiles burdened by data overload and electronic dependency, SonoTextiles offer a precise, efficient, and versatile solution. They stand out by being lightweight, breathable, washable, and capable of accurately measuring touch, pressure, and movement with no electronics. The researchers embedded glass fibers into fabric, connecting each to a sound wave transmitter and receiver. By operating each transmitter at a unique frequency, the system minimizes computing needs while maximizing data processing efficiency. This innovation opens the door to various applications, including health monitoring, sports performance, sign language translation, and enhancing virtual experiences, and sets a new benchmark for smart textile technology.
/web/2025/11-250521-24

12. General Interest

No Benefit in LSD Microdosing for ADHD

(University of Basel, April 01, 2025)

Researchers at the University of Basel, led by Dr. Lorenz Müller, found that LSD microdosing does not benefit ADHD treatment. Their study shows the perceived advantages come from the placebo effect rather than the drug itself. This insight challenges the popular belief in its efficacy for ADHD and highlights the importance of expectations in treatment outcomes. The team conducted a rigorous randomized placebo-controlled trial, proving the necessity of such methods to confirm treatment effectiveness. Their findings reveal no real benefit of microdosed LSD for ADHD but suggest it might help with other psychiatric conditions like depression. The University of Basel's thorough approach paves the way for future research aiming to separate true treatment effects from placebo responses, thereby refining our understanding of psychedelic-assisted therapies.
/web/2025/12-250401-a7

Misleading Milk Substitute Labels Exposed

(Agroscope, April 30, 2025)

Despite "no added sugar" claims, some milk substitutes are just as sugary as those without such labels, misleading consumers. Researchers from Agroscope, led by Dr. Carole Liechti, Dr. Gabriele Mack, and Dr. Jeanine Ammann, exposed this inconsistency, stressing the need for clearer labeling to aid in making healthier, more sustainable choices. The team analyzed 66 milk substitutes from Swiss supermarkets, categorizing 327 labels and comparing them to actual nutritional content and prices. Their findings, which included calculating each product's Nutri-Score, highlight the necessity for transparent food labeling. This research could guide stricter food marketing regulations and help consumers make informed decisions.
/web/2025/12-250430-80

Chemicals from Climbing Shoes Pollute Air in Indoor Halls

(EPFL, April 30, 2025)

Climbing gym air contains dangerous pollution levels from rubber sole wear, as high as those near busy highways, according to a new study. Dr. Anya Sherman and Dr. Thibault Masset, leading teams from EPFL and the University of Vienna, found climbers and staff face risks from harmful chemicals like the rubber stabilizer 6PPD. This discovery calls for better air quality measures in climbing facilities to protect the health of users. Using a new method based on tire additive analysis, the scientists analyzed dust from gyms in Switzerland, France, and Spain, and the chemical composition of 30 climbing shoe soles. They measured air quality in a Vienna gym with an impinger, reflecting human lung function, to catch airborne particles. Their work shows significant pollution from shoe wear, urging gym owners and shoe makers to adopt safer materials and improve ventilation to make indoor climbing safer.
/web/2025/12-250430-36

Tire Additives Found Deposited on Fruits and Vegetables

(EPFL, May 12, 2025)

Researchers from EPFL and the Swiss Federal Food Safety and Veterinary Office, led by Dr. Florian Breider, have found tire additives in all major fruits and vegetables in Switzerland. This finding challenges the belief in the purity of rural and organic produce and highlights a significant, overlooked route through which people are exposed to potentially harmful substances. The presence of these additives poses health risks, including reduced fertility and neurotoxic effects. The team examined about 100 popular fruits and vegetables from various Swiss retailers, testing for 11 common tire additive compounds. Their thorough analysis, coupled with consumption data, has mapped the extent of contamination and estimated potential daily intake of these substances. This research emphasizes the widespread nature of tire additive pollution and the urgent need for actions to reduce its presence in our food. It also stresses the importance of further studies on the long-term health effects of such contaminants, challenging past assumptions about what is safe to eat.
/web/2025/12-250512-e0

Your Best Friend's Personality Can Shape Your Own

(University of Zurich, May 30, 2025)

Your friends can change your personality, like making you more competitive, open, and conscientious for up to four years if those friends also exhibit these traits. Associate Professor Ulf Zölitz and Dr. Xiaoyue Shan from the University of Zurich and National University of Singapore led a team that showed friends significantly shape personality development. This research provides strong evidence that peer influence boosts traits beneficial for academic success, proving personality is flexible and shaped by social interactions. The study used a randomized field experiment with over 1,200 undergraduates in a Swiss Bachelor's degree program. By measuring the Big Five personality traits and competitiveness, then placing students in four-person study groups, the team tracked personality changes over four years. This finding suggests educational policies and group formations could be designed to enhance personal growth and academic achievement, underscoring the powerful impact of social environments on personality development.
/web/2025/12-250530-d8

Upcoming Science and Technology Related Events

The PASC25 Conference
June 16-18
https://pasc25.pasc-conference.org/
IT, Web & Electronic, AI
FHNW Campus Brugg-Windisch, Brugg

Annual Conference 2025 | Swiss Alliance for Global Research Partnerships
June 20
https://is.gd/rZnkr7
IT, Web & Electronic, AI, Scientific, Research & Development
Venue to be announced, Bern

ETH Nanoparticles Conference
June 16-19
https://npc25.scg.ch/
Scientific, Research & Development
ETH Zurich

Swiss Medtech Day
June 25
https://is.gd/kW5AHg
Industrial Products & Engineering, Life Sciences, Health Care & Medical, Scientific, Research & Development
Kursaal, Bern

Cloud Leadership Day
June 26
https://cloudxai.io/
IT, Web & Electronic, AI
Arena Cinemas, Zurich

AI for Good Global Summit
July 8-11
https://aiforgood.itu.int/summit25/
IT, Web & Electronic, AI
Geneva

World Summit on the Information Society Forum
July 7-11
https://www.itu.int/net4/wsis/forum/2025/
Business & Economy, IT, Web & Electronic, AI
Palexpo Geneva

CSCS-USI Summer University 2025 on Effective High-Performance Computing and Data Analytics
July 19-25
https://is.gd/O9dsDw
IT, Web & Electronic, AI
Hotel Serpiano

Tech Tour Growth Health
July 2-4
https://techtour.com/growthhealth25/
Finance, Banking, Investment & Insurance, Life Sciences, Health Care & Medical
Venue to be announced, Lausanne

39th International Cosmic Ray Conference
July 15-24
https://indico.cern.ch/event/1258933/
Scientific, Research & Development
Geneva

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