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Science-Switzerland, August – September 2025

News on Swiss science, technology, education and innovation

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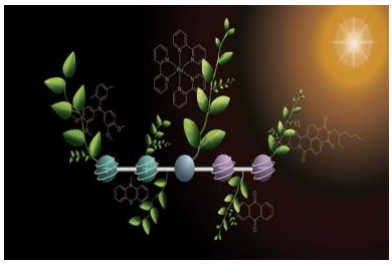
Breakthrough Blood Test Could Detect Brain Tumors with 90% Accuracy

(Swisstech, August 10, 2025)

A promising blood test aims to identify aggressive brain tumors with over 90% accuracy in initial research, and could mark a significant advance in cancer diagnosis and treatment. Currently being researched by Dr. Tobias Weiss and his team at the University Hospital Zurich and developed by spin-off company ZuriEV, this experimental test analyzes blood for extracellular vesicles (EVs) to potentially detect and monitor brain cancers without surgery. Early studies suggest it could enable earlier detection and ongoing tracking of cancers like glioblastomas, potentially improving survival rates. This research method isolates and examines extracellular vesicles in blood for tumour markers, including DNA, RNA, and proteins, offering what could become a non-invasive, efficient, and safer alternative to biopsies and traditional imaging. The University Hospital Zurich's research platform shows promise to outperform existing diagnostic methods in cost, safety, and accuracy, with plans to launch the first product in 2028.
/web/2025/00-250810-9f

Chemists Develop Molecule for Important Step Toward Artificial Photosynthesis

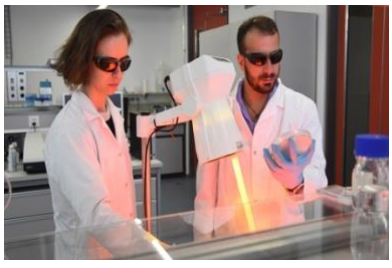
(University of Basel, August 26, 2025)



Researchers at the University of Basel, led by Professor Oliver Wenger and Dr. Mathis Brändlin, have created a molecule that stores four charges under light, similar to photosynthesis. This innovation could lead to sustainable energy sources like hydrogen and synthetic petrol, significantly lowering our carbon emissions. The team's method uses two light flashes to excite the molecule, mimicking natural sunlight's intensity. The first flash generates a pair of charges that move to the molecule's ends; a second flash replicates this, enabling efficient sunlight-to-chemical energy conversion. This marks a major step in artificial photosynthesis, offering a promising path to carbon-neutral fuels.
/web/2025/00-250826-47

Light-Activated Coating Ends Germs, Sparks Hope

(EMPA, September 19, 2025)



Researchers from Empa, the University of Zurich, the Center for Dental Medicine, and Czech Palacký University in Olomouc, led by Dr. Giacomo Reina and Dr. Peter Wick, have created a metal-free, light-activated coating that kills germs effectively. This green solution, made of polyvinyl alcohol and graphenic acid, uses near-infrared light to produce germ-killing heat and oxygen radicals. It offers a new way to fight antibiotic-resistant bacteria and viruses. The team embedded graphenic acid in a polyvinyl alcohol matrix. When exposed to near-infrared light, this combination kills microbes by heating and generating oxygen radicals. Tests show it works against various bacteria and viruses. This innovation could lead to dental splints that sterilize the oral cavity and transform surface disinfection in healthcare, preventing resistance buildup.
/web/2025/00-250919-37

1. Policy

An Urgent Need for a Clear Data Policy in Switzerland

(EPFL, September 08, 2025)

Switzerland's data, crucial for the digital economy, remains trapped in silos or is inaccessible due to interoperability issues, blocking the nation's growth and autonomy. Dr. Melanie Kolbe-Guyot and her team from Center for Digital Trust (C4DT), EPFL highlight the urgent need for a thorough data policy. Their research shows that current challenges prevent the full economic and social benefits of data, emphasizing the need for trustworthy data spaces for its responsible use and reuse, which is vital for sustaining long-term economic competitiveness. Comparing Switzerland's data management and sharing practices with the EU's cohesive data strategy, the C4DT team proposes a unified and interoperable data ecosystem for Switzerland. This approach aims to unlock new economic opportunities and boost digital self-determination.
/web/2025/01-250908-48

Single-Person Households: Key Target for Carbon Emissions Reduction

(EPFL, September 12, 2025)

Researchers at the Human-Environment Relations in Urban Systems (HERUS) Laboratory at EPFL, led by Ankita Singhvi, found that single-person households in Switzerland use the most energy and emit the most carbon per person. These households present an opportunity to cut emissions through better housing technology and social changes. This finding is key for achieving climate goals by 2050, highlighting the need for innovations in housing to both improve technology and change social practices. The team analyzed energy audits to measure the carbon emissions of buildings, considering both the emissions from daily use like heating and electricity, and those from building materials. They also looked at how people living near Lake Geneva think and act about the environment. Their detailed work shows single-person homes have the highest energy needs, indicating big opportunities for emission cuts through smart renovations and new housing policies.
/web/2025/01-250912-59

2. Education

The Swiss Embrace Science Amid Global Skepticism

(University of Zurich, September 23, 2025)

60% of Swiss people strongly believe in science, underlining Switzerland's strength as an innovation hub. Researchers from the University of Zurich, led by Prof. Dr. Mike S. Schäfer, found that the Swiss categorize their support for science into four groups: 'Sciencephiles,' 'critically interested,' 'passive supporters,' and 'disengaged.' This highlights Switzerland's innovative ethos and the value of respectful scientific debate without attacking researchers. The 2025 Science Barometer Switzerland survey, using a mix of online and paper questionnaires and involving 1,548 participants, sheds light on these attitudes. By leveraging census data and employing the split ballot method, the study pinpoints how to engage each group effectively, aiming to boost public support and involvement in science. The University of Zurich's work underscores the need to understand public views on science to nurture a culture that champions research and innovation.
/web/2025/02-250923-04

3. Life Science

Preterm Infants More Likely to Experience Delayed Language Development

(University of Zurich, August 01, 2025)

Researchers at the University of Zurich, led by Dr. Miriam Löffler, found that preterm infants have weaker language skills than full-term children in the first 18 months of life. This discovery highlights the need for early language development monitoring and targeted interventions during routine health check-ups to prevent delays. Parental involvement plays a crucial role in supporting early language growth. The team reviewed 21 studies across nine countries, involving over 1,800 children, to compare language comprehension and expression in preterm and full-term infants. Their analysis identified a critical period for early intervention that could significantly improve the language development of preterm infants. The University of Zurich's work stresses the importance of early detection and intervention, offering a chance to positively influence the developmental paths of preterm infants globally by ensuring they receive necessary support from the start.
/web/2025/03-250801-a9

Lab-Grown Beef Mimics Natural Counterpart

(ETH Zurich, August 03, 2025)

ETH Zurich researchers, led by Dr. Christine L. Trautmann, Dr. Adhideb Ghosh, and Associate Professor Dr. Ori Bar-Nur, have created a way to grow three-dimensional muscle tissue from cow cells. This tissue thickens into fibers that match natural cow muscle in structure and function. This breakthrough could make meat production more sustainable and ethical, offering an alternative to traditional livestock farming that lessens environmental harm. The team improved muscle fiber growth by introducing a mix of three molecules to the cell culture, a method Bar-Nur developed at Harvard. These molecules, essential for early cell dif-ferentiation, can later be removed, simplifying and reducing the cost of the process. By starting with cells from regular beef and refining the growth medium, the researchers have produced lab-grown beef that tastes, feels, and nourishes like the real thing. This achievement could lead to widespread, commercial production of lab-grown beef.
/web/2025/03-250803-c3

How DNA Packaging Controls a Key Tumor Suppressor

(EPFL, August 05, 2025)

Researchers from EPFL, the Friedrich Miescher Institute for Biomedical Research, and the University of Basel have made a groundbreaking discovery that challenges how we understand genetic information use by key proteins. Prof. Nicolas Thomä's team found that despite being tightly wrapped in nucleosomes, the key tumor suppressor ‘p53’ can still bind to DNA and interact with specific cofactors. This insight reveals a new control layer over the tumor suppressor protein p53, showing how nucleosomes determine which proteins can engage with it, thus influencing its cancer-preventing capabilities. Using cryo-electron microscopy, biochemical assays, and genome-wide mapping, the study showed how p53's interactions with cofactors on nucleosomal DNA affect the accessibility of USP7 and the viral E6-E6AP complex to p53. This breakthrough not only advances our understanding of DNA's physical structure and its role in molecular interactions, especially with p53, but also opens new doors in cancer research: it sets the stage for developing therapies that could either restore or manipulate p53 function, offering hope for new cancer treatments.
/web/2025/03-250805-f8

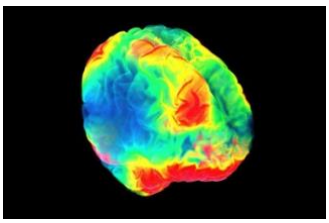
Organisms Can Produce Energy from Air

(University of Bern, August 07, 2025)

Researchers led by Sarah Soom, Prof. Christoph von Ballmoos, and Stefan Moning, have found that some organisms can survive on air, using hydrogen as their sole energy source. This discovery challenges existing views on biological energy sources and suggests new, sustainable energy pathways. An international team from the University of Bern, University of Otago, Queensland University of Technology, Monash University, and the University of Melbourne shows that life can adapt in extreme conditions and reevaluates atmospheric hydrogen's ecological role. The researchers built a synthetic model mimicking cellular respiration, embedding three key enzymes in an artificial lipid membrane. This model captures hydrogen from the air, converting it into ATP, cells' vital energy molecule, through a series of enzymatic reactions.
/web/2025/03-250807-91

Does Neurotechnology Threaten our Mental Privacy?

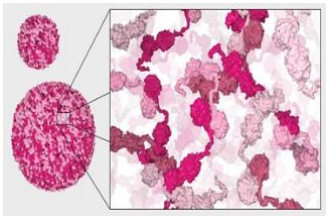
(EPFL, August 11, 2025)



The idea that businesses or criminals could access and manipulate our most personal data, thoughts, moods, and memories, through neurotechnology, represents an unprecedented threat. Dr. Marcello Ienca and his team from the Technical University of Munich and EPFL are exploring the double-edged sword of neurotechnology, including neural interfaces and brain-computer interfaces. These technologies could revolutionize patient care by restoring lost functions but also pose serious risks to mental privacy and could be exploited for non-therapeutic purposes. They are researching the development and implications of advanced neurotechnologies, like portable EEG machines and brain implants from companies such as Neuralink.
/web/2025/03-250811-7d

Discovery of Previously Unknown ‘Folding Factories’ for Proteins

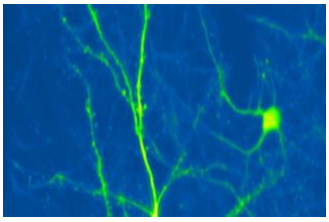
(University of Basel, August 14, 2025)



Researchers at the University of Basel, led by Anna Ladina Leder, Prof. Anne Spang, and Prof. Sebastian Hiller, have discovered ‘folding factories’ inside cells, revolutionizing our understanding of protein folding. They have discovered that specific folding assistants known as chaperones in cells form into droplet-like condensates that carry on the work of protein folding. The research started with genetic diseases linked to mutations in the chaperone PDIA6. This discovery shifts our understanding of how cells manage proteins, and could provide new ways to tackle diseases caused by protein misfolding, such as diabetes and neuro-degenerative disorders.
/web/2025/03-250814-06

The Brain Shapes What We Feel in Real Time

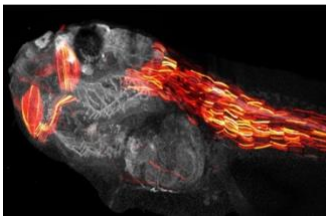
(University of Geneva, August 20, 2025)



Researchers Dr. Ronan Chereau and Prof. Dr. Anthony Holtmaat from the University of Geneva have discovered a brain mechanism that changes how we process sensory signals, shedding light on why the same stimulus can seem different at times. This mechanism, involving thalamic projections to the somatosensory cortex, affects neuron excitability in the cortex, influencing our sensory perception threshold. The team used imaging, optogenetics, pharmacology, and electrophysiology to study the electrical activity of dendrites and the synaptic mechanism. They found that thalamic projections adjust cortical neuron activity by targeting an alternative receptor with glutamate, priming neurons for future sensory input without exciting them.
/web/2025/03-250820-dc

AI Meets CRISPR for Precise Gene Editing

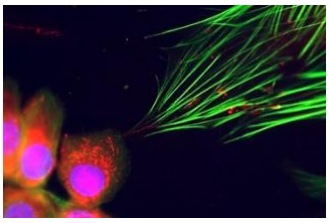
(University of Zurich, August 21, 2025)



Researchers from the University of Zurich, Ghent University, and ETH Zurich, led by Dr. Thomas Naert and Prof. Dr. Soeren Lienkamp, have introduced a new AI-based method for genome editing that boosts precision. Their method, Pythia, improves gene therapy safety by using AI to predict how cells repair DNA after CRISPR/Cas9 edits and guides the repair with carefully designed templates. This method could enable new advancements in gene therapies, especially for genetic disorders in non-dividing brain cells. The team developed Pythia with advanced AI algorithms to create DNA repair templates, with the aim to ensure exact genetic modifications.
/web/2025/03-250821-91

Cancer Cells Hijack Neighbors to Aid Their Growth

(ETH Zurich, September 09, 2025)



Cancer cells boost their growth by transferring mitochondria to healthy neighboring cells, essentially recruiting them to support the cancer. Dr. Michael Cangkrama's team at ETH Zurich found that cancer cells reprogram connective tissue cells to aid their proliferation by donating mitochondria. This discovery could lead to new cancer treatment strategies, focusing on stopping this mitochondrial transfer to curb cancer growth. Using fluorescence microscopy, researchers directly observed cancer cells passing mitochondria to connective tissue cells, unveiling a previously unknown cancer cell communication method. This insight paves the way for therapies that block this transfer, offering a new avenue to combat cancer.
/web/2025/03-250909-ea

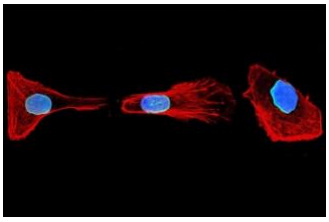
Gene of Rare Disease Controls Post-Injury Gut Regeneration

(EPFL, September 10, 2025)

A breakthrough from the EPFL reveals a gene essential for gut stem cell repair after injury. Professor Gisou van der Goot and her team found that the gene, CMG2, is crucial for the pathway called ‘Wnt signaling pathway’ which aids stem cell regeneration in the gut. This discovery sheds light on Hyaline Fibromatosis Syndrome (HFS) and suggests new treatments for intestinal diseases like inflammatory bowel disease by boosting the body's repair processes. Using a mouse model lacking CMG2 and subjected to gut injury, the team showed how this genetic flaw impairs stem cell renewal. By inducing colitis in mice, they traced the problem to a breakdown in Wnt signaling, specifically the activation failure of β-catenin, which is vital for gene activation.
/web/2025/03-250910-4b

Cells Navigate Tight Spaces with 'Memory'

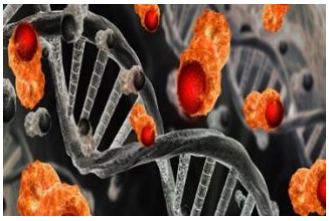
(University of Basel, September 10, 2025)



Cells 'remember' past movements through tight spaces, improving their efficiency in future navigations. This ability aids healing and may accelerate cancer metastasis. Yohalie Kalukula, Prof. Dr. David Brückner, and Prof. Dr. Sylvain GABRIELE's team at the University of Mons and the Biozentrum, University of Basel found that migrating cells retain a mechanical memory. This memory allows them to recall the shape they assumed in narrow spaces, enhancing our understanding of cell movement in complex tissues and its effects on wound healing, immune defense, and cancer spread. The researchers observed cells on dumbbell-shaped micropatterns on a chip, mimicking tight tissue spaces. This method, alongside David Brückner's mathematical model, uncovered the dynamics of cell migration and shape change in confined spaces.
/web/2025/03-250910-8c

Blood cancers: Predicting the Success of Cell Transplants

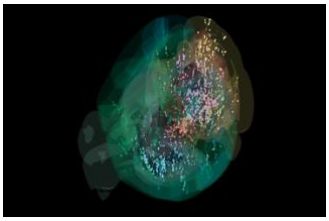
(University of Geneva, September 10, 2025)



Nearly half of all blood stem cell transplants in Switzerland fail because of genetic mismatches. Dr. Antonia Schäfer and her team at the University of Geneva (UNIGE) and Geneva University Hospitals (HUG), in partnership with Swiss transplant centers, have discovered the KIR gene system's crucial role in boosting transplant success for blood cancer patients. By matching donors and patients based on genetic compatibility, this breakthrough can greatly improve patient survival and reduce treatment failure rates. The researchers analyzed the KIR genes in 1,247 donor-recipient pairs, studying how their interactions affect survival, disease progression, and the risk of graft-versus-host disease.
/web/2025/03-250910-ae

The Complete Brain Map of our Decision-making Process

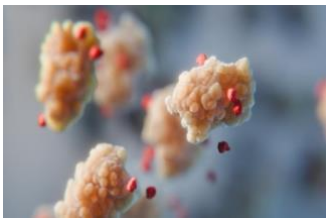
(University of Geneva, September 16, 2025)



Contrary to the long-held belief of a hierarchical decision-making process in the brain, a new study shows that our brains operate more democratically. Signals for decision-making and expectations of future events spread across the entire brain, not just in specific areas. This finding, by researchers at the University of Geneva and the International Brain Laboratory (IBL), led by Dr. Kenneth Harris and Prof. Alexandre Pouget, challenges traditional views of brain functionality and could greatly influence the understanding and treatment of neuropsychiatric disorders, where these processes often falter. In a collaborative effort spanning 21 laboratories, the teams recorded activity from over 650,000 neurons in 279 brain areas, covering 95% of a mouse's brain volume.
/web/2025/03-250916-16

Scientists Uncover Key Stabilizing Role of Small Molecule

(EPFL, September 16, 2025)



Amino acids, often dubbed the ‘anti-salt,’ play a crucial role in stabilizing proteins and colloids in solutions, debunking previous beliefs. Researchers led by Dr. Ting Mao from EPFL, MIT, and the Southern University of Science and Technology have discovered that amino acids and other small molecules significantly stabilize larger particles in solution. This finding challenges the old view that amino acids mainly prevent protein misfolding, instead underscoring their broad role in solution stability. This breakthrough opens new possibilities in biomedical research and pharmaceutical development. The team used both theoretical and experimental approaches to explore how amino acids interact with proteins and colloids under various conditions, revealing a stabilizing mechanism.
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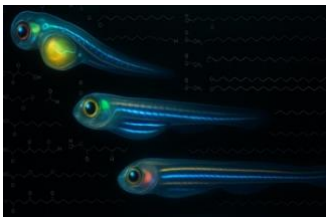
Mapping the Lipid Blueprint of Life in 4D

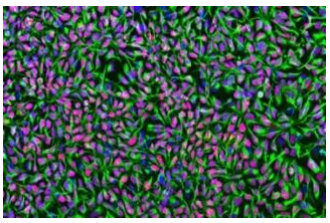
(EPFL, September 16, 2025)



Researchers at EPFL, led by Prof. Dr. Gioele La Manno, Giovanni D’Angelo, and Prof. Andrew Oates, have created the first 4D lipid map of vertebrate development, uncovering how lipids shape our bodies from the embryo stage. This map shows that specific lipids gather in different developing organs like the swim bladder, brain, and bones, highlighting their crucial roles in organ function and development. Using a new computational method and imaging mass spectrometry, the team tracked over 100 lipid types through space and time in a zebrafish embryo.
/web/2025/03-250916-11

Stem Cells Repair Mouse Brains After Stroke

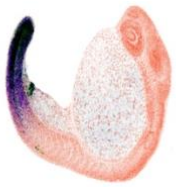
(University of Zurich, September 18, 2025)



Researchers from the University of Zurich's IREM lab and Kyoto University's CiRA lab, led by Dr. Christian Tackenberg and Dr. Rebecca Zoe Weber, have found that stem cell transplantation can significantly reverse stroke damage in mice. This study demonstrates neuron regeneration, motor function restoration, new blood vessel formation, reduced inflammation, and stronger blood-brain barriers, offering new treatment paths for brain disorders. The team injected human neural stem cells into mice brains after strokes, and tracked recovery for five weeks. They turned stem cells into neurons that merged with brain circuits. Using AI, they tracked mouse movement improvements and developed a new way to make stem cells without animal products.
/web/2025/03-250918-b7

From Fish Cloaca to Terrestrial Digits: The Origin of our Digits

(University of Geneva, September 19, 2025)



Digits in terrestrial vertebrates, including humans, likely evolved from a fish organ related to excretion and reproduction. Dr. Denis Duboule, Dr. Aurélie Hintermann and their team from the University of Geneva, EPFL, and other institutions discovered that this evolution might stem from repurposing ancient genomic regions. This finding challenges traditional views on limb evolution by highlighting nature's strategy of recycling genetic mechanisms for new functions, offering insights into its adaptability. The team compared genomes between mice and fish, identifying a key regulatory area essential for mouse digit development. Using CRISPR/Cas9 to remove this DNA segment in fish led to lost gene expression in the cloaca but not the fins.
/web/2025/03-250919-37

New Fusion Protein Boosts Cancer Therapy

(University of Basel, September 19, 2025)

A breakthrough in cancer treatment has emerged from the collaboration of the University of Basel, University Hospital Basel, and their partners. Led by Prof. Alfred ZIppelius, Irene Fusi, and Dr. Clara Serger, the team has developed a fusion protein that combines two powerful immunotherapy strategies. This protein prevents cancer cells from sending ‘do not attack’ signals and activates immune cells that target tumors, avoiding the activation of cells that suppress the immune response and rejuvenating tired immune cells. This innovation marks a significant advance in cancer therapy, aiming to improve treatment effectiveness while reducing side effects.
/web/2025/03-250919-17

Astrocytes: The Unexpected Conductors of Brain Networks

(University of Geneva, September 29, 2025)

Nearly half of the brain's cells are glial, with astrocytes proving to be key players in signal integration across neural circuits, overturning previous notions of their brain function. Andrea Volterra, Karin Pernet-Gallay, and their teams from the University of Lausanne, University of Geneva, Grenoble Institute of Neuroscience, and Wyss Center have found that astrocytes actively contribute to brain processes such as memory, emotions, and decision-making. Using advanced imaging techniques like nanoscopic resolution volumetric electron microscopy and a new optical method, the researchers observed calcium changes in astrocytes' leaflets in their natural setting.
/web/2025/03-250929-bd

4. Nano / Micro Technology / Material Science

Ultra-Thin Sound Absorbers Revolutionize Noise Control

(EMPA, August 06, 2025)

Empa researchers, collaborating with de Cavis AG under the leadership of Dr. Bart Van Damme, have created ultra-thin sound absorbers from mineral gypsum or cement foams. These absorbers challenge the norm by being four times thinner than traditional materials while maintaining high noise reduction efficiency. They are customizable for various frequencies, fireproof, recyclable, and weatherproof, making them ideal for both indoor and outdoor applications. This innovation offers a space-saving, eco-friendly solution to noise pollution, especially beneficial in urban areas where space is precious. The team engineered mineral foams with complex pore structures, forcing air to take longer paths, thus better absorbing sound without the bulk. They supported their design with a numerical model that predicts acoustic behavior, enabling customization of pore size, perforation, and layer structure to effectively target specific noise frequencies. Tested on a Zurich driveway, these absorbers mark a significant leap in noise control technology, blending seamlessly into architectural designs and setting a new industry standard by combining environmental sustainability with advanced science.
/web/2025/04-250806-35

Revolutionizing Molecular Imaging with Single-Photon Precision

(EPFL, August 09, 2025)

Unlike traditional imaging techniques, a new method detects an unprecedented number of molecules quickly, reducing the process time from hours to under a minute. A team led by Prof. Aleksandra Radenovic, Nathan Ronceray, Prof. Edoardo Charbon, Prof. Matteo Dal Peraro, and Prof. Guillermo Acuna from EPFL and the University of Fribourg, managed to simultaneously characterizes thousands of molecules with picosecond precision, enabling swift analysis of large protein samples and dynamic molecular studies. The method captures image series of molecules after an excitation pulse and a few nanoseconds later, using a SPAD camera equipped with nearly a million sensors that can detect a single photon to determine the molecule's fluorescence lifetime. This precision uncovers molecules' unique light signatures, marking a significant advancement in molecular imaging. This innovation allows for detailed molecular dynamics studies in large samples, potentially transforming our understanding of biological systems at the molecular level.
/web/2025/04-250809-44

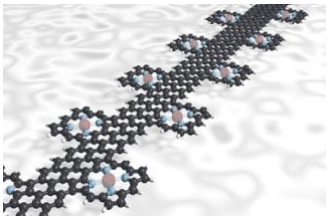
Machine Learning Reveals the Mysteries of Thin Films at Atomic Scale

(EMPA, August 18, 2025)

Researchers Dr. Simon Gramatte, Dr. Vladyslav Turlo, Dr. Claudia Cancellieri, and Dr. Ivo Utke from Empa have unlocked how to simulate amorphous aluminum oxide with hydrogen inclusions at the atomic level. Their findings show that high hydrogen levels can alter the material's density by attaching to oxygen, changing the chemical states of nearby elements. The team combined experimental data, high-performance simulations, and machine learning to map amorphous alumina's chaotic structure. Using Empa's innovative spectroscopy method called HAXPES for chemical analysis and integrating these insights into simulations, they shed light on hydrogen's distribution within the material. This method not only speeds up the study of complex materials but also paves the way for improving amorphous alumina's use in protective coatings, electronics, and green hydrogen production.
/web/2025/04-250818-9f

Quantum Leap in Molecular Electronics

(EMPA, August 25, 2025)



Empa researchers have created a precisely engineered molecular chain by binding organic porphyrin molecules with functional metal centers to a graphene nanoribbon. Led by Dr. Feifei Xiang at Empa, and the Max Planck Institute for Polymer Research, this work marks a milestone in precision molecular design and could lead to breakthroughs in molecular electronics and quantum technologies. The team's success in attaching porphyrin molecules to graphene creates a magnetically and electronically unified hybrid system, setting a new standard for molecular manipulation toward advanced uses. The team synthesized a one-nanometer-wide graphene ribbon with zigzag edges to act as a molecular wire, then systematically attached porphyrin molecules along it, alternating sides. Verified by advanced microscopy, this method involved heating precursor molecules on a gold surface under extreme vacuum to form long, atomically precise chains. This advancement could lead to sophisticated chemical sensors and quantum computing components, revolutionizing data storage, processing, and sensing.
/web/2025/04-250825-08

Physicists Create Smart Material for Energy Harvesting and Self-Powered Electronics

(University of Fribourg, September 22, 2025)

Dr. Subhrangsu Sarkar and his team at the University of Fribourg have developed a material that converts ambient electromagnetic noise into electric signals and currents, capable of powering devices without conventional power sources. This presents a major advancement in sustainable and autonomous energy, particularly in areas lacking traditional power. The researchers created thin-film multilayers from superconducting cuprates and magnetic manganites. When cooled below 120 kelvin, these materials spontaneously generate a direct-current voltage that can power an external circuit, turning omnipresent electromagnetic noise into a steady power source. This innovation offers new research possibilities in self-powered sensors, memory units, and energy-harvesting devices operable in moderate cryogenic conditions, with potential applications in space exploration, quantum computing, and more.
/web/2025/04-250922-31

5. Information & Communications Technology

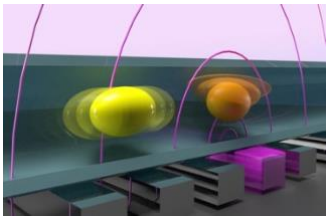
A Hybrid Photonic-terahertz Chip for Communications and Sensing

(EPFL, August 12, 2025)

Researchers from EPFL and Harvard University Prof. Cristina Benea-Chelmus, Dr. Yazan Lampert and Dr. Amirhassan Shams-Ansari have developed a chip that significantly enhances terahertz (THz) electric fields by over 100 times and increases bandwidth by five times. This compact, power-efficient chip opens doors to ultrafast 6G communications, improving sensing, ranging, and enabling advanced computing and spectroscopy. The team combined micron-sized transmission lines for THz waves with optical waveguides on a lithium niobate photonic chip. This integration boosts the interaction and energy-efficient conversion between THz and optical waves. Their innovative dual-waveguide system not only advances photonic and terahertz circuit integration but also promises new opportunities in telecommunications, security scanning, and more by focusing on reducing energy loss and maximizing field strength and bandwidth.
/web/2025/05-250812-2e

A Smart Accelerator for Qubits

(University of Basel, August 19, 2025)



By adjusting energy levels in a nanowire, University of Basel researchers, in collaboration with NCCR SPIN, University of Oxford, and Eindhoven University of Technology, have broken the long-standing trade-off between qubit speed and coherence. This achievement, led by Dr. Miguel J. Carballido and Professor Dominik Zumbühl, uses electric fields to significantly enhance both the speed and coherence time of a spin qubit in a germanium nanowire, which could lead to more powerful quantum computers. The team removed a single electron from a low or higher energy level of the nanowire to manipulate a 'hole' within it, leveraging spin-orbit coupling. This method finely tunes the qubit's speed and its ability to resist environmental noise, resulting in quicker and more dependable quantum computations.
/web/2025/05-250819-35

AI Outsmarts Humans in Spotting Propaganda on Telegram

(EPFL, August 25, 2025)

The fight against digital propaganda has advanced significantly. A team led by Dr. Klim Kireev at EPFL, with partners from the Max Planck Institute for Security and Privacy and Ruhr University Bochum, created a method that spots propaganda on Telegram with 97.6% accuracy, surpassing human capabilities by 11.6%. Analyzing 13.7 million comments from 13 political and news Telegram chan-nels, the researchers developed an automated system that spots propaganda by identifying accounts that reply to comments with specific keywords, using identical messages across different platforms.
/web/2025/05-250825-d2

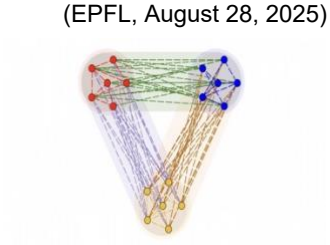
AI Can Detect Colorectal Cancer Using Gut Bacteria

(University of Geneva, August 27, 2025)

Researchers at the University of Geneva and Geneva University Hospitals, led by Dr. Mirko Trajkovski and Dr. Matija Trickovic, have developed a revolutionary non-invasive method for colorectal cancer screening. By analyzing gut microbiota in stool samples with machine learning, they achieve a 90% detection rate, nearly equal to colonoscopies at 94%. This method surpasses all other non-invasive tests, offering a simpler, more accessible early screening option to improve treatment success and save lives. The team created a detailed catalogue of human gut microbiota subspecies and combined it with clinical data to accurately predict the presence of colorectal cancer.
/web/2025/05-250827-e8

A New Way to Read Network Flows

(EPFL, August 28, 2025)



Researchers at EPFL and the University of Geneva, led by Alexandre Cionca, have developed a new algorithm that reveals pairs of communities within networks, which they call bicommunities. This method shows not just connections but also the direction of influence, marking a significant leap in analyzing complex systems from the human brain to urban traffic. Unlike traditional clustering that focuses on nodes, this edge-based approach identifies communities based on the direction of their interactions, enabling a deeper understanding of information flow. This innovation could transform our approach to network analysis across various fields, from neuroscience to social media and traffic management.
/web/2025/05-250828-13

Digital Mouse Brain Model Mimics Real Wiring

(EPFL, September 01, 2025)

For the first time, a team has created a digital mouse brain model with wiring that mirrors real brain connections, opening new paths for exploring how the brain functions. Researchers Prof. Dr. Remy Petkantchin, Dr. Lida Kanari, and their team from EPFL, Southeast University, and Shanghai Academy of Natural Sciences have devised a method to produce brain-wide connection maps that closely resemble the mouse brain's actual wiring. The team analyzed vast datasets of 'axonal reconstructions' and used machine learning to categorize neurons by their wiring patterns. They then applied a computational method to create synthetic axons that replicate the branching and connections of real neurons in different brain areas. This innovation brings us closer to extensive brain simulations and informs future neuroscience research, potentially ushering in new treatments for neurological disorders. EPFL's method, merging cutting-edge machine learning with detailed mathematical modeling, also presents an innovative approach to mapping the brain's elaborate networks.
/web/2025/05-250901-5d

Apertus: Switzerland's First Fully Open Large Language Model

(EPFL, September 03, 2025)

Apertus has just been released to the public and emerges as Switzerland's first comprehensive, open, multilingual language model, spotlighting previously underrepresented languages such as Swiss German and Romansh. This achievement was made by Prof. Dr. Martin Jaggi, Dr. Imanol Schlag, and their team from ETH Zurich, EPFL, and the Swiss National Supercomputing Centre (CSCS). The team invested over 10 million GPU hours on the 'Alps' supercomputer and secured funding from the ETH Board to train Apertus on 15 trillion tokens from over 1,000 languages, emphasizing non-English content. This extensive training ensures that Apertus excels in multilingual support, and could become a crucial tool for innovation across the economy, research, society, and industry. As a rare open large language model, Apertus stands out for its commitment to multilingualism, transparency, and ethical standards, offering a new model for inclusive and sovereign AI technology development.
/web/2025/05-250903-70

Transforming Cancer Care with AI

(EPFL, September 18, 2025)

Researchers at Geneva University Hospitals and EPFL, led by Dr. Dorina Thanou, have launched NAIPO (National AI Initiative for Precision Oncology), a new AI project in cancer care. This project merges clinical support agents, language models for records analysis, and predictive models for treatment outcomes with experimental models and patient avatars to customize treatments for individual patients. This method aims to transform cancer care in Switzerland by providing equal access to advanced AI-supported treatments, speeding up new treatment discoveries, and promoting sustainable healthcare innovations. NAIPO will use top-notch data governance and AI to improve diagnostics, tailor treatment plans, and aid clinical decisions without centralizing sensitive health information. It will rely on a shared data platform, adaptable models, and easy-to-use clinical interfaces and patient applications. NAIPO aims to lessen healthcare inequalities, accelerate the discovery of new biomarkers and treatments, and place Switzerland at the forefront of medical AI innovation. This initiative could not only change cancer care but also exemplifies how to apply similar AI strategies in other healthcare areas.
/web/2025/05-250918-88

6. Energy / Environment

Climate Warming Disrupts the Interaction Between Plants and Soil Microorganisms

(University of Bern, August 19, 2025)

Climate warming is gradually disrupting the seasonal rhythm between plants and micro-organisms, a crucial aspect of ecosystem health. Researchers, led by Prof. Dr. Hao Wang and Prof. Dr. Madhav P. Thakur from the University of Bern, along with teams from Lanzhou University and East China Normal University, found that soil microorganisms adjust their seasonal activities more than plants do in response to climate warming. This mismatch threatens vital ecosystem functions, like carbon storage and nutrient recycling, and could compromise ecosystem stability and resilience. Analyzing around 1,000 global studies, the team showed how plants and soil microorganisms react differently to climate change, highlighting a significant gap in our understanding of ecosystem behavior. Their work suggests that recognizing these desynchronized patterns is key to developing conservation strategies that could lessen climate warming's negative impact on ecosystem services.
/web/2025/06-250819-2f

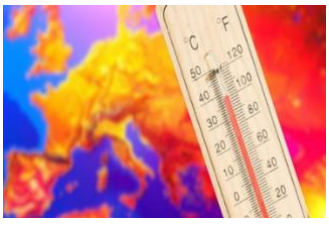
Optimizing Electric Car Charging for Climate and Wallet

(EMPA, September 11, 2025)

Charging electric cars in a climate-friendly way can slash emissions by up to 82 percent, highlighting the huge potential for environmental improvement through better charging strategies. Dr. Elliot Romano, Dr. Binod Koirala, Dr. Martin Rüdisüli, Dr. Sven Eggimann, and their team from Empa and the University of Geneva discovered that charging electric cars at low costs and with minimal CO_2 emissions is tough. Yet, with real-time data on electricity prices and emissions and effective incentives, charging can benefit both the planet and drivers' wallets. This promises substantial savings and emission cuts, enhancing the sustainability and affordability of electric vehicle use. The team analyzed data from 1.5 million users of Mobility's car-sharing service, focusing on the impact of emission-dependent charging strategies. Through simulations, they showed that CO_2 pricing and dynamic tariffs can significantly alter charging behavior. Smart charging strategies, combined with car sharing, can greatly reduce both costs and environmental damage.
/web/2025/06-250911-b7

Key Contributors to Global Heatwaves Identified

(ETH Zurich, September 11, 2025)



Only 14 out of 180 major fuel and cement producers emit enough greenhouse gases to contribute to more than 50 heatwaves globally, previously nearly impossible without climate change. A team from ETH Zurich, led by Professor Sonia I. Seneviratne and Dr. Yann Quilcaille, has linked emissions from the largest fossil fuel and cement producers to over 200 global heatwaves between 2000 and 2023. This study is a first in systematically connecting specific corporations and countries to climate-induced extreme weather, highlighting the urgent need for climate policy reform and corporate responsibility. Using attribution studies, the researchers precisely mapped how different factors contribute to climate change or specific events. Their method analyzed extreme weather events together, showing how individual entities, such as nations or corporations, are directly responsible for the frequency and severity of heatwaves. This work by ETH Zurich not only exposes the disproportionate impact of major carbon emitters but also supports the enforcement of the ‘polluter pays’ principle in legal frameworks.
/web/2025/06-250911-b6

Ocean CO2 Absorption Dips Amid Heatwave

(ETH Zurich, September 11, 2025)

Amid an unprecedented marine heatwave, the ocean's capacity to absorb CO2 fell by ten percent, equivalent to losing nearly half a billion tonnes of CO2 absorption capacity. Dr. Jens Daniel Müller and his team at ETH Zurich found a significant drop in the ocean's ability to capture carbon dioxide, crucial for regulating Earth's climate. This discovery reveals the severe impact marine heatwaves can have on the global carbon balance, challenging earlier beliefs about the ocean's ability to counter climate change. Using global oceanic CO2 measurements, the study examined the effects of extreme temperatures on the ocean's CO2 sink two years ago. This research shows that marine heatwaves can greatly diminish the ocean's role in climate change mitigation. The findings from ETH Zurich stress the immediate need to understand and counteract impacts of marine heatwaves on the carbon cycle, urging a rethink of strategies for climate resilience and sustainability.
/web/2025/06-250911-9b

A Decade to Define Our Climate Future

(Paul Scherrer Institute, September 17, 2025)

Achieving net-zero emissions by 2050 demands adaptability and scalable strategies, not a perfect plan. Researchers, led by Evangelos Panos and team from the Paul Scherrer Institut, Swiss Federal Office of Energy, and University of Piraeus, stress the next ten years are crucial for ditching fossil fuels in favor of clean alternatives like expanding district heating, tripling solar capacity, and moving to electric vehicles. This shift is vital for Switzerland to hit its net-zero target, urging immediate action and a mix of strong national efforts and European collaboration. The POLIZERO project's findings, based on model analyses, spotlight the growth of renewables, decreased energy imports via wind and bioenergy, synthetic fuel production, and CO2 capture as key. It also underlines the significance of emissions trading, regulatory frameworks, and the balance between national measures and EU cooperation. This research paves the way for strategic energy transition planning, crucial for climate change mitigation, aligning with the EU Green Deal's goals.
/web/2025/06-250917-af

7. Engineering / Robotics / Space

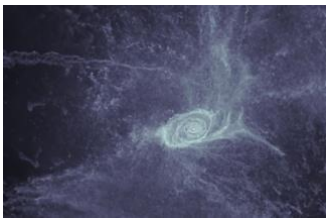
Studying Collective Bee Behavior Thanks to Robotics

(EPFL, August 02, 2025)

Researchers at EPFL, led by Cyril Monette, have introduced a revolutionary thermal robotic beehive frame that observes honeybee behavior without disturbing their natural environment. This technology sheds light on the bees' social structures and honey storage practices, offering valuable insights for bee conservation and education. The frame, a creation of the MOBOTS group at EPFL's School of Engineering, features 64 temperature sensors in 10 regions, each capable of independent heating. By applying heat pulses and measuring the thermal response of honeycomb, scientists can accurately assess honey quantities, enabling them to study bee behavior under almost natural conditions. This innovation not only advances our understanding of bees but also highlights new ways for environmental monitoring and protection.
/web/2025/07-250802-45

Watching How Stars Form with Advanced Simulations

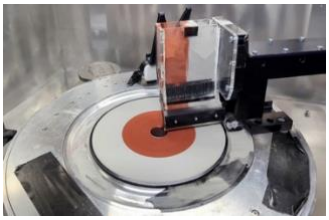
(University of Zurich, August 21, 2025)



The cosmos reveals its earliest secrets through the work of University of Zurich researchers, led by Prof. Lucio Mayer and Ravit Helled. They are uncovering the formation processes of the universe's first galaxies, stars, and planets using advanced computer simulations and data from the James Webb Space Telescope. By combining state-of-the-art computer simulations with artificial intelligence, the team, in collaboration with the Swiss Data Science Center, analyses celestial body formation and evolution. Validated by the James Webb Space Telescope data, these simulations expose the intricate dynamics of galaxy and star formation, and allows astronomers to simulate and explore the universe's earliest formations with unmatched precision. The University of Zurich's innovative integration of AI into astrophysics research also offers a fresh approach to this field.
/web/2025/07-250821-6f

Students Develop New Multi-metal 3D Printing Process

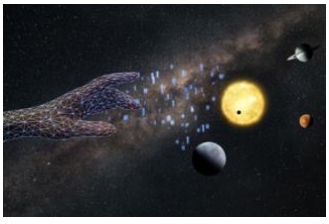
(ETH Zurich, September 05, 2025)



Prof. Dr. Markus Bambach and Michael Tucker, PhD from ETH Zurich have developed a new multi-metal 3D printing process by simplifying deposit and fusing into a single step, which drastically reduces manufacturing times and opens opportunities in aerospace and other sectors. It uniquely allows the creation of custom, intricate parts with various metals at once, overcoming the limitations of traditional methods. This breakthrough could redefine manufacturing efficiency and standards. The team tackled major hurdles, such as aligning the laser scanning with the gas inlet and powder supply rotations. Their ingenious solutions included a rotatable gas inlet connection and an automatic powder refill system, enabling the fast production of customized aerospace parts. This innovation could significantly cut production times, offering the aerospace industry more flexible and efficient manufacturing options.
/web/2025/07-250905-3f

AI Reveals the Secrets of Planetary Systems

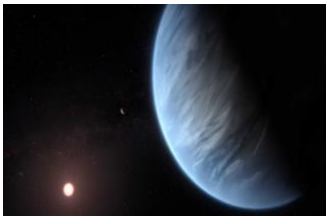
(University of Bern, September 12, 2025)



Researchers from the University of Bern and partners have created an AI that quickly predicts the layouts of planetary systems, greatly helping to uncover new planets. This AI, developed by Prof. Yann Alibert, Dr. Sara Marques, and Dr. Jeanne Davoult, speeds up the process a million-fold compared to old methods, saving observation time and boosting the odds of finding Earth-like planets. It uses the Transformer architecture, similar to that in advanced language models, to anticipate planet sequences from initial properties, enhancing target selection for planet observation and advancing our grasp of planet formation. This method, fueled by tens of thousands of simulations, not only streamlines the search for habitable worlds but also redefines our approach to studying the cosmos. By merging AI technology with astronomical expertise, the University of Bern's team opens new pathways in the quest to decode the universe's secrets, offering a smarter way to pinpoint potential Earth-like planets and understand planetary system formation.
/web/2025/07-250912-01

Earth's Uniqueness Challenged by New Planetary Study

(ETH Zurich, September 19, 2025)



Researchers challenge the long-held belief that Earth is unique in the universe. A team from ETH Zurich, Max Planck Institute for Astronomy, and the University of California, led by Aaron Werlen and Prof. Caroline Dorn, shows that sub-Neptunes, planets larger than Earth but smaller than Neptune, are not the watery worlds we once thought. This finding shifts the focus of the search for extraterrestrial life, suggesting that life-supporting conditions may be less common than we believed. Using advanced computer simulations, the team analyzed the chemical makeup of 248 model planets, revising our understanding of planetary water content. Their work combines a planetary evolution model with a new model for chemical interactions between gases and magma, highlighting that smaller, Earth-like planets may be more conducive to life than larger, drier sub-Neptunes.
/web/2025/07-250919-19

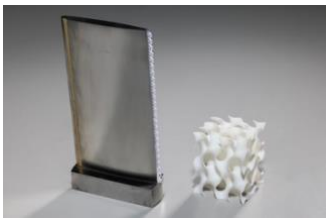
Revolutionizing Railway Bridges with Carbon Fiber

(EMPA, September 19, 2025)

The construction of the Oder Bridge has revolutionized engineering and sustainability by cutting CO2 emissions by 20%, marking a major step towards greener infrastructure. Researchers from Empa and Carbo-Link AG, led by Prof. Dr. Giovanni Terrasi and Andreas Steiner, introduced the world's first use of carbon fiber reinforced polymers (CFRP) as tension members in a railway bridge. This innovation boosts material efficiency and cuts the environmental impact of bridge building, winning the project two prestigious awards: the British Bridges International Award and the German Bridge Construction Prize.
/web/2025/07-250919-74

Device Drastically Reduces the Vibration from Rotating Parts

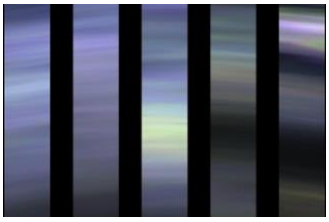
(EPFL, September 22, 2025)



Researchers at EPFL, led by Thomas Berger and Dr. farhat Mohamed, have created a gyroid structure that stops destructive vortex formation in fluids, overcoming a decades-old engineering challenge. This 3D-printed device dampens the vibrations caused by rotating parts such as boat propellers, turbines, and hydraulic pumps, enhancing machinery design and operation. The team tested various shapes and materials using 3D printing and settled on the gyroid, a structure known for its curved surfaces, porosity, and strength, that can effectively prevent vortices when attached to a steel blade in a wind tunnel.
/web/2025/07-250922-15

Mars's Atmospheric Layers Revealed

(University of Bern, September 23, 2025)



For the first time, researchers have obtained images of Mars's atmosphere with a clarity of 18 meters per pixel, revealing its complex layered structure. Prof. Dr. Nicolas Thomas and his team from the University of Bern have captured these layers; they are filled with clouds and dust, span altitudes from 15 to 55km. Using the Color and Stereo Surface Imaging System (CaSSIS) on the ESA's ExoMars Trace Gas Orbiter, the team captured a sequence of five vertical images. Each image, 3.6 km wide and spaced 200 km apart, was taken in Mars's shadow with the sun backlighting dust at dusk. This allowed the researchers to measure particle sizes at different altitudes, revealing that particles get smaller at higher elevations.
/web/2025/07-250923-ae

Analyzing Motorway Bridges with Technology from Mars

(ETH Zurich, September 24, 2025)

Originally designed for Mars exploration, a technology now ensures vital infrastructure safety on Earth, even revealing a hidden corridor in the Great Pyramid of Egypt. Christian Boehm, Michael Afanasiev, and Lion Krischer, with teams from ETH Zurich and the European Space Agency Business Incubation Center Switzerland, have repurposed Martian tech to examine structures like bridges, pipelines, and aircraft components without damaging them. This breakthrough method improves the safety and reliability of essential services. The technology employs waves, similar to those from earthquakes or ultrasounds, to probe objects. Sensors measure how these waves change as they pass through, comparing the data with a digital twin that mimics the object's exact features to identify issues like cracks or defects.
/web/2025/07-250924-0c

Witnessing the Formation of Moons

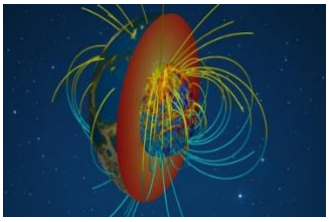
(University of Zurich, September 30, 2025)

For the first time, using NASA's James Webb Space Telescope, scientists have directly measured the chemical and physical properties of a potential moon-forming disk around a large exoplanet, revealing a carbon-rich chemistry that contrasts sharply with its star's disk, offering new insights into how moons and planets form. Researchers from the University of Zurich, the National Center of Competence in Research PlanetS of the Swiss National Science Foundation, and the Observatories of The Carnegie Institution for Science, led by Dr. Gabriele Cugno and Dr. Sierra Grant, found seven carbon-bearing molecules, including acetylene and benzene, within the exoplanet CT Cha b's circumplanetary disk. This discovery highlights a rapid chemical evolution, distinct from the star's surrounding disk, which could influence moon and planet formation within these disks. The team used infrared observations from Webb's Mid-Infrared Instrument (MIRI) with its medium resolution spectrograph, and high-contrast methods to distinguish the star's light from the planet's.
/web/2025/07-250930-49

8. Physics / Chemistry / Math

A Fully Liquid Earth's Core Also Generates a Magnetic Field

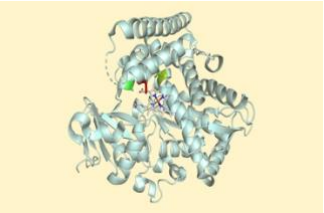
(ETH Zurich, August 04, 2025)



Researchers from ETH Zurich and SUSTech, China, led by Assistant Professor Yufeng Lin, Dr. Philippe Marti, and Dr. Andrew Jackson, have upended traditional beliefs about Earth's magnetic field. They found that a completely liquid core, contrary to the previously held view that a solid inner core is necessary, can generate Earth's magnetic field. This discovery reshapes our understanding of Earth's history and its defense against cosmic radiation, vital for life and technology. Using a new computer model and simulations on the Piz Daint supercomputer, the team showed that a liquid core could maintain a stable magnetic field without the influence of core viscosity. This innovative approach challenges established theories about planetary magnetic fields and opens new doors for studying the magnetic properties of other celestial bodies. ETH Zurich's work offers fresh insights into how planets protect themselves and sustain life, marking a significant advancement in geoscience.
/web/2025/08-250804-dc

Engineered Enzyme to Precisely Build Complex Molecules

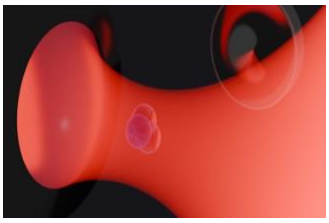
(University of Basel, August 08, 2025)



Researchers at the University of Basel, led by Prof. Dr. Thomas R. Ward and Dr. Xiang Zhang, have repurposed a haemoprotein to catalyze asymmetric metal-catalyzed hydrogen atom transfer (MHAT) reactions. This breakthrough not only simplifies the production of complex chemicals but also cuts down on the environmental harm caused by traditional chemical synthesis. Their method marries MHAT chemistry with enzymatic catalysis, allowing unparalleled control over a molecule's structure. By doing so, they achieve a dominant form of molecules with a 98 to 2 ratio of left- to right-handed versions, vital for the efficacy of many drugs.
/web/2025/08-250808-61

Breakthrough in Room Temperature Quantum Experiments

(ETH Zurich, August 13, 2025)



Researchers from ETH Zurich, Vienna University of Technology, The University of Manchester, and Fundacio Institut de Ciencies Fotoniques in Barcelona, including Dr. Lorenzo Dania, have shown that objects comprising several hundred million atoms can display quantum behavior at room temperature, a condition previously achievable only near absolute zero. This breakthrough paves the way for quantum sensors in navigation and medical imaging, avoiding the high costs and energy demands of cooling. The team used optical tweezers, focusing polarized laser light in a vacuum to align and stabilize particles with the laser's electric field.
/web/2025/08-250813-a6

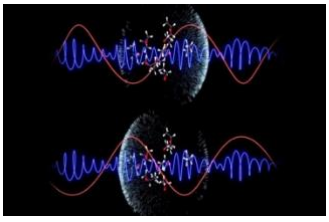
A Leap in Chirality Visualization

(ETH Zurich, August 18, 2025)

An ETH Zurich team, led by Dr. Rebecca Büchner, has developed a method to visualize the chirality of nanoscale structures clearly in a single image. Using circularly polarized light, this technique can distinguish between left-handed and right-handed structures with unmatched clarity. This innovation marks a significant step forward in biology and materials science, offering a new way to analyze biological samples, materials, and active substances with greater precision. The team employed gold nanostructures and a novel imaging method that utilizes circularly polarized light to interact uniquely with chiral molecules.
/web/2025/08-250818-75

Electron Behavior: A New Dimension in Molecular Asymmetry

(ETH Zurich, September 02, 2025)



Chirality, a property distinguishing left from right, goes beyond structure to affect electrons in molecules, uncovering a layer of complexity previously unseen. Dr. Meng Han and Prof. Dr. Hans Jakob Wörner's team at ETH Zurich visualized and manipulated electron emission from chiral molecules in real-time, showing that chirality affects electronic behavior. This insight not only deepens our understanding of chirality but also paves the way for developing sensitive methods to determine the chirality of medical agents, investigate life's chirality origins, and advance technologies across various sectors. Using circularly polarized attosecond light pulses, the researchers measured and controlled electron movement within chiral molecules. They detected the electron ejection direction based on the molecule's chirality and the light's rotation, manipulating it through attosecond pulses and infrared light.
/web/2025/08-250902-71

Geometry Revealed at the Heart of Quantum Matter

(University of Geneva, September 04, 2025)

Researchers at the University of Geneva, University of Salerno, and CNR-SPIN Institute, led by Dr. Giacomo Sala, Prof. Carmine Ortix, and Prof. Andrea Caviglia, have made a groundbreaking discovery in quantum materials. For the first time, they have observed the quantum metric, a theoretical geometry that shapes electron movement, at the interface between strontium titanate and lanthanum aluminate. This finding reveals how quantum metric and strong magnetic fields bend electron paths, akin to gravity's effect on light. This insight opens new avenues for designing advanced quantum electronics by understanding material properties more deeply. The team achieved this breakthrough by closely observing how electron paths distort when exposed to quantum metric and magnetic fields. Their work at the strontium titanate and lanthanum aluminate interface, known quantum materials, allows for precise characterization of optical, electronic, and transport properties. This discovery could revolutionize electronics that operate at terahertz frequencies, improve superconductivity, and enhance light-matter interactions.
/web/2025/08-250904-55

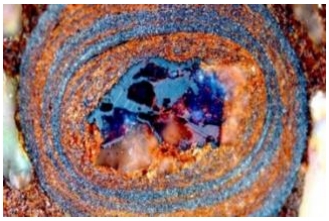
UZH Device Searches for Light Dark Matter

(University of Zurich, September 12, 2025)

University of Zurich researchers have developed a new method to search for very light dark matter particles, using an advanced superconducting nanowire single-photon detector (SNSPD). This breakthrough opens up a new path to understanding the dark sector of the universe, shedding light on dark matter's composition and offering insights into the fundamental structure and evolution of the universe. The team's method relies on the SNSPD's ability to detect single low-energy photons, essential for spotting the faint signals from dark matter particles interacting with visible matter. This new strategy moves away from the traditional focus on heavier dark matter particles, setting the stage for significant discoveries in astrophysics. By capturing these elusive photons, the University of Zurich is leading the way in revealing the role of dark matter in the universe's formation and dynamics, which promises a fresh perspective on solving the dark matter mystery.
/web/2025/08-250912-cf

Carbon Secrets of Ancient Oceans Unveiled

(ETH Zurich, September 26, 2025)

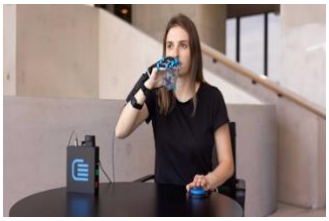


For the first time, researchers at ETH Zurich, led by Prof. Jordon Hemingway, have shown that ancient oceans held 90 to 99 percent less dissolved organic carbon than today, challenging old views on Earth's history. This discovery, made by analyzing tiny egg-shaped iron oxide stones, suggests early seas were much less carbon-rich, forcing scientists to rethink theories on ice ages and the emergence of complex life. The team's innovative use of iron oxide grains for direct carbon measurement offers a new lens on Earth's past, promising to reshape our understanding of its geological and biological evolution. This method not only questions established beliefs about the development of complex life and ice ages but also opens new paths for exploring Earth's early environmental conditions.
/web/2025/08-250926-76

9. Architecture / Design

A Hand Exoskeleton for Stroke Rehabilitation

(ETH Zurich, September 30, 2025)



An exoskeleton, as light as a smartphone and customizable via 3D printing, has been developed at ETH Zurich and the Singapore-ETH Centre. Led by Dr. Natalie Tanczak, this innovation enables stroke survivors to regain the ability to grasp objects comfortably for daily use. Its design stands out for simplicity and robustness. It is lightweight and offers a practical tool for improving motor functions and independence, with the potential to impact millions globally. The team engineered a mechanical structure that moves with motors on the forearm, avoiding hydraulic or pneumatic drives. Its accordion-like exterior mimics human finger flexion, while a leaf spring and the outer structure work seamlessly together. By leveraging 3D printing, they tailor the exoskeleton to each user's hand size and finger length, simplifying the design and enhancing accessibility.
/web/2025/09-250930-5c

10. Economy, Social Sciences & Humanities

Switzerland Tops Global Innovation Index Again

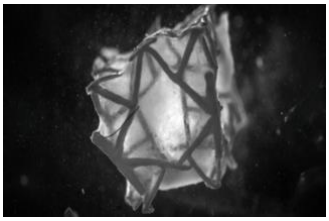
(RTS Info, September 20, 2025)

Despite a global investment slowdown, Switzerland keeps its title as the world's top innovator. The global innovation index evaluates numerous indicators across over 130 countries; it underlines the need for continuous financial support in innovation ecosystems, especially as investment growth reaches a 15-year low, showcasing Switzerland's innovation ecosystem's resilience and robustness. The global innovation index, crafted from various indicators among more than 130 countries, highlights the essential roles of technology access, human capital, and research in maintaining innovation leadership. This achievement allows Switzerland to not only stay ahead in innovation but also to highlight the investment gaps in new technologies compared to traditional industries.
/web/2025/10-250920-04

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

Heart Patches That Heal, Not Just Seal

(ETH Zurich, August 20, 2025)



Unlike traditional heart patches that act as foreign bodies and lead to complications, the RCPatch developed by researchers at ETH Zürich and the University Hospital of Zurich integrates into the heart's tissue. Led by Lewis Jones, Prof. Dr. Robert Katzschmann and Omer Prof. Dr. med. Dzemali, the team created the RCPatch, a novel cardiac patch that not only seals but also heals damaged heart areas. This advancement surpasses traditional patches by offering a long-term solution for repairing myocardial damage and regenerating heart tissue. The RCPatch combines volumetric 3D printing with melt-electrowriting to produce a scaffold that includes a sealing mesh, support layer, and a hydrogel with heart muscle cells. This design matches the heart's mechanical properties and withstands blood pressures, aiding tissue repair and integration.
/web/2025/11-250820-a5

Robot Delivers Largest Open Dataset for Battery Research

(EMPA, September 03, 2025)

A significant advancement in battery technology has emerged from Empa, led by Dr. Enea Svaluto-Ferro and Dr. Graham Kimbell, scientists created the largest open battery dataset to date. This dataset, produced by the autonomous robot Aurora, includes tests on 199 button cell batteries using NMC/graphite and LFP/graphite chemistry over 1000 cycles. This effort not only establishes a new standard in battery research but could also accelerate progress in energy storage technologies. The team employed Aurora, an advanced robot developed by Empa and Chemspeed Technologies, to conduct fully automated experiments. These experiments generated high-quality, standardized data under uniform conditions. By releasing this data in the Battery Data Format (BDF), the researchers ensure it is accessible and reusable, adhering to FAIR data principles. This move will significantly boosts battery research efficiency, encouraging worldwide innovation and collaboration. Empa's strategy of using automation and standardization is set to accelerate the development of future batteries, impacting renewable energy and electric mobility.
/web/2025/11-250903-6e

High-tech ‘Replacement parts’ Offer Hope to Millions

(EPFL, September 11, 2025)

Groundbreaking discoveries from EPFL, University Hospital of Zurich, and the University of Bern are setting new standards in prosthetics and heart treatment. Prof. Dr. Silvestro Micera and Prof. Dr. Nicole Lindenblatt lead teams that have introduced a sensory feedback system for prosthetic hands, a supportive ring-shaped device for the heart, and innovative hydrogels for cartilage repair, all aiming to improve life quality for those with physical impairments. These advancements include noninvasive thermal electrodes that allow amputees to feel warmth, a ring-shaped device enhancing heart function through suction, and hydrogels that solidify inside the body to mend cartilage. These technologies not only offer hope for returning normalcy to the lives of those with limb loss but also mark a significant step forward in organ support and tissue repair, showcasing a collaborative triumph in mimicking natural body functions and potentially transforming heart failure treatments and physical rehabilitation.
/web/2025/11-250911-d7

Breakthrough in Blood Pressure Control for Spinal Cord Injury Patients

(EPFL, September 19, 2025)

Over 70% of spinal cord injury (SCI) patients suffer from chronic low blood pressure, leading to fatigue and reduced cognitive function. A new therapy, developed by a team led by Prof. Gregoire Courtine, Dr. Jocelyne Bloch, and Prof. Aaron Phillips, offers hope by stabilizing blood pressure and enhancing patient quality of life. Using their ARC-IM neurostimulation system, this treatment targets a specific spinal area to regulate blood pressure, addressing both chronic hypotension and dangerous spikes known as autonomic dysreflexia. The team mapped the neuronal architecture responsible for autonomic dysreflexia and discovered that spinal stimulation could control blood pressure by targeting the hemodynamic hotspot. They created an implantable system for precise electrical stimulation to this region, validated by extensive clinical trials in Switzerland, the Netherlands, and Canada. This innovation not only stabilizes blood pressure in SCI patients but also improves mood, independence, and physical health, representing a significant advancement over traditional treatments focused solely on movement restoration.
/web/2025/11-250919-ec

Friction-free Precision, from Space to Watchmaking

(EPFL, September 25, 2025)

Researchers from EPFL, CSEM, and Almatech SA, led by Prof. Simon Henein and Dr. Florent Cosandier, have engineered compliant mechanisms that withstand higher loads and offer larger strokes, surpassing traditional limitations. This advancement enhances reliability and precision in fields like robotics, aerospace, and possibly biomedical devices, introducing systems that demand minimal maintenance while maximizing durability. The team used parasitic motion and created a new flexure-based oscillator that moves more freely. They applied advanced additive manufacturing, such as Laser Bed Powder Fusion, to produce com-plex, assembly-free components, ensuring smooth operation. This innovation paves the way for more robust mechanisms in space exploration, watchmaking, and medical devices, likely cutting maintenance costs and boosting reliability across sectors. EPFL and CSEM's work, eliminating wear and lubrication needs through creative design and manufacturing, redefines compliant mechanism development.
/web/2025/11-250925-42

Innogrant Program Helps Entrepreneurs Take Their Technology to Market

(EPFL, September 26, 2025)

EPFL is significantly impacting the startup ecosystem by converting groundbreaking research into successful businesses. Since 2005, its Innogrant program has supported over 206 projects, with 65% of them flourishing today. These startups have raised a total of CHF 1.6 billion, demonstrating the program's effectiveness in transforming innovative ideas into thriving businesses. EPFL's Innogrant program offers researchers a year's salary to develop their business plans and advance their technologies for the market. It provides financial aid and access to a wide network of experts in management, sales, and business development. This support accelerates the transition from concept to market and equips entrepreneurs with the skills to succeed, establishing EPFL's program as a key player in the success of numerous startups.
/web/2025/11-250926-17

12. General Interest

Virtual Reality can Trigger an Immune Response in Humans

(University of Geneva, August 19, 2025)

Exposure to sick avatars in virtual reality can activate the immune system similarly to real pathogens, showing our brains can initiate physical immune reactions from virtual signals alone. Prof. Andrea Serino, Prof. Camilla Jandus, and their team uncovered a new way the brain and immune system communicate, allowing immune responses to begin from the mere anticipation of disease. This discovery gives new insights into understanding how we react to potential threats. Involving 250 participants, the study exposed them to virtual humans, some appearing ill with signs like chickenpox, while others showed neutral or scared faces. Monitoring through electroencephalograms, MRI scans, and blood tests for 15 minutes, researchers tracked immune markers. The findings demonstrate the brain's ability to foresee infection risks and kickstart a defense, even without actual pathogens. This research could lead to therapeutic uses of virtual reality in boosting or suppressing immune responses, merging technology, psychology, and immunology in innovative ways.
/web/2025/12-250819-b5

Swiss Synchrotron Shines Brighter, Unlocks New Research Possibilities

(Paul Scherrer Institute, August 22, 2025)

The Paul Scherrer Institute has inaugurated a major upgrade to the Swiss Light Source (SLS), significantly increasing its brightness to outshine conventional X-rays by billions of times. The SLS is a synchrotron light source, a sophisticated facility that accelerates electrons to near light-speed and uses powerful magnets to bend their path, generating extraordinarily bright X-ray beams. This intense, focused light enables scientists to examine materials and biological structures at the atomic level with unprecedented precision. Directed by Dr. Hans-Heinrich Braun and Prof. Dr. Christian Rüegg, the SLS's powerful light now enables in-depth studies of complex materials and biological structures, paving the way for advancements in understanding neurodegenerative diseases, improving semiconductor technology, and enhancing catalyst efficiency. The overhaul of the SLS included installing 500 copper vacuum chambers and 1000 precision magnets. It is set to shorten research cycles and speeding up the translation of discoveries into practical applications.
/web/2025/12-250822-b9

Formula for Stable Beer Foam Discovered

(ETH Zurich, August 29, 2025)

Researchers at ETH Zurich, led by Prof. Dr. Jan Vermant, have uncovered the secret to the lasting foam on Belgian Trappist beers. They found that the protein LTP1 and its transformation during fermentation play a crucial role. Triple-fermented beers, in particular, have the most stable foam due to the unique action of LTP1 proteins, significantly outperforming the foam stability of single-fermented lagers. This discovery could not only improve beer-drinking experience but could also enhance brewing quality industry-wide. The ETH Zurich team analyzed beer protein content and foam physical properties, conducting experiments to see how different fermentation processes impact LTP1 proteins. They linked these changes to foam stability, highlighting the importance of Marangoni stresses and surface viscosity. This breakthrough could lead to beers with better foam quality and the development of sustainable surfactants and foam stabilizers for various uses, including in electric vehicle lubricants and milk foam.
/web/2025/12-250829-1b

Upcoming Science and Technology Related Events

Data Center Nation Zurich 2024
November 25
https://is.gd/wwBtsg
IT, Web & Electronic, AI
Messe Zürich

Digital Asset Seminar 2025
November 25-27
https://is.gd/oGnvj1
Finance, Banking, Investment & Insurance, IT, Blockchain
Trust Square Zurich

Swiss Chapter Geo Forum
November 26
https://geo-forum.ch/
IT, Web & Electronic, AI
Technopark Zurich

The Swiss Innovation Platform
November 27
https://www.open-i.swiss/en
Scientific, Research & Development, Finance, Banking, Investment & Insurance
Zurich Convention Center

Swiss AI Summit
November 17
https://www.swissaisummit.com/
IT, Web & Electronic, AI
Park Hyatt ZurichBiozentrum University of Basel

AI Week 2025
December 1-5
https://is.gd/AzGEZ5
Business & Economy, Finance, Banking, Investment & Insurance, AI
Asilo Ciani Lugano

4th Basel CAPEX Summit
December 2-3
https://is.gd/ey3xVH
IT, Web & Electronic, AI, Pharmaceutical & Biotechnology
Venue to be announced Basel

SwissITminds 2025
December 3-4
https://is.gd/CanbGQ
IT, Web & Electronic, AI
The Dolder Grand Zurich

Working Group Measuring E-Commerce and the Digital Economy
December 4-5
https://indico.un.org/event/1012832/
IT, Web & Electronic, AI
Palais des Nations Geneva

ACM SIGGRAPH MIG 2025
December 3-5
https://mig.siggraph.org/2025/
IT, Web & Electronic, AI, Computer Graphics
Zurich Convention Center

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