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Science-Switzerland, June – July 2025

News on Swiss science, technology, education and innovation

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ETH Professor Wins America's Most Prestigious Space Leadership Award

(ETH Zurich, June 27, 2025)

Dr. Thomas H. Zurbuchen, astrophysicist and Professor at ETH Zurich, has won the AIAA von Braun Award for Excellence in Space Program Management, becoming the first Swiss to earn this honor since its 1988 start. At NASA, Zurbuchen led missions like the James Webb Space Telescope, Mars 2020, and Parker Solar Probe, greatly improving our universe's understanding. His leadership not only boosts weather forecasts but also spurs novel sensor technology development, creating significant economic and societal benefits. Now guiding ETH Zurich teams, Zurbuchen has sparked innovations in space exploration and launched a comprehensive program to enhance science and technology leadership's quality and diversity. His approach has led to pioneering space research findings and new technologies useful in environmental monitoring and national security. Zurbuchen's focus on leadership, innovation, and diverse team assembly redefines achieving civilization-scale impacts in space missions.
/web/2025/13-250627-e2

Zurich Becomes European Hub for Space Florida

(CSA, June 18, 2025)

A Memorandum of Understanding (MoU) was signed on June 17, 2025, between Switzerland Innovation Park Zurich, Center for Space and Aviation Switzerland and Liechtenstein (CSA), and Space Florida. This space collaboration initiative will create a transatlantic space hub connecting Europe and Florida, opening new frontiers in the rapidly expanding New Space Economy. This partnership, aimed at creating a vibrant hub for commerce, logistics, research, innovation, and education, could revolutionize the global space ecosystem and spur market growth beyond USD 1.8 trillion by 2035. Switzerland Innovation Park Zurich strengthens its position as a premier location for pioneering space technologies at the heart of Europe, building on the Greater Zurich Area's reputation as one of the most innovative regions in Europe with strong startup dynamics and investment willingness. This also positions Switzerland as a key connector, bridging talents and innovations across continents. The partnership spans multiple sectors including biotechnology, biomedicine, robotics, artificial intelligence (AI), data, and materials science.
/web/2025/00-250618-16

Graphene Supercapacitors Set to Revolutionize Energy Storage

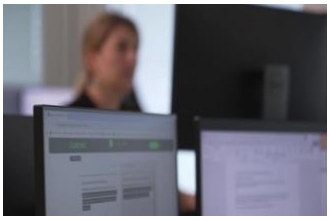
(EMPA, July 31, 2025)

Researchers at Empa, led by Dr. Sina Azad, Dr. Jakob Heier, an Dr. Vahid Charkhesht, have developed a graphene-based supercapacitor technology that promises to greatly enhance energy storage capabilities. By inventing a graphene ink for making electrodes with precise pore sizes, they've significantly increased the energy density of supercapacitors. This breakthrough overcomes existing limitations and could transform energy storage across various sectors, including electric vehicles and renewable energy systems. The team created a cost-effective and efficient method to exfoliate high-quality graphene from graphite, turning it into a gel-like ink. This ink allows for the production of supercapacitor electrodes with controlled pore sizes using two types of graphene. Focused on scalability and industrial viability, Empa's method aims for large-scale production through a roll-to-roll process. This advancement not only boosts the energy density of supercapacitors but also paves the way for their industrial adoption, marking a significant leap towards more effective and powerful energy storage solutions.
/web/2025/00-250731-a6

1. Policy

Women Are More Vulnerable to Generative AI Automation in the Workplace

(RTS Info, June 02, 2025)



Generative AI, while promising innovation and efficiency, poses a significant risk to job security, hitting women's employment hardest. A recent report from the International Labour Organization shows that over a third of jobs in rich countries could suffer due to generative AI, with women's roles three times more at risk. This situation highlights the immediate need for gender-inclusive policies amidst technological progress. The report analyzed the job market's vulnerability to generative AI, especially in sectors women typically dominate, and reviewed employer-provided AI training opportunities. Addressing this gender disparity requires immediate action from policymakers, employers, and technology developers to ensure equitable access to AI training and reskilling programs. Without proactive intervention, the digital transformation risks widening existing gender gaps in the workforce.
/web/2025/01-250602-45

Switzerland's Ethical AI Initiative

(EPFL, June 20, 2025)

Switzerland is carving a niche in the AI domain, focusing on ethical development and public-private partnerships. Prof. Marcel Salathé, Prof. Martin Jaggi, and Jemma V. at the EPFL AI Center and Swiss National Super-computing Center (CSCS) have launched the country's first citizens' assembly on AI and created a multilingual, transparent, open-source Swiss Large Language Model (LLM) for local institutions. This strategy not only incorporates public input into AI policy but also ensures innovations reflect Swiss people's diverse needs, establishing a global standard for ethical AI. The team recruited a representative group for the assembly, engaging them in information sessions, workshops, and discussions, leading to a detailed report. They also developed the Swiss LLM, trained in over 1,000 languages, ensuring it met Swiss and European regulations for transparency. This development paves the way for ethically responsible, linguistically diverse AI applications, showcasing Switzerland's commitment to ethical considerations and multilingualism, and positioning it as a global leader in beneficial societal innovations.
/web/2025/01-250620-1f

Machine Learning Misreads Human Context, Warns Research

(University of Basel, July 27, 2025)

The University of Basel's Linus Hany and his team have shown that machine learning can often misinterpret human data, leading to potentially harmful societal conclusions. They found that without proper context, algorithms might mistakenly attribute poor school grades to laziness rather than external factors like the absence of a quiet study space. This highlights the ethical need for careful data interpretation to avoid misguided policies, especially in education and psychology. Hany is working on new methods for analyzing psychology data to prevent such errors. His research stresses the significance of considering context in data derived from humans, which is inherently complex and multifaceted. This insight could transform how psychology approaches data analysis, underscoring the vital role of context in the ethical application of machine learning in the social sciences.
/web/2025/01-250727-04

2. Education

QS Rankings: ETH Zurich Secures 7th Place Once Again

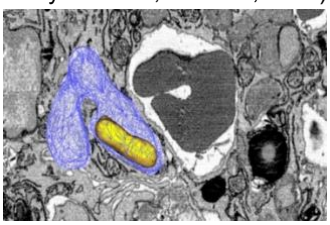
(ETH Zurich, June 20, 2025)

ETH Zurich consistently ranks among the top ten universities globally, showcasing its excellence and leadership in sustainability, where it holds the 2nd position worldwide. The QS World University Rankings 2026 ranked ETH Zurich at the 7th place, marking over 11 years in the top 10. This achievement highlights ETH Zurich's global leadership in sustainability, driven by its academic reputation, high citation rates, and diverse international researcher community. The top spot in this year's ranking has been taken once again by the Massachusetts Institute of Technology followed by Imperial College London and Stanford University. Other than ETH Zurich, EPFL (rank 22) and the University of Zurich (rank 100) were represented in the top 100.
/web/2025/02-250620-fa

3. Life Science

Pathogen Taps Iron Source in Immune Cells to Survive

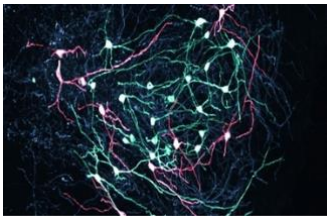
(University of Basel, June 02, 2025)



Salmonella bacteria outsmart the body's defense by accessing iron within immune cells, exposing a weakness in how our immune system fights infections. A team from the University of Basel, led by Prof. Dr. Dirk Bumann, found that Salmonella thrives in iron-rich areas inside macrophages. These bacteria get iron from the macrophages' digestion of red blood cells, allowing them to grow despite the immune system's attempt to restrict iron availability. Using single-cell analysis, Bumann's team showed how Salmonella evades immune defenses by using erythrophagocytosis to bypass iron limitations imposed by the protein SLC11A1. This insight could lead to new therapies that prevent Salmonella from accessing iron, offering a novel way to fight infections that evade standard immune responses. The University of Basel's work emphasizes the value of studying pathogens at the single-cell level, advancing our understanding of the management of infectious diseases.
/web/2025/03-250602-2e

How the Brain Controls Movements

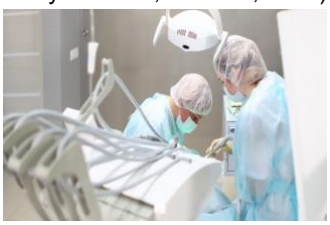
(University of Basel, June 03, 2025)



Researchers led by Antonio Falasconi, Harsh Kanodia, and Prof. Silvia Arber have revolutionized our understanding of movement control in the brain. They discovered that the basal ganglia's output signals do more than stop movements; they also precisely allow them, acting like a complex traffic light system for the brain's movement commands. This finding challenges the old idea that the basal ganglia mainly stop movement, highlighting the vital role of Substantia Nigra pars reticulata (SNr) neurons in starting and stopping movement finely. Using optogenetics to control SNr neurons in mice and recording brain activity as the mice reached for food, the team saw specific SNr neuron activity patterns linked to different movement stages. This discovery of a movement-specific coding system within the basal ganglia opens the door to new treatments for movement disorders like Parkinson's disease and chorea, marking a significant shift in how we might treat these conditions.
/web/2025/03-250603-94

General Anesthesia in Children: Improved Monitoring via Breath Analysis

(University of Basel, June 05, 2025)



A breakthrough in pediatric care was made by Jiafa Zeng and Associate Professor Pablo Sinues's team, from the University of Basel and affiliated hospitals, developed a method to monitor anesthesia in children by analyzing their breath. This technique accurately detects propofol and its by-products, along with markers of oxidative stress from anesthesia and surgery. This innovation promises safer, more precise anesthesia administration, enabling optimal dosing and the early identification of complications. The team compared breath to blood samples from ten children before and during anesthesia, using secondary electrospray ionization high-resolution mass spectrometry.
/web/2025/03-250605-e4

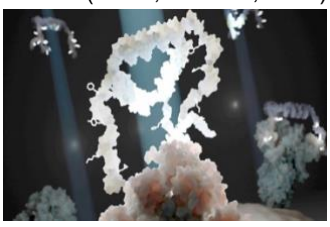
Study Demonstrates Benefits of Molecular Tumor Analysis

(ETH Zurich, June 05, 2025)

In a world first, a team led by Dr. Nicola Miglino and Dr. Andreas Wicki from ETH Zurich and the University of Zurich has shown how new molecular biology technologies enable tumor profiling to guide melanoma treatment. By analyzing 43,000 data points per tumor, this method offers individualized treatment plans, significantly advancing personalized medicine. Targeted therapies now can be based on each tumor's unique features, potentially improving outcomes significantly. The team employed nine molecular biology techniques to analyze malignant melanoma, generating detailed tumor profiles in just four weeks. This approach, analyzing half a terabyte of data per patient, enables the creation of personalized treatment plans by providing a comprehensive view of the tumor's molecular landscape.
/web/2025/03-250605-85

Revolutionizing Virus Treatment with Synthetic Molecules

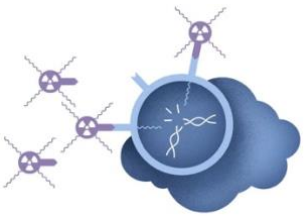
(EPFL, June 09, 2025)



Researchers at EPFL's Programmable Biomaterials Laboratory, led by Artem Kononenko and Prof. Maartje Bastings, have developed a new technique for creating so-called "multimeric aptamers", synthetic molecules that can be used in biomedical diagnosics and treamtnets. These new binders target protein complexes with unprecedented precision and functionality, showing 10 to 1,000 times stronger binding than single binders and higher selectivity. The team used a bioinspired scaffold that mimics the SARS-CoV-2 spike protein's shape to guide the creation of trimeric binders that effectively latch onto the target. Through a cycle of selection and amplification, they significantly increased the binders' affinity for their targets.
/web/2025/03-250609-a1

Terbium-161: A New Hope for Lymphoma Patients

(Paul Scherrer Institute, June 11, 2025)



Terbium-161 in radionuclide therapy could double the survival outcomes of lymphoma patients. Researchers at the Paul Scherrer Institute, with Bern University Hospital, led by Dr. Elisa Rioja Blanco and Dr. Martin Behe, found that terbium-161 targets and destroys lymphoma cells effectively. This marks a significant leap in treating the nearly 2,000 people diagnosed with lymphoma yearly in Switzerland. The team attaches terbium-161 to an antibody that seeks the CD30 receptor on lymphoma cells, injecting this into the patient's bloodstream. This method delivers terbium-161 straight to the tumor, killing cancer cells while saving healthy organs.
/web/2025/03-250611-a4

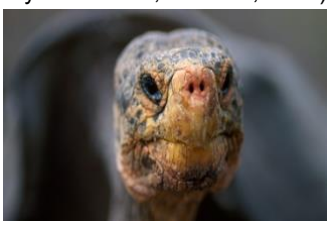
Unlocking Wheat's Hidden Defenses Against Yellow Rust

(University of Zurich, June 13, 2025)

Researchers have identified new genomic regions in traditional Asian wheat that offer durable protection against yellow rust, a major threat to global wheat production. This discovery by Dr. Katharina Jung's team from the University of Zurich, in collaboration with Kyoto University, and the International Maize and Wheat Improvement Center in Mexico, could transform wheat breeding, ensuring future food security by using the genetic diversity of crops grown by local farmers for centuries. Jung's team conducted field experiments in Switzerland and Mexico, analyzing wheat varieties from Japan, China, Nepal, and Pakistan for yellow rust resistance. They found specific quantitative trait loci that convey this resistance, setting the stage for developing commercial wheat varieties that can withstand yellow rust more effectively.
/web/2025/03-250613-59

How Scales Form in Turtles

(University of Geneva, June 16, 2025)



Turtles develop head scales through a unique process, combining genetic signals and mechanical stress, unlike other vertebrates. Prof. Michel Milinkovitch, Dr. Rory Cooper, and Jahanbakhsh Ebrahim from the University of Geneva and EPFL found that genetic factors forms the peripheral scales, while mechanical stress causes the top head scales to emerge through skin folding. This discovery sheds light on reptile evolution, suggesting the scaleforming process might be ancient, possibly shared with dinosaurs and crocodiles, and challenges current views on vertebrate scale development.
/web/2025/03-250616-fb

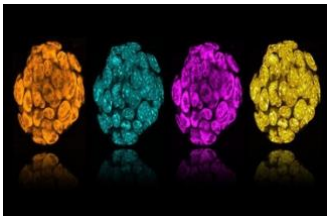
Unveiling New Genes in Cell Division Evolution

(EPFL, June 25, 2025)

Researchers at EPFL, led by Prof. Dr. Didier Trono, Dr. Romain Forey, and Dr. Cyril David Son-Tuyên Pulver, have found that new genes, such as ZNF519 and ZNF274, are crucial in controlling cell division. This challenges the old view that biological processes don't change and highlights that cell division evolves by adding genes unique to humans and their close kin. These genes affect vital functions like DNA replication and mitosis, offering new insights into diseases caused by cell cycle problems, including cancer and developmental issues. The team combined cell biology and genomics to map human cell cycle gene activity, creating an atlas from 1.9 million cells based on their gene expression. This work, which involved lab experiments, genomic analysis, and CRISPRi data, provides a detailed look at how cell division is regulated in humans and primates.
/web/2025/03-250625-88

New Protein Targets for Cancer Treatments

(University of Geneva, June 26, 2025)



Researchers at the University of Geneva, led by Assistant Professor Simon Braun and Hanna Schwämmle, have found that proteins MLF2 and RBM15 are crucial in regulating DNA compaction within cell nuclei. This regulation is vital for proper gene activity, and its disruption can cause cancer or neurological issues. The team's discovery offers new paths for treating these diseases by targeting the chromatin remodeling process. Using the CRISPR-Cas9 method, the team screened over 20,000 genes and identified MLF2 and RBM15 as key to chromatin remodeling. This insight paves the way for developing treatments that specifically address chromatin remodeling defects, promising more effective and less harmful therapies.
/web/2025/03-250626-d9

Building Breast Tissue in the Lab to Better Understand Lactation

(ETH Zurich, June 26, 2025)

Researchers at ETH Zurich, led by Amelia Hasenauer and Prof. Marcy Zenobi-Wong, have created a human lactating breast tissue model using 3D printing and cells from human breast milk. This innovation produces human milk components, and offers insights into lactation and the potential to transform breast cancer research and the study of medication effects on lactation without invasive procedures or animal testing. Using a new volumetric bioprinting technique, the team directs a laser to solidify a liquid with bovine udder tissue components, mimicking human breast tissue. This process forms structures similar to milk ducts and alveoli, which are then filled with mammary epithelial cells from human breast milk.
/web/2025/03-250626-63

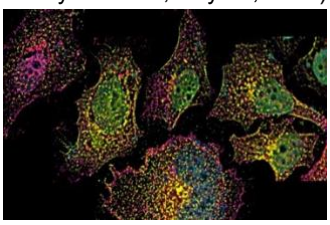
A Recycling Mechanism that Helps Cells Fight Aging

(EPFL, July 01, 2025)

Researchers have found activating the LySR pathway in worms extends their lives by 60%, opening new research avenues for increasing human healthspan and fighting neurodegenerative diseases. Dr. Johan Auwerx's team at EPFL, alongside Fudan University, Amsterdam UMC, and Baylor College of Medicine, discovered the Lysosomal Surveillance Response (LySR) pathway in worms (Caenorhabditis elegans). This pathway boosts cells' waste-clearing abilities, including the removal of toxic proteins linked to neurodegenerative diseases, offering a potential mechanism to enhance cellular health and promote healthy aging. The team's research showed that disabling waste-disposal genes, particularly those for vacuolar H+-ATPase subunits crucial for lysosome function, unexpectedly activates the LySR pathway.
/web/2025/03-250701-5b

Unlocking RNA Drug Potential Through Cellular Traffic Control

(University of Basel, July 02, 2025)



Most RNA-based drugs struggle to reach their target within cells, diminishing their effectiveness. Researchers from the University of Basel and Roche, led by Dr. Liza Malong, found that slowing the internal transport of RNA-based drugs significantly boosts their impact. This discovery could vastly improve the delivery and effectiveness of RNA treatments, potentially changing outcomes for many diseases. The team used a genome-wide CRISPR/Cas9 screen to identify genes that affect the efficacy of so-called "antisense oligonucleotide" (ASO) molecules, focusing on AP1M1, a gene that controls transport within cells. By turning off AP1M1, they ensured ASOs stayed longer in certain areas, enhancing their chance to work.
/web/2025/03-250702-46

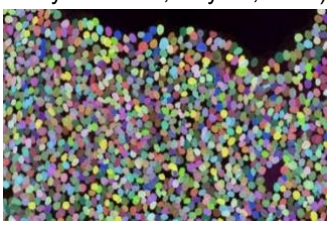
Our Brains Stay Alert to Danger Even in Sleep

(University of Geneva, July 02, 2025)

Our brains remain vigilant to dangers like screams or alarms during sleep, which is an aspect of sensory processing and survival instincts. Researchers from the University of Geneva and Institut Pasteur, led by Dr. Guillaume Legendre, Dr. Sophie Schwartz, and Dr. Luc Arnal, found that our brains process rough sounds while asleep, triggering specific brain waves. This discovery shows our brains keep alert to threats during sleep, aiding in understanding perceptual disorders like hyperacusis and the effects of nighttime noise. In the study, 17 volunteers slept in rooms while their brain activity was monitored. Researchers played various human cries and modified sounds at low volumes to study brain reactions without waking the subjects.
/web/2025/03-250702-3f

A High-Resolution View of Cancer Cells

(University of Zurich, July 04, 2025)



Researchers have developed a groundbreaking technique for personalized cancer treatment, enabling the simultaneous testing of around 50 cancer drugs directly on patient tumor cells. The team, including Prof. Lucas Pelkmans and Dr. Sara Félix from the University of Zurich, ETH Zurich, University Hospital Basel, and the Friedrich Miescher Institute for Biomedical Research in Basel, have introduced the 4i technology. This innovative method uses a fully automated fluorescence microscope to analyze the organization of proteins inside cancer cells, revealing how tumors react to various drugs and identifying factors that drive their aggression.
/web/2025/03-250704-ae

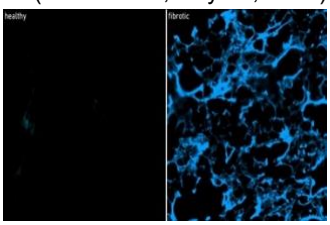
Nutrition in Early Life Shapes Intestinal Immunity

(University of Bern, July 04, 2025)

Early nutrition plays a crucial role in strengthening the immune system by enhancing antibody production and diversity in the gut, a new study by researchers from the University of Bern and Charité University Medicine Berlin reveals. Led by Assistant Professors Stephanie Ganal-Vonarburg and Dr. Andrew Macpherson, the study shows that certain foods can boost our body's infection-fighting abilities from a young age, potentially leading to re-vised nutritional guidelines for improved health over a lifetime. Using a mouse model, the researchers compared immune responses between germ-free mice and those with normal gut bacteria, focusing on diets with varying levels of lipopolysaccharides (LPS), which are known to affect im-mune function.
/web/2025/03-250704-93

Revolutionizing Early Detection of Fibrosis

(ETH Zurich, July 04, 2025)



Over 80% of lung fibrosis cases are detected late, drastically shortening life expectancy to 3-5 years. Dr. Giuseppe Antoniazzi's team at ETH Zurich, alongside University and Children's Hospitals in Zurich, developed a diagnostic tool that glows when it finds the LOX enzyme, an early fibrosis indicator. This discovery offers hope for early treatment, potentially saving millions by preventing irreversible damage. The team created a chemical probe that detects LOX activity, crucial in fibrosis progression. Successfully tested on tissue samples, the probe is now adapting for liquid samples like blood serum, simplifying early diagnosis. This innovation not only facilitates early fibrosis detection but also enables real-time treatment effectiveness tracking.
/web/2025/03-250704-55

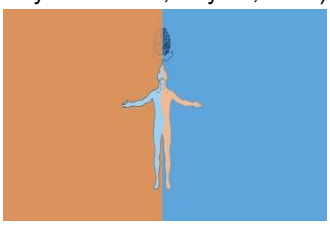
Transforming Chronic Wound Care with Smart Hydrogel

(ETH Zurich, July 07, 2025)

Researchers at ETH Zurich, led by Dr. Dilara Börte Emiroğlu and Dr. Apoorv Singh, have developed a smart hydrogel that revolutionizes chronic wound care. Unlike traditional bandages, this hydrogel directly addresses the root causes of non-healing wounds by capturing harmful inflammatory signals and enhancing tissue regeneration. It marks a significant leap in treating persistent wounds, offering new hope to those suffering from conditions like diabetes or circulatory issues. This innovative hydrogel works by utilizing tiny, ligand-equipped gel particles that target and bind specific signaling molecules. This process not only absorbs pro-inflammatory molecules but also promotes healing, setting this method apart from conventional treatments.
/web/2025/03-250707-fc

Parkinson's Onset Side Predicts Cognitive Vs. Psychiatric Risk

(University of Geneva, July 08, 2025)



Parkinson's disease, more than its well-known motor symptoms, has a side-specific onset, right or left, that influences whether a patient will more likely face cognitive decline or psychiatric issues. Dr. Philippe Voruz, Dr. Julie Péron, and their team from the University of Geneva, Geneva University Hospitals, and EPFL found that the initial side of Parkinson's onset significantly affects the progression of non-motor symptoms. This discovery is vital for creating personalized treatment plans aimed at effectively managing cognitive and emotional symptoms. Analyzing 80 studies over fifty years, the research team showed that knowing which side of the body Parkinson's affects first can help predict the course of non-motor symptoms.
/web/2025/03-250708-bc

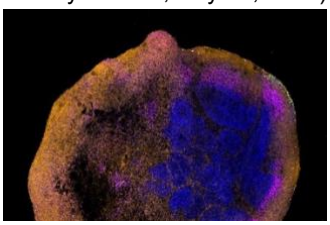
A Microbe that Turns CO2 into Minerals

(EPFL, July 09, 2025)

Bacillus megaterium can turn CO2 in gas form into solid calcium carbonate, offering a new way to make building materials from CO2. This discovery by researchers Dr. Pamela Principi and Prof. Dr. Dimitrios Terzis from EPFL's Soil Mechanics Laboratory, the University of Applied Sciences and Arts of Southern Switzerland, and Medusoil, demonstrated a new clean, innovative carbon capture method. It converts CO2 directly into a solid mineral without harmful byproducts, which presents a new sustainable path for reducing greenhouse gases and fighting climate change. Using C13-labelled urea, the team traced the carbon in the mineral, accurately measuring its microbial pathways.
/web/2025/03-250709-72

Study Shows Monkeypox Can Infect the Human Brain

(University of Bern, July 09, 2025)



Researchers, including Isabel Schultz-Pernice and Prof. Dr. Marco Alves from the University of Bern, the Institute of Virology and Immunology IVI, the University of Lausanne, and the Spiez Federal Laboratory, have shown that the monkeypox virus (MPXV) efficiently spreads between cells in human brain organoids, causing significant neuron death. This discovery reveals the virus's potential to harm the human central nervous system and highlights the urgent need for further study into its effects on the brain. The finding that MPXV can destroy neurons without damaging surrounding tissues deepens our understanding of its threat to our health.
/web/2025/03-250709-bb

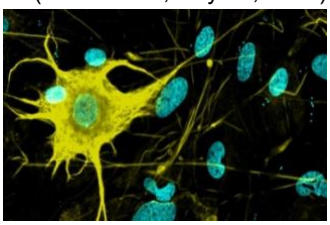
Memory Chooses Depth Over Surface

(University of Geneva, July 11, 2025)

Researchers at the University of Geneva, led by Dr. lucas raynal and Prof. Emmanuel Sander, have resolved a long-standing debate by showing that memory prioritizes the essence of situations over their superficial aspects. This discovery reveals that memory selects connections based on underlying problems or ideas rather than on surface-level details like specific people or places, indicating a preference for a deeper level of understanding. This insight has significant implications for learning and knowledge transfer, suggesting that educational tools that leverage this understanding could revolutionize teaching methods. The team developed a psychological model explaining when and why memory favors structural connections over superficial ones.
/web/2025/03-250711-13

Revolution in Nerve Cell Production from Stem Cells

(ETH Zurich, July 15, 2025)



For the first time, a team from ETH Zurich, led by Prof. Barbara Treutlein, has successfully produced over 400 types of nerve cells from human stem cells, a significant leap from the few dozen previously possible. This breakthrough allows for detailed studies on a variety of neurological disorders and facilitates drug testing without animal experiments, aiming ultimately to cure these diseases. The team used a novel method, activating specific genes in human induced pluripotent stem cells derived from blood and treating them with a mix of morphogens under nearly 200 experimental conditions. Their rigorous testing confirmed the success of the nerve cell production through RNA analysis, cell appearance, and functionality, including how the cells connect and transmit signals.
/web/2025/03-250715-64

Swiss Genome of the 1918 Influenza Virus Reconstructed

(University of Zurich, July 17, 2025)

Researchers from the University of Basel and the University of Zurich (UZH), led by Dr. Christian Urban and Dr. Verena Schunemann, have decoded the 1918 influenza virus's genome using a historical specimen. They discovered three mutations in the Swiss strain that increased its resistance and infectiousness in humans. This study provides essential insights into how the deadliest influenza pandemic began and helps model future pandemics more accurately.
/web/2025/03-250717-78

Deafness and Loneliness Accelerate Cognitive Decline

(University of Geneva, July 18, 2025)

Despite not being socially isolated, individuals who feel lonely experience faster cognitive decline when they suffer from deafness, highlighting the link between sensory loss and emotional health in cognitive function. Researchers from the University of Geneva, led by Dr. Kira (Charikleia) Lampraki, Dr. Andreas Ihle, and Dr. Matthias Kliegel, found that hearing loss and loneliness together hasten cognitive worsening in the elderly. They identified three profiles based on social isolation and perceived loneliness, noting those feeling lonely showed quicker cognitive decline, regardless of their social ties. Using data from the Survey of Health, Aging and Retirement in Europe (SHARE) which tracks health and aging in Europeans aged 50 and over, the team analyzed information from 33,000 participants across twelve countries, including Switzerland.
/web/2025/03-250718-dd

Unraveling Life's Complexity with Math

(University of Zurich, July 30, 2025)

Researchers from the University of Zurich, Johannes Gutenberg University Mainz, University of Valencia, and Universidad Politécnica de Madrid have shown how life's complexity and evolution can be predicted with mathematics. The team, led by Dr. Jordi Bascompte Vaquero, Dr. Enrique Muro, Dr. Fernando Ballesteros, and Prof. Bartolo Luque Serrano, found mathematical relationships that map and predict gene and protein lengths and variances across all life forms. This discovery links evolution's random nature to fundamental physical laws, suggesting a mathematical correlation between the growth of gene sections and life's complexity. Using computational analysis, the researchers studied gene and protein lengths in over 33,000 genomes and proteomes from more than 9,900 organisms, drawing from specialized public databases.
/web/2025/03-250730-5d

4. Nano / Micro Technology / Material Science

New Composite materials with Self-Healing, Energy-Efficient Resins

(EPFL, June 06, 2025)

Researchers at EPFL have revolutionized composite materials by developing vitrimers that merge high resistance and malleability. This innovation, led by Associate Professor Veronique Michaud and Prof. Anastasios P. Vassilopoulos, introduces self-curing resins, self-healing composites, and smart fibers, marking a significant step towards a sustainable future. By reducing plastics' carbon footprint, these composites support a shift to a low-carbon economy. The team employed a lifecycle approach, exploring bio-based alternatives and pioneering self-curing and self-healing techniques, such as UV radiation for curing and heat for repair. This strategy not only prolongs the materials' lifespan but also integrates smart fibers for real-time data gathering and damage detection.
/web/2025/04-250606-52

New AIMR Joint Research Center established at Empa

(EMPA, June 09, 2025)

Tohoku University's Advanced Institute for Materials Research (AIMR) and Empa have established a Joint Research Center through an agreement signed on May 27, 2025, marking a significant milestone in international energy research collaboration. This fourth JRC in AIMR's global network, joining centers at the University of Cambridge, University of Chicago, and Tsinghua University, strengthens connections with continental Europe and advances sustainable energy solutions. The partnership, formalized by Empa's Dr. Nathalie Casas and AIMR Director Prof. Shin-ichi ORIMO, demonstrates strong commitment to European-Asian technological cooperation in materials science. The European JRC will establish a hub-to-hub collaboration model that will extend beyond traditional partnerships. AIMR will serve as the central hub through Tohoku University's Core Research Cluster for Materials Science, while Empa will function as the European hub connecting to the Karlsruhe Institute of Technology and ETH Zurich. This strategic network will leverage complementary strengths in energy research, facilitating joint projects and academic exchanges across Europe. The JRC will employ local scientists and promote intensive collaborative research, establishing a new standard for international cooperation that promises to accelerate breakthroughs in sustainable energy technologies.
/web/2025/04-250609-3d

AI Paves the Way Towards Green Cement

(Paul Scherrer Institute, June 19, 2025)

Researchers at the Paul Scherrer Institute, including Dr. Romana Boiger, Dr. Nikolaos Prasianakis, and Dr. John Provis, have developed a new method to reduce the cement industry's carbon footprint significantly. Using AI and genetic algorithms, they quickly find the best cement mixes that cut CO2 emissions without sacrificing quality. This breakthrough could greatly decrease global carbon emissions. Their method uses AI and genetic algorithms to predict a cement mix's strength and CO2 output in milliseconds, much faster than traditional methods. By reverse-engineering the search for eco-friendly cement, this approach speeds up development and promotes sustainable construction. The Paul Scherrer Institute's work combines mathematical optimization with collaborative research, offering a potential revolution in cement production and climate change mitigation.
/web/2025/04-250619-70

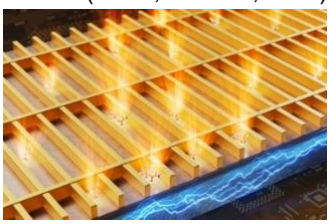
Living Material Actively Stores CO2

(ETH Zurich, June 20, 2025)

ETH Zurich researchers, including Assistant Professor Mark Tibbitt, Dr. Andrea Lee Shin Ling, Dr. Yifan Cui, and Dr. Dalia Dranseike have created a living material that absorbs carbon dioxide from the air. This material, a mix of cyanobacteria and hydrogel, captures CO2 and turns it into biomass and solid minerals. This breakthrough could greatly reduce the carbon impact of buildings and infrastructure, marking a significant advance in efforts towards the conservation of the environment. The team optimized a hydrogel for cyanobacteria survival and efficient photosynthesis, leading to effective CO2 capture. Using 3D printing, they designed structures that enhance light access and nutrient flow, ensuring the material's success in binding carbon for over 400 days. This method not only demonstrates a sustainable strategy to lower atmospheric CO2 but also showcases the potential of living materials in restoring environments and developing green infrastructure, blending biotechnology with material science to combat global warming.
/web/2025/04-250620-0f

The First Ever Self-illuminating Biosensor

(EPFL, June 27, 2025)



EPFL Engineers have developed the first ever self-illuminating biosensor that does not require an external light source, marking a significant advancement in optical biosensing. By leveraging quantum physics, this biosensor can detect biomolecules at very low concentrations, comparable to the most sophisticated sensors currently available. The team, including experts EPFL, ETH Zurich, ICFO (Spain), and Yonsei University (Korea), led by Prof. Hatice Altug and first author Dr. JiHye Lee, created a device capable of identifying amino acids and polymers at picogram levels. This innovation enhances biomolecule detection sensitivity and removes the need for heavy, costly light sources and detection equipment, revolutionizing scientific and medical research. The biosensor uses a nanostructure that prompts an electron to cross an aluminum oxide barrier and reach a thin gold layer, where it transfers energy to a plasmon, emitting a photon through inelastic electron tunneling. This breakthrough could enable the development of compact, scalable, and high-performance sensing systems, potentially transforming point-of-care diagnostics and environmental monitoring by utilizing quantum physics for unparalleled sensitivity and simplicity.
/web/2025/04-250627-c6

5. Information & Communications Technology

Making AI Multicultural

(EPFL, June 04, 2025)

Despite AI advancements, language models struggle with regional history, which shows a gap in local understanding. Researchers Dr. Angelika Romanou and Dr. Negar Foroutan from EPFL, ETH Zurich, and Cohere Labs have introduced the INCLUDE benchmark, a tool with over 197,000 questions in 44 languages that tests the cultural knowledge of Large Language Models' (LLMs). INCLUDE aims to create AI that understands diverse cultures, improving its use in education, healthcare, and law. The team compiled real-world exam questions in various languages and worked with native speakers to include cultural nuances. They tested top LLMs like GPT-4o, LLaMA-3, and Aya-expanse, finding differences in how well each understood different languages and subjects. This approach not only shows INCLUDE's unique contribution to AI's cultural understanding but also pushes for more inclusive and fair AI development.
/web/2025/05-250604-3d

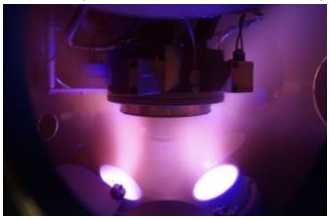
An Algorithm Reveals How our Brain is Motivated

(University of Geneva, June 06, 2025)

Researchers have revealed a more complex role for the brain's ventral tegmental area (VTA), showing it not only anticipates rewards but also their timing. This finding, led by Prof. Alexandre Pouget from the University of Geneva, along with teams from Harvard University and McGill University, challenges the old view of the VTA as just a reward center and highlights its sophisticated computational skills in reward processing. Alexandre Pouget developed a mathematical algorithm that, when applied to detailed neuro-physiological data from animal studies at Harvard, illustrates the VTA's advanced ability to predict not only the occurrence but also the timing of rewards.
/web/2025/05-250606-6f

Better Electronics: Piezoelectric Film Breakthrough at Low Temperatures

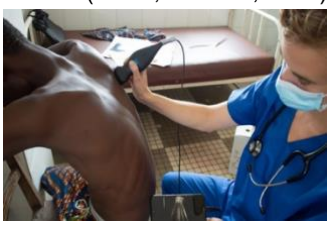
(EMPA, June 10, 2025)



For the first time, scientists have developed a method to produce high-quality piezoelectric thin films on insulating substrates at low temperatures, revolutionizing the manufacturing of essential electronic components. Dr. Jyotish Patidar and Dr. Sebastian Siol from Empa led the discovery of this new technique, enabling the creation of functional layers crucial for microelectronics without the high-temperature demands of previous methods. This advancement will not only improve the quality of piezoelectric films but also expand their use in cutting-edge technologies. The team used high power impulse magnetron sputtering (HiPIMS) with precise timing to avoid argon inclusions, accelerating only the desired ions onto the substrate.
/web/2025/05-250610-4a

AI Ultrasound Tool Revolutionizes TB Diagnosis

(EPFL, June 11, 2025)



Tuberculosis, despite being preventable and treatable, remains a significant cause of death, particularly in sub-Saharan Africa. Tanya Petersen and her team from EPFL, Lausanne university hospital, and various African institutions have introduced a groundbreaking AI-powered lung ultrasound tool, ULTR-AI, that promises to transform TB diagnosis. This tool not only meets but also surpasses the World Health Organization's diagnostic standards for TB triage tests, offering a cost-effective, accessible solution that could save millions of lives by facilitating early and accurate TB detection. The team designed an algorithm that works with portable ultrasound devices connectable to smartphones, automatically evaluating images for TB signs.
/web/2025/05-250611-25

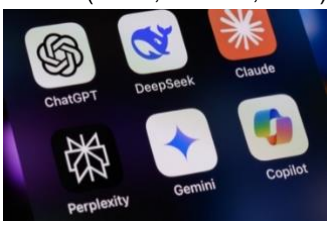
AI Monitors Wildlife Behavior in the Swiss Alps

(EPFL, June 17, 2025)

MammAlps marks a breakthrough in wildlife monitoring by offering a comprehensive view through angles, sounds, and contexts, thus redefining standards in wildlife monitoring. A team at EPFL led by Valentin Gabeff, in partnership with the Swiss National Park, has developed a highly detailed, multi-view, multimodal wildlife behavior dataset aimed at training AI for species and behavior recognition. This innovation could boost conservation efforts by deepening our understanding of animal behaviors. Using nine camera traps, the team captured over 43 hours of footage and refined it to 8.5 hours using AI for animal detection and tracking. They meticulously labeled behaviors, and added audio and environmental data for a comprehensive context.
/web/2025/05-250617-a3

How AIs Understand Words

(EPFL, June 21, 2025)



Researchers from EPFL, ETH Zurich, and the University of Bocconi, under Associate Professor Lenka Zdeborova's leadership, have introduced a mathematical model called Bilinear Sequence Regression (BSR). This model makes it easier for large language models (LLMs) to learn by simplifying language understanding. It represents a significant step towards improving AI's ability to process language. The BSR model turns complex AI language structures into an easy-to-understand format without losing key learning aspects. It converts words into numerical lists and arranges them in tables to track sequences and word nuances, enhancing prediction accuracy. This approach not only sets a clear mathematical standard but also deepens our understanding of LLMs.
/web/2025/05-250621-49

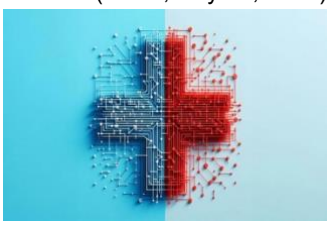
Selfies Could One Day be Stored on DNA Strands

(EPFL, June 26, 2025)

A single gram of DNA can store about 215 million gigabytes of data, a capacity equivalent to 860,000 external hard drives of 250GB each, which could offer a sustainable way to store trillions of photos each year. A team led by Prof. Touradj Ebrahimi from EPFL, along with collaborators from the International Electrotechnical Commission, Takushoku University, and the JPEG committee, has introduced a new image-compression algorithm that turns binary data into DNA sequences. Their development, JPEG DNA, promises an efficient, long-term method for storing visual information, potentially revolutionizing data preservation.
/web/2025/05-250626-dd

A Language Model Made in Switzerland, Built for the Public Good

(EPFL, July 09, 2025)



Researchers from ETH Zurich and EPFL, with Dr. Imanol Schlag, Assistant Professor Antoine Bosselut, Prof. Martin Jaggi, and Prof. Thomas Schulthess, will release this summer a large language model (LLM) developed on public infrastucture. Fluent in over 1000 languages, and built on the "Alps" supercomputer, this open-source AI will facilitate multilingual communication and will advance digital inclusivity worldwide. Available in two versions, with 8 billion and 70 billion parameters. This LLM, trained on a dataset of over 1500 languages, including code and mathematics, used the power of more than 10,000 NVIDIA Grace Hopper Superchips that constitute the "Alps" supercomputer at the Swiss National Supercomputing Centre (CSCS).
/web/2025/05-250709-be

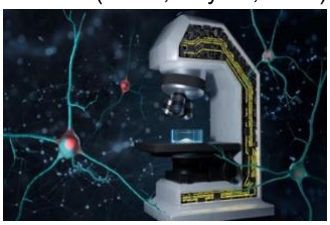
AI Learns Human Vision Trick for Better Object Recognition

(EPFL, July 26, 2025)

Researchers at EPFL's NeuroAI Lab and Michael Herzog's Laboratory of Psychophysics, led by Ben Lonnqvist and Prof. Martin Schrimpf, found that AI can boost its object recognition skills by adopting a human vision technique known as "contour integration." This discovery opens a path to enhance AI's capacity to identify objects, with potential benefits for autonomous vehicles and medical diagnostics. In their study, Lönnqvist, Schrimpf, and their team compared the performance of fifty volunteers and more than a thousand AI models in recognizing objects from partially obscured images. The results showed that AIs trained to incorporate human-like "integration bias" markedly improved at identifying fragmented objects.
/web/2025/05-250726-7c

Self-Driving Microscope Revolutionizes Disease Research

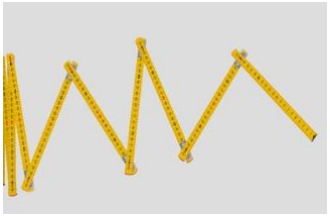
(EPFL, July 29, 2025)



Scientists have developed a self-driving imaging system that predicts and analyzes protein aggregates linked to neurodegenerative diseases in real-time. This system, crafted by researchers EPFL and the European Molecular Biology Laboratory (EMBL) in Heidelberg and led by Dr. Khalid Ibrahim, Prof. Aleksandra Radenovic, and Dr. Hilal Lashuel, could dramatically change neurodegenerative disease research and treatment. It offers a new way to accelerate therapy development by providing insights into the early stages of diseases like Alzheimer's and Parkinson's. The team uses two deep learning algorithms to improve microscopy for neurodegenerative disease. The first detects mature protein aggregates in living cells without labels, using Brillouin microscopy for biomechanical analysis. The second predicts the start of protein aggregation with 91% accuracy, using images labeled fluorescently. This approach enables real-time, label-free study of protein aggregation, enhancing our ability to observe and understand these processes without disrupting cellular functions.
/web/2025/05-250729-8f

What a Folding Ruler Can Tell us About Neural Networks

(University of Basel, July 31, 2025)



Researchers at the University of Basel, led by Dr. Cheng Shi and Prof. Dr. Ivan Dokmanić, have discovered that the behavior of a simple folding ruler when pulled and shaken can predict how effectively each layer of a deep neural network transforms data. They created a mechanical model akin to a folding ruler that simulates the data transformation in neural network layers. This provided them with an intuitive method to enhance and predict the complex operations of these networks, suggesting more efficient training methods could exist beyond the conventional trial-and-error approach. The team compared the neural network layers to sections of a folding ruler, with mechanical friction and added noise representing network nonlinearity and training randomness. Their approach, validated through simulations and mathematical analysis, proposes a new way to improve neural network performance by optimizing layer contributions to data processing.
/web/2025/05-250731-ea

6. Energy / Environment

How Trace Elements are Recycled in the Deep Sea

(ETH Zurich, June 12, 2025)

Contrary to previous beliefs, vital elements like iron and zinc don't disappear in the ocean's surface layer; instead, they partake in a recycling journey involving deep-sea sediments, reshaping our grasp of ocean nutrient cycles and their influence on climate. Dr. Derek Vance and his team at ETH Zurich found that these essential metals attach to manganese oxide particles, sink to the depths, and then release back into the ocean, ensuring their ongoing cycle. This discovery redefines ocean chemistry, underlining a key process in the Earth's carbon cycle and climate regulation. Using ocean chemistry markers and a numerical model, the ETH Zurich team tracked these metals from the surface to the deep sea and back. Their work shows how sediment pore chemical reactions release the metals, letting ocean currents carry them upwards. This insight offers a new understanding of phytoplankton growth, vital for carbon dioxide capture and climate change mitigation. By merging chemical tracers with modeling, ETH Zurich provides a fresh perspective on the ocean's complex recycling mechanisms.
/web/2025/06-250612-13

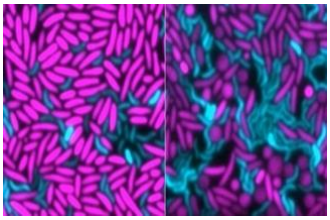
Breakthrough in Water Splitting Makes Hydrogen Production More Efficient

(EPFL, June 13, 2025)

Researchers at EPFL and the Swiss National Supercomputing Centre (CSCS), led by Dr. Yong-Bin Zhuang and Dr. Alfredo Pasquarello, have made a significant breakthrough in hydrogen production. They uncovered the mechanism of the very first step in hydrogen production: a process called proton-coupled electron transfer (PCET), at the BiVO4-water interface. Their discovery shows a sequential process where the proton moves first, followed by the electron. This sequence sets the reaction's speed and pinpoints the slowest step that controls the rate. Using long-timescale molecular dynamics simulations and machine learning, the team observed hundreds of thousands of atomic configurations.
/web/2025/06-250613-eb

Bacteria Fight and Feast with the Same Tool

(ETH Zurich, June 13, 2025)



Researchers have found that certain Vibrio bacteria attack and consume their neighbors, a behavior that redefines our understanding of microbial interactions and nutrient cycling. Dr. Astrid Stubbusch and her team at ETH Zurich and Eawag discovered these bacteria use a type 6 secretion system (T6SS) to kill and feed on other cells, highlighting a direct nutrient transfer method that could greatly affect the microbial food web. The team observed two species of sea bacteria in tiny chambers, analyzed DNA sequences, and conducted nutrient availability experiments to understand this behavior. Their work shows that the T6SS isn't just for defense but also serves as a foraging tool, offering new insights into microbial ecology.
/web/2025/06-250613-e5

Methane Emissions Slashed in Romania

(EMPA, June 13, 2025)

Researchers led by Dr. Gerrit Kuhlmann have dramatically cut methane emissions in Romania, a greenhouse gas far more harmful than CO2 in the short term. By fixing leaks identified in 2019, emissions fell by up to 60% through repairs and controlled burning, offering a clear route to tackle this potent pollutant. Using drones and planes equipped with the AVIRIS-NG spectrometer, the team tracked methane across southern Romania, comparing data from 2019 and 2021 after fixes. This approach not only proved the success of targeted repairs but also showed the importance of visible emissions for effective action.
/web/2025/06-250613-3e

Solar Power as A Basic Public Service for All

(EMPA, June 27, 2025)

Empa researchers Dr. Harald Desing, Hauke Schlesier, and Marcel Gauch are advocating for a "solar basic service" model, which could offer everyone a fair share of solar power, about 500 watts per person, funded by public money. This model aims to make energy accessible to all, reduce dependence on fossil fuels, and facilitate a just transition to renewable sources. It envisions a sustainable world where energy equity powers every home, regardless of financial status. The strategy combines public funding with smart consumption, encouraging the use of solar power when it's most abundant, thus avoiding expensive storage technologies. Empa's study represents a step toward energy dependance and a cleaner, fairer future by leveraging minimal training and existing infrastructure to tap into solar energy efficiently.
/web/2025/06-250627-4d

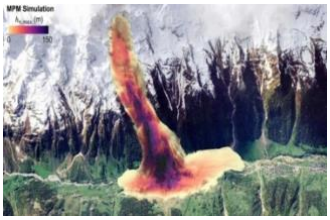
Trees in Cities Provide Cooling even in Extreme Heat

(EPFL, June 30, 2025)

Urban trees fight off heatwaves by increasing water evaporation, cooling their surroundings effectively. Researchers from the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and EPFL, led by Dr. Christoph Bachofen, found that even during extreme heat above 39 °C, city plane trees significantly boost water evaporation, cooling nearby areas. This discovery overturns previous assumptions and underscores urban trees' role in making cities more bearable as global temperatures climb. In spring 2023, the team equipped eight trees in Lancy, Geneva, with devices to monitor sap flow, particularly during record-breaking heatwaves.
/web/2025/06-250630-01

New Models Improve Predictions of Snow, Rock and Ice Avalanches

(ETH Zurich, July 08, 2025)



The Alps just got safer thanks to Associate Professor Johan Gaume and his team from ETH Zurich and the WSL Institute for Snow and Avalanche Research SLF. They have developed a new 3D simulation tool that significantly enhances the accuracy of avalanche predictions. This advancement is key to protecting mountain communities by enabling better disaster management and preparedness. The tool's effectiveness was proven in Brienz, where it accurately predicted a landslide's impact. Gaume's team created a detailed 3D simulation that captures the initiation and flow of avalanches, incorporating the behavior of mixed materials driven by shockwaves.
/web/2025/06-250708-de

New Liquid Can Simplify Hydrogen Transportation and Storage

(EPFL, July 17, 2025)

Researchers from EPFL and Kyoto University, led by Prof. Andreas Züttel and Prof. Satoshi Horike, have developed a groundbreaking hydrogen storage solution. Their creation, a transparent, stable, hydrogen-rich liquid at room temperature, holds an impressive 6.9% hydrogen by weight, exceeding the US Department of Energy's 2025 targets. This advancement makes hydrogen storage and transport safer, more practical, and efficient, broadening its application as a clean fuel. The team created this solution by mixing ammonia borane and tetrabutylammonium borohydride in precise ratios, achieving a liquid state at room temperature. They confirmed the presence of strong hydrogen bonds in the mixture through spectroscopy, which prevents crystals from reforming at low temperatures.
/web/2025/06-250717-fc

A Blueprint for a Secure Energy System

(ETH Zurich, July 17, 2025)

Researchers from Empa, ETH Zurich, and Lawrence Berkeley National Laboratory, led by Dr. Matthias Sulzer and Dr. Georgios Mavromatidis, have introduced a pioneering model to enhance energy security. This model, shaped like a pyramid with five levels, changes how we measure energy supply security. It accounts for both static and dynamic factors, making it a thorough tool for assessing a country's energy resilience, leading to more sustainable and secure energy systems globally. The team used quantitative indices to assess energy security aspects, from self-production to full independence, focusing on the dynamic needs of renewable energy systems.
/web/2025/06-250717-a7

Identifying Chemicals of Concern in Plastics

(EMPA, July 18, 2025)

A recent study led by Prof. Martin Wagner and Dr. Laura Monclús Anglada, Dr. Zhanyun Wang, and Dr. Ksenia Groh, involving Empa, Eawag, the Norwegian University of Science and Technology, and the Norwegian Geotechnical Institute, has identified over 4,200 of the 16,000 existing chemicals in plastics as hazardous. This research highlights the need for safer plastic production to protect health and the environment from harmful chemicals. Using the Plastchem database and bioassay techniques, the team developed a method to pinpoint harmful chemicals in plastics to promote the creation of non-toxic, recyclable, and reusable plastics. It also advocates for simpler plastic compositions and greater chemical transparency, aiming for a safer, circular plastic economy and a healthier planet.
/web/2025/06-250718-89

Alpine Waters Face a Warming Crisis

(University of Basel, July 18, 2025)

Alpine waters in Switzerland risk warming up to 3.5°C by century's end without climate action, threatening biodiversity and water management. The team, led by Dr. Love Råman Vinnå at the Aquatic Research Institute Eawag and the University of Basel, shows how Swiss water temperatures might rise, affecting different water bodies uniquely. Their work underlines the urgent need for plans to shield heat-sensitive aquatic life and sustain water use in a changing climate. Using data from 82 monitoring stations and modeling air temperature and runoff under various climate scenarios, they have pinpointed adaptation tactics like adding shade, managing reservoirs, river renaturalization, and using groundwater for cooling. This pioneering study by Eawag and the University of Basel stresses effective groundwater management as key to adapting to climate impacts, offering a model for worldwide application in similar settings.
/web/2025/06-250718-45

Satellite Maps Earth's Invisible Stresses

(University of Zurich, July 31, 2025)

Researchers at the University of Zurich, Eawag, and the European Space Agency, have unlocked Earth's hidden environmental stresses using satellite data. Led by Associate Professor Alexander Damm, the team uses the FLuorescence EXplorer (FLEX) satellite to measure plant fluorescence, indicating stress from factors like water scarcity. This innovative method provides a fresh perspective on planetary health, pinpointing critical areas and steering conservation. The team integrates optical and radar satellite data with expert insights from plant physiologists and environmental scientists. This interdisciplinary approach yields detailed maps that not only track water dynamics and human impacts but also uncover invisible processes such as groundwater contamination. By converting satellite data into actionable intelligence, the University of Zurich and its collaborators are revolutionizing environmental protection and sustainable development, enabling comprehensive monitoring of biodiversity and ecosystem health worldwide.
/web/2025/06-250731-cd

7. Engineering / Robotics / Space

Soft Robot Modules for New Haptic Interactions

(EPFL, June 20, 2025)

EPFL scientists led by Serhat Demirtaş and Dr. Jamie Paik, have developed the Digits framework, an innovative soft robotic system that employs compressed air to enable customizable shape changes, vibrations, and haptic feedback. It marks a significant advancement in touch experiences for virtual reality, rehabilitation, and more, all without the need for coding skills. By enhancing the open-source robotics software Feelix, the team allows users to easily create their own haptic interactions. The Digits framework uses machine learning to detect touch-induced changes, facilitating the creation of smart, intuitive interactions. Through the TangiGlove and TangiBall, the framework demonstrates its adaptability in various settings. This development not only improves virtual and augmented reality by offering realistic haptic feedback but also innovates in rehabilitation and physical therapy.
/web/2025/07-250620-50

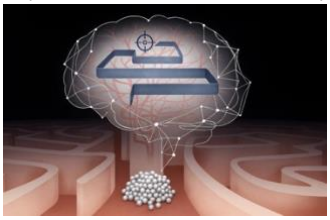
Tidal Forces from the Sun Could Have Deformed Cliffs on Mercury

(University of Bern, June 24, 2025)

The Sun's gravitational pull has sculpted Mercury's landscape over billions of years. Researchers from the University of Bern, led by Dr. Liliane Burkhard and Prof. Dr. Nicolas Thomas, found that tidal forces, along with the planet cooling and contracting, have significantly influenced Mercury's tectonic features. This discovery challenges earlier beliefs about Mercury's geological history and enhances our understanding of how solar tidal stresses affect planetary evolution. Using advanced models of Mercury's interior, the team simulated the Sun's tidal effects on the planet's surface for the past four billion years. By tweaking factors like rotational speed and orbital eccentricity, they showed how these solar forces shaped Mercury's tectonic evolution. This breakthrough allows for more precise predictions of how planetary surfaces develop, benefiting the study of other celestial bodies. The University of Bern hopes to gain further insights thanks to the BepiColombo mission of the European Space Agency and the Japan Aerospace Exploration Agency.
/web/2025/07-250624-72

Microrobots Master Human Body Navigation Through Dream Simulations

(ETH Zurich, June 30, 2025)



Microrobots now use "dream" simulations to master navigating the human body's intricate vascular system, achieving over a 90% success rate with minimal real-world adjustment. Assistant Professor Daniel Ahmed and Mahmoud Medany from ETH Zurich and the European Research Council (ERC) are behind this innovation, marking a significant step towards smart, non-invasive medical robots. These devices can precisely deliver drugs, clear blood vessel blockages, or perform microsurgeries, potentially transforming patient care and medical procedures. Leveraging model-based reinforcement learning, a form of advanced AI, the microrobots train in virtual environments that mimic real-world physics accurately. This technique allows them to adapt and accurately navigate through complex microfluidic channels. The team's use of AI and realistic simulations minimizes the need for real-world training, speeding up the microrobots' development and deployment in medical settings.
/web/2025/07-250630-45

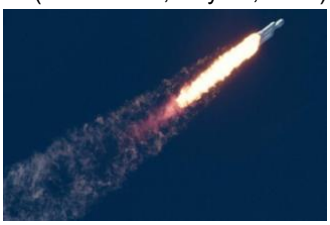
Mimicking Nature: Robots with Biological Tissue Flexibility

(EPFL, July 18, 2025)

EPFL's CREATE Lab, led by Assistant Professor Josie Hughes, has developed a revolutionary foam lattice that mimics the flexibility of biological tissues, enabling robotic parts to twist, bend, and rotate like an elephant's trunk and joints. This breakthrough promises more adaptable and precise robots, marking a significant advancement in robotics. The researchers used a programmable lattice with over one million configurations, combining two types of cells, the body-centered cubic (BCC) cell and the X-cube, to achieve a wide range of stiffness, deformation, and load-bearing capacities. This method creates robotic 'tissue' that mirrors the diversity of natural musculoskeletal systems, offering a scalable approach for designing lightweight, adaptable robots and opening new possibilities for complex movements and functionalities in robotics research and design.
/web/2025/07-250718-d5

The New Space Age Could Threaten Ozone Layer Recovery

(ETH Zurich, July 18, 2025)

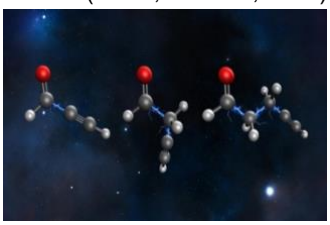


Global efforts to heal the ozone layer face a setback from the increasing number of rocket launches, a study reveals. Researchers from the University of Canterbury, ETH Zurich, and the Physical Meteorological Observatory in Davos (PMOD/WRC), including Dr. Sandro Vattioni, Dr. Laura Revell, and Dr. Timofei Sukhodolov, found that rocket emissions could delay the ozone layer's recovery by years, or even decades. With the space industry's growth, harmful emissions, notably chlorine and soot, could thin the ozone significantly by 2030, underscoring the need for urgent regulatory action. The team, employing a sophisticated chemistry climate model from ETH Zurich and PMOD/WRC, simulated the impact of rocket emissions on the ozone layer by 2030, considering the space industry's expansion. Their work shows that rocket emissions pose a serious, yet underestimated threat to the ozone layer's recovery.
/web/2025/07-250718-a5

8. Physics / Chemistry / Math

Bigger Molecules Can Help Quantum Charge Flow Last Longer

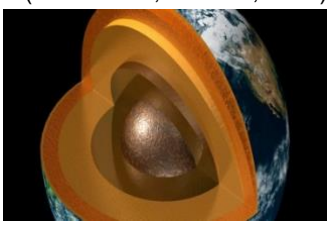
(EPFL, June 05, 2025)



Contrary to previous beliefs, larger and more flexible molecules stabilize quantum coherence, opening new doors for quantum technology and chemical synthesis advancements. Researchers led by Dr. Alan Scheidegger and Associate Professor Jiri Vanicek at EPFL, and Assistant Professor Nikolay Golubev at the Universty of Arizona, found that increasing molecule size and flexibility prolongs the life of quantum charge flow. This discovery could impact future quantum technologies and the control of chemical processes. The team applied semiclassical dynamics, blending classical mechanics for atomic nuclei and quantum mechanics for electrons, to see how atomic vibrations preserve quantum states. By studying simple organic molecules and adjusting carbon chain lengths, they showed how electron coherence and charge migration respond. This method debunks the myth that larger molecules lose coherence faster and introduces a new molecule design strategy. It paves the way for more efficient quantum computing, ultra-sensitive sensors, and advanced laser-driven chemical control, revolutionizing attochemistry and offering new insights into quantum state stabilization in larger molecules.
/web/2025/08-250605-4f

Why Seismic Waves Spontaneously Race Inside the Earth

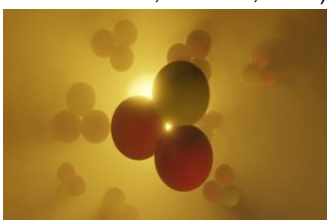
(ETH Zurich, June 06, 2025)



Researchers at ETH Zurich, led by Prof. Motohiko Murakami, have discovered that solid rock flows nearly 3000 kilometers below the Earth's surface, overturning previous beliefs about the Earth's interior. This flow occurs in the so-called D'' layer, where earthquake waves speed up due to solid rock aligning its crystals under extreme conditions. This finding not only solves the D'' layer mystery but also sheds light on deep Earth dynamics, establishing the concept of solid rock flow. The team used laboratory experiments and computer simulations to uncover this.
/web/2025/08-250606-38

Measuring Helium-3's Nucleus with Unmatched Precision

(Paul Scherrer Institute, June 10, 2025)



Researchers at the Paul Scherrer Institute and ETH Zurich, led by Dr. Karsten Schuhmann and Dr. Aldo Antognini, have achieved a groundbreaking measurement of the muonic helium-3 atomic nucleus radius at 1.97007 femtometres. This achievement not only validates previous findings but does so with 15 times more precision, setting a new standard for nuclear and atomic physics research and deepening our understanding of light atomic nuclei. The team replaced helium's two electrons with a muon, using PSI's proton accelerator to precisely determine the nuclear radius. This method uncovers details of atomic structure previously beyond our reach, enabling more accurate nuclear theory tests.
/web/2025/08-250610-79

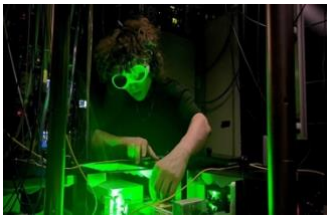
New Insights into How the Building Blocks of Life Form

(ETH Zurich, June 27, 2025)

Researchers at ETH Zurich and Auburn University, led by Prof. Ruth Signorell, Mercede Azizbaig Mohajer, and Dr. Pallab Basuri, have found that urea, a key component for life, can spontaneously form on water surfaces from carbon dioxide and ammonia without catalysts, heat, or pressure. This breakthrough challenges previous beliefs about life's chemical beginnings on Earth, hinting at a simpler origin of life's precursor. The team observed tiny water droplets, mimicking sea spray and mist, to discover urea forming spontaneously in the droplets' surface layer under normal conditions, combining experimental evidence with theoretical calculations.
/web/2025/08-250627-8f

New Boundaries in Dark Matter Research

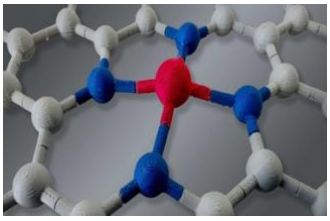
(ETH Zurich, July 01, 2025)



The Standard Model falls short in explaining dark matter, a significant enigma in physics. A team led by Prof. Diana Prado Lopes Aude Craik and Luca Immanuel Huber, involving researchers from ETH Zurich and the Max Planck Institute, has advanced the search for a new force between neutrons and electrons, bringing us closer to understanding dark matter. By establishing precise limits on the traits of a potential particle that could mediate this force, their work focuses the search for physics beyond the Standard Model. Through detailed measurements on calcium isotopes using an ion trap and precision atomic spectroscopy, the team pinpointed the frequency of light from energy transitions with unprecedented accuracy of 100 millihertz. This accuracy was achieved by simultaneously trapping two isotopes to reduce noise and by collaborating to enhance precision in calculating nuclear mass ratios and energy transitions.
/web/2025/08-250701-35

A Map for Single-atom Catalysts

(ETH Zurich, July 03, 2025)



Researchers from ETH Zurich, the University of Lyon, and Aarhus University, led by Prof. Javier Pérez-Ramírez and Prof. Christophe Coperet, have discovered that the efficiency of platinum-based single-atom catalysts significantly relies on their atomic environments. This finding could make these catalysts more uniform and effective, crucial for sustainable chemical production and reducing platinum's environmental impact. Using nuclear magnetic resonance (NMR), the team studied single platinum atoms' atomic environments. This method, akin to MRI in healthcare, lets scientists see the spatial orientations and atomic arrangements around platinum atoms, offering new insights into their catalytic behavior.
/web/2025/08-250703-ac

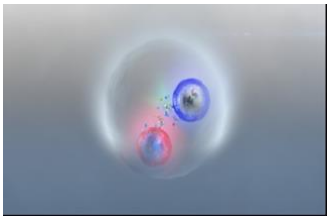
New Technique Captures Every Twist of Polarized Light

(EPFL, July 03, 2025)

Researchers from EPFL and Université Paris-Saclay, led by Prof. Sascha Feldmann, have created a new spectroscopy technique that offers a detailed view of polarized light across a broad spectrum with low noise. This method allows for an in-depth examination of the polarization of molecules, enabling new possibilities quantum computing and secure communication through the study of chiral emitters and quantum materials. The team built an innovative instrument using common components that captures the full "Stokes vector" in real-time, enhancing the detection of light emission changes with unmatched sensitivity and range.
/web/2025/08-250703-36

Unexpected Antimatter Interaction Observed in Top Quark Pairs

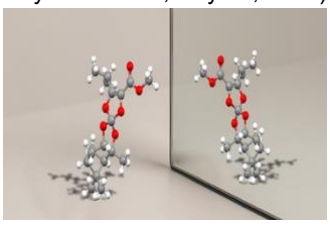
(CERN, July 10, 2025)



Top quarks usually avoid pairing due to their short lifespans. However, CERN researchers have discovered that top quarks can briefly pair with their antimatter counterparts, creating a state known as toponium. This finding challenges the Standard Model of particle physics, particularly our understanding of the strong force and quark-antiquark interactions, and may reshape our knowledge of the universe's basic components. The team analyzed proton-proton collision data from the CMS experiment (2016-2018) and the full LHC Run-2 dataset (2015-2018) by the ATLAS collaboration. They measured the production probability of top quark-antiquark pairs and used complex calculations of the strong nuclear force to reveal this temporary interaction.
/web/2025/08-250710-ce

A New Architecture at the Heart of Molecules

(University of Geneva, July 17, 2025)



A team from the University of Geneva and the University of Pisa, led by Prof. Jerome Lacour, Prof. Gennaro Pescitelli, and Dr. Olivier Viudes, has made a significant breakthrough in creating a new family of chiral molecules. These molecules feature a novel type of stereogenic center with a central carbon atom surrounded by oxygen and nitrogen atoms, a first in chemistry. This innovation opens doors to designing drugs with controlled geometries and creating new materials. The team's method involved synthesizing and characterizing these chiral molecules using dynamic chromatography and quantum chemistry calculations, revealing their extraordinary stability. For instance, one molecule would take 84,000 years at room temperature to convert to its mirror image, underscoring their remarkable stability.
/web/2025/08-250717-b9

Uranium-based Catalyst Turns Air Nitrogen into Ammonia

(EPFL, July 28, 2025)

For the first time, a team led by Prof. Marinella Mazzanti has developed a uranium-based catalyst that can bind nitrogen gas and convert it into ammonia. This method challenges the traditional approach and offers a more efficient, environmentally friendly way to produce ammonia, crucial for agriculture. The discovery, involving researchers from EPFL, combines the biological efficiency and industrial feasibility of ammonia production, introducing new possibilities in nitrogen chemistry and the use of uranium. The team created a unique molecular complex by combining uranium with a triamidoamine ligand, enabling the nitrogen gas to attach sideways. They successfully broke the nitrogen atoms' strong bond by adding electrons step-by-step, ultimately transforming nitrogen into nitride ions. This innovative process signifies a potential revolution in the ammonia production industry by offering a more environmentally friendly and efficient method, setting a new standard in the field and highlighting the untapped potential of uranium in catalysis.
/web/2025/08-250728-1f

9. Architecture / Design

Swiss Cities Embrace High-Density Living

(ETH Zurich, June 25, 2025)

A shift toward high-density development is transforming Switzerland's urban areas. Assistant Professor David Kaufmann and his team at ETH Zurich show that replacing buildings, adding floors, and converting old industrial sites significantly increase living spaces in Switzerland's big cities. This change not only adds homes but also highlights the need to balance growth with social fairness, as it can lead to people being pushed out. Kaufmann's research, using data from 2000 to 2023, examines Basel, Bern, Geneva, Lausanne, and Zurich. The study finds that these cities can add housing without tearing down buildings or displacing residents by adopting soft densification. This suggests a move toward careful planning and political action for sustainable and equitable urban growth.
/web/2025/09-250625-9d

10. Economy, Social Sciences & Humanities

Microsoft Invests $400 Million in Swiss AI Expansion

(Swissinfo, June 04, 2025)

Microsoft plans to invest $400 million in Swiss cloud and artificial intelligence (AI) infrastructure, aiming to give one million Swiss citizens access to AI by 2027. This investment marks Microsoft's dedication to innovation and highlights Switzerland's increasing importance in the global AI market as a leading tech hub. The initiative focuses on improving infrastructure and promoting education to make AI technologies available to everyone. Through collaboration with national innovation parks and international groups in Geneva, Microsoft aims to integrate AI across various sectors, such as education, healthcare, and business. Microsoft's strategy stands out by balancing technological progress with community education, aiming for a future where AI's advantages are universally accessible.
/web/2025/10-250604-5e

How Slow Digital Transformation Helps Democracy

(University of Basel, June 24, 2025)

The decline of liberal democracies worldwide signals an urgent need for a digital transformation that aligns with democratic values. Researchers at the University of Basel's e-PIAF, led by Dr. Christian R. Ulbrich, have shown that Switzerland and Germany might surpass early digital adopters like the UK and Estonia by developing digital systems that bolster democracy. They highlight decentralization as key to preventing data misuse and power concentration. Ulbrich and his team analyzed digital efforts in Switzerland, Germany, Estonia, and the UK, focusing on maintaining democratic values. Their findings stress the importance of decentralization, open standards, and power dispersal in public administration. This approach not only enhances efficiency but also reinforces democracy. The University of Basel's work marks a significant advance in merging technology with governance, ensuring digital progress supports democratic integrity.
/web/2025/10-250624-a9

Switzerland's Economic Growth Boosted by Skilled Immigrants

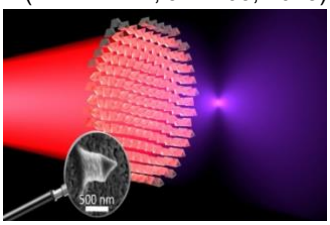
(EPFL, July 07, 2025)

The average immigrant in Switzerland now is a 33-year-old college graduate from a neighboring country. Dr. Lerch Mathias and Philippe Wanner from EPFL and the University of Geneva show that highly skilled immigrant workers have significantly transformed Switzerland since 1966, urging the need for policies to attract and keep such talent. Their research used data from censuses, population registers, and the central migration system, analyzing over five decades of immigration trends. Their work provides detailed insights into the demographic and geographic trends of immigration, and analyzes Switzerland's appeal to highly skilled workers. The study shows how Switzerland cold enhance its economic competitiveness and growth, illustrating the importance of adaptable immigration policies for the country's changing economic needs.
/web/2025/10-250707-ff

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

Ultra-thin Lenses that Make Infrared Light Visible

(ETH Zurich, June 03, 2025)



Researchers at ETH Zurich, led by Associate Professor Rachel Grange, have achieved a breakthrough in optics by creating tiny lenses that turn invisible infrared light into visible light. This innovation could transform the design and function of lenses in security cameras, photography, and microscopes, making them smaller, less complex, and more efficient. The team's technique involves chemically synthesizing and nanoengineering a unique metal-oxide, lithium niobate, into nanoscale patterns. They then heat these patterns to 600°C to attain the essential crystalline properties for light conversion. This method results in the production of ultra-thin, high-efficiency lenses that could make banknotes impossible to counterfeit and significantly enhance camera and microscope performance. By pioneering the use of lithium niobate for light conversion, ETH Zurich sets a new benchmark for shrinking optical devices without sacrificing efficiency.
/web/2025/11-250603-d2

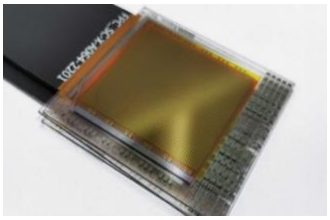
Practicing Medicine on a Lifelike Silicone Model

(ETH Zurich, June 16, 2025)

ETH Zurich and the University Hospital Zurich, collaborating with ETH 3R Hub and guided by Fabian Landers, Pascal Theiler, and Oliver Brinkmann, have developed anatomically accurate silicone models of brain vessels. These models, made from advanced synthetic materials through 3D printing based on MRI and CT scans, mimic the elasticity and transparency of real vessels, reducing the need for animal testing and improving training quality for complex medical procedures. This innovation promotes safer, ethical research by following the 3R principles (Replace, Reduce, Refine), minimizing animal use. It offers doctors a realistic, risk-free platform to hone their skills, potentially bettering patient care.
/web/2025/11-250616-ed

Revolution in Imaging with Perovskite Sensors

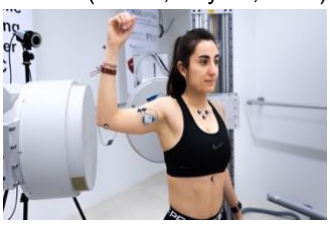
(ETH Zurich, June 21, 2025)



Perovskite image sensors, developed by Professor Maksym Kovalenko and his team at ETH Zurich and Empa, can capture three times more light than traditional silicon sensors, offering triple the resolution. This advancement revolutionizes digital imaging, improving color accuracy and reducing artifacts in low light. It's ideal for machine vision and promises to enhance digital photography, medical analysis, and environmental and agricultural monitoring. The team created these sensors using lead halide perovskite, a material that changes properties based on its chemical makeup. By adding different amounts of iodine, bromine, and chlorine, they engineered stacked pixel layers that selectively capture red, green, or blue light, while allowing other wavelengths to pass through.
/web/2025/11-250621-e2

Revolutionizing Shoulder Instability Diagnosis with Unprecedented Precision

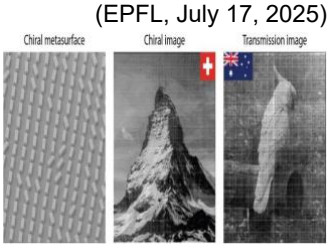
(EMPA, July 09, 2025)



Prof. Dr. Ameet Aiyangar and his team from Empa, sitem-insel AG, and Inselspital Bern have developed a groundbreaking 4D analysis technique combines high-precision X-ray videos with 3D models of the joints, achieving millimeter accuracy in pinpointing shoulder instabilities. This advancement promises more accurate treatment decisions and aims to reduce unnecessary surgeries, enhancing patient recovery. The team uses a biplanar radiographic imaging system to capture dynamic 3D shoulder images from two angles, along with CT scans to create detailed 3D bone models. They meticulously track and optimize the joint's tiniest movements, crucial for assessing stability.
/web/2025/11-250709-21

Invisible Ink of the Future: Dual-Layer Watermarks

(EPFL, July 17, 2025)



Researchers at EPFL, alongside Australian partners and led by Dr. Ivan Sinev, Dr. Felix Richter, and Ivan Toftul, have developed optical metasurfaces that can encode invisible dual-layer watermarks. This breakthrough could transform data encryption, biosensing, and quantum technologies by adding a layer of security invisible to unauthorized eyes. The team changed the orientation of tiny elements, or meta-atoms, within a 2D lattice to control how the metasurface interacts with polarized light. Their experiment demonstrated encoding two separate images on a single metasurface tuned for the invisible mid-infrared range; one visible under unpolarized light and the other under circularly polarized light.
/web/2025/11-250717-38

12. General Interest

Root of Insomnia in Perception, Not Sleep Loss

(University of Bern, June 10, 2025)

Researchers have discovered that the main problem for people with insomnia might not be poor sleep itself but how they perceive their sleep. A new study led by Carlotta Louisa Schneider and Dr. Christoph Nissen at Geneva University Hospitals and the University of Bern suggests this, contradicting the old view that insomnia stems from actual sleep disruptions. In their study, the team compared the sleep experiences of 30 healthy individuals with 30 people diagnosed with insomnia. They used deliberate awakenings and a vibrating bracelet to measure responses during sleep and found no significant differences in sleep patterns between the two groups. This suggests that cognitive behavioral therapy, which focuses on changing perceptions and attitudes towards sleep, could be a more effective, non-medicated treatment for insomnia. This approach could change how we treat this widespread sleep disorder.
/web/2025/12-250610-f1

AI Leans Toward Conformity and Dominant Discourse

(Swissinfo.ch, June 23, 2025)

Researchers at ETH Zurich, led by Dr. Joshua C. Yang, found that AI, specifically Large Language Models like ChatGPT, tend to support established parties and lack the diverse judgment of humans in voting scenarios. Their study shows AI's tendency for uniformity in decisions, particularly when voting on local political projects, underscoring the potential and limitations of AI in democratic processes. While AI can help make decisions more frequently and with more information, it generally promotes conformity and may not reflect the broad spectrum of human preferences, potentially affecting societal decision diversity. The team compared the decisions of AI models, ChatGPT-4 and LLaMA-2, with those of 180 human participants on 24 projects in Zurich, such as a car-free Langstrasse and a multicultural festival. The comparison revealed AI's bias towards popular or dominant ideas, highlighting a need for careful integration of AI in decision-making to ensure it complements rather than compromises the diversity of societal choices. This research emphasizes incorporating varied human perspectives to maintain decision-making diversity with AI integration.
/web/2025/12-250623-4b

Fiber Optics Cables Could Help Detect Glacier Collapse

(RTS Info, July 04, 2025)

Fiber optic cables show promise for early warning systems in detecting natural disasters like landslides and glacier collapses. A team from Uva Wellassa University of Sri Lanka and ETH Zurich, led by Dr. Madhubhashitha Herath and Dr. Tom Hudson, found that these cables could significantly improve natural disaster surveillance. This innovation offers a cost-effective, easy-to-maintain method that complements satellite and radar technologies, enhancing monitoring capabilities. The researchers created an AI algorithm that detects early signs of geological movement, indicating possible landslides or glacier collapses. By installing fiber optic cables across unstable glaciers, they monitored surface and deep changes, enhancing prediction accuracy. This method marks a major advance in environmental monitoring, offering a scalable, efficient solution for disaster preparedness worldwide.
/web/2025/12-250704-48

13. Calls for Grants/Awards

MyNerva Wins Grand Prize with Revolutionary Diabetic Sock

(ETH Zurich, June 25, 2025)

MyNerva AG claimed the Grand Prize (CHF 150,000) and Health & Nutrition category at the 2025 Swiss Venture Awards for their breakthrough neuroprosthetic sock treating diabetic neuropathy. The startup joins five other innovative companies as finalists, with rrreefs winning Social & Environmental Impact with 3D-printed coral reef technology, and BTRY claiming Industrials & Engineering for temperature-resistant solid-state batteries. The second-place finishers showcased equally impressive innovations: Terensis (Finance & Insurance) with satellite-based crop monitoring, Chiral Nano AG (Industrials & Engineering) with precision nanomaterial integration, and DNAir (Social & Environmental Impact) with airborne DNA capture technology. These breakthrough technologies span healthcare, environmental restoration, energy storage, agriculture, semiconductor manufacturing, and biodiversity monitoring.
/web/2025/13-250625-00

A New Era in Earth Observation

(ETH Zurich, July 09, 2025)

A historic 100 million Swiss francs donation from the Jörg G. Bucherer Foundation will transform Earth observation at ETH Zurich. ETH Zurich has recently launched the ETH Swiss GeoLab, and it is now supported by the Jörg G. Bucherer Foundation and the Canton of Lucerne, where it will have a physical presence. This center aims to improve planet monitoring by analyzing data from satellites, drones, meteorological stations, and more. Led by Prof. Thomas H. Zurbuchen and Prof. Verena Griess, the ETH Swiss GeoLab will employ cutting edge techniques for large dataset analysis to improve natural disaster early warning systems, agricultural forecasts, and address both global and local issues through cutting-edge research and technology. With significant funding and infrastructure, the center will stand out by providing a comprehensive platform for global Earth monitoring.
/web/2025/13-250709-28

Upcoming Science and Technology Related Events

SpinQueST Conference
August 17-21
http://spinquest.ch/
Scientific, Research & Development
Congressi Stefano Franscini, Ascona

PSI-K Conference
August 25-28
https://sites.google.com/view/psik2025/
IT, Web & Electronic, AI, R&D
SwissTech Convention Center, Lausanne

.NET Day Switzerland
August 26
https://dotnetday.ch/
IT, Web & Electronic, AI
Arena Cinemas, Zürich

Epigenetic Inheritance Symposium
August 27-29
https://is.gd/I0lmkn
Life Sciences, Health Care & Medical, Scientific, Research & Development
ETH Zurich

Annual Conference of the International Society for Clinical Biostatistics
August 24-28
https://iscb2025.info/
Human Resources, Education & Training, Life Sciences, Biotechnology
Biozentrum University of Basel

ISREC-SCCL Symposium
September 1-4
https://isrec-sccl-symposium.epfl.ch/
Life Sciences, Healthcare, R&D
SwissTech Convention Center, Lausanne

Ilmac Conference
September 16-18
https://www.ilmac.ch/en/basel/
Chemicals, Physics & Molecular Sciences
Messe Basel

CISBAT International Scientific Conference
September 3-5
https://cisbat.epfl.ch/
Scientific, R&D
SwissTech Convention Center, Lausanne

Basel Computational Biology Conference
September 8-10
https://www.bc2.ch/
Physics & Molecular Sciences, AI
Congress Center Basel

Intelligent Health
September 9-10
https://indico.cern.ch/event/1258933/
Pharmaceutical & Biotechnology, AI
Congress Center Basel

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