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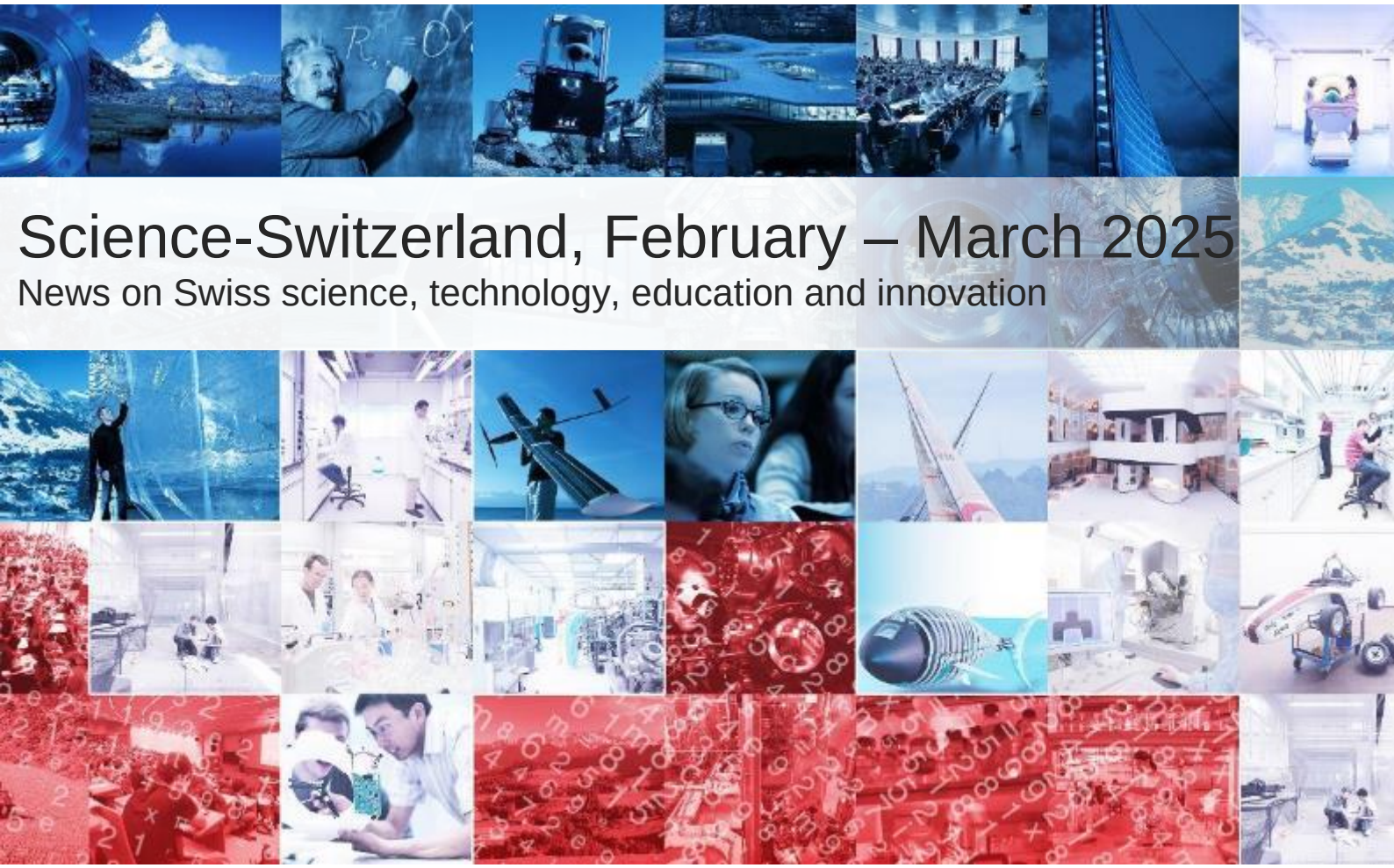

Science-Switzerland, February – March 2025

News on Swiss science, technology, education and innovation

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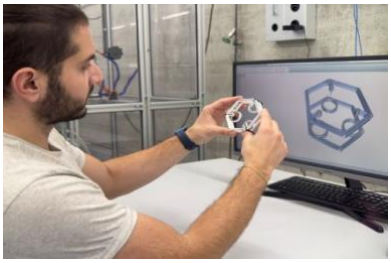
New Air-Cooling Tech Saves 60% on Energy Use

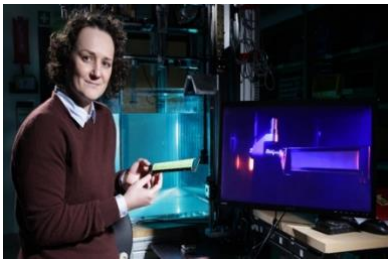
(EMPA, February 03, 2025)



Researchers from Empa and startup Ionic Wind Technologies, led by Dr. Donato Rubinetti, have introduced a revolutionary cooling method that uses ionic wind to cool down electronics, which has the potential to cut data center energy consumption by 60%. This method, featuring a new airflow amplifier that taps into the Coandă effect and charges the air electrically, significantly surpasses traditional cooling techniques. The team conducted extensive simulations and laboratory tests to fine-tune the electrode design and airflow, achieving unmatched efficiency. This breakthrough in energy-efficient cooling not only changes the game for data centers but also for drying, air purification, and other applications as well. By moving away from conventional cooling parts like power-intensive and noisy fans, this technology offers considerable cost savings and reduces environmental impact.
/web/2025/00-250203-22

Bat-Inspired Wings Boost Flight Efficiency

(EPFL, February 04, 2025)



Researchers at EPFL, led by Dr. Alexander Gehrke. Dr. Karen Mulleners, have found that wings that mimic the flexibility of bat wings provide better lift and efficiency. Using a flexible membrane wing in a water tank, they tracked airflow patterns with polystyrene tracer particles. By changing the wing's angles, they showed how its deformation prevents airflow separation, improving lift. This discovery could lead to the creation of more efficient flying vehicles, especially drones, that currently struggle in turbulent conditions. By using flexible, bat-like wing designs, these technologies might reach new levels of performance, offering more effective and sustainable energy solutions.
/web/2025/00-250204-48

PSI Spin-off Araris Biotech Reaches Unicorn Status

(Paul Scherrer Institute, March 17, 2025)

Taiho Pharmaceutical Co., Ltd., has announced the acquisition of Araris Biotech AG in a landmark deal worth up to USD 1.14 billion, making it the first PSI Paul Scherrer Institut spin-off to achieve unicorn-level valuation. The agreement includes USD 400 million upfront with potential additional milestone payments of up to USD 740 million. Founded by Dr. Dragan Grabulovski, Dr. Isabella Attinger-Toller, and Dr. Philipp Spycher in 2019 as a spin-off from PSI and ETH Zurich, Araris pioneered revolutionary antibody-drug conjugate (ADC) technology for cancer treatment. At the core of Araris' innovation is the proprietary AraLinQ platform, which enables the attachment of multiple cancer-fighting payloads to a single antibody in an efficient one-step process. This breakthrough technology creates highly uniform, stable ADCs that can deliver different types of cancer-fighting drugs simultaneously to tumors with high precision while reducing harmful side effects. The company is currently advancing three products for hematological and solid tumors, all in preclinical stage with anticipated clinical trials between 2025 and 2026. Prior to this acquisition, Araris had already established significant partnerships with Chugai Pharmaceutical Co., Ltd. worth up to $780 million and received strategic investment from Samsung Ventures. The acquisition represents a major achievement for Swiss innovation and demonstrates the successful translation of scientific research into commercial success.
/web/2025/00-250317-19

1. Policy

How Regulation Can Keep Pace with Healthcare Innovation

(ETH Zurich, March 12, 2025)

Digitalization could cut Switzerland's healthcare costs by 12% annually, yet slow approval processes hinder progress. ETH Zurich's Professor Effy Vayena and her team have outlined a roadmap for policymakers to foster responsible digital healthcare innovations. Their strategy promises to streamline approvals, boost efficiency, and potentially save CHF 8.2 billion each year. A collaborative research effort among engineers, investors, physicians, patient representatives, and regulators, suggests the implementation of agile regulation and experimental test environments for safe technology trials. These steps could lead to a more adaptable regulatory framework.
/web/2025/01-250312-2e

2. Education

New Master's Program Encourages Fresh Approaches to Urban Planning

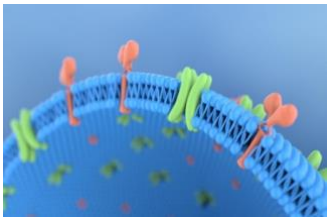
(EPFL, March 12, 2025)

EPFL will launch a master's program in urban systems with a sustainability-oriented approach, starting this fall. Directed by Dr. Stéphane Joost and Prof. Dr. Vincent Kaufmann, the program aims to create experts capable of designing sustainable cities. It addresses global warming by promoting innovative urban planning and development. This innovative program will combine architecture, civil, and environmental engineering through a cross-disciplinary approach, providing students with a deep understanding of urban sustainability challenges and opportunities. Through projects, workshops, and guest lectures, it will offer a rich learning experience, preparing graduates to effectively combat climate change and improve urban life.
/web/2025/02-250312-f2

3. Life Science

Designing Proteins with Enhanced Receptor Efficiency

(EPFL, February 03, 2025)



Prof. Dr. Patrick Barth, Dr. Lucas Rudden, and their team from EPFL, along other contributors, have discovered that water-mediated interactions play a crucial role in receptor activity. They used SPaDES, a sophisticated computational tool, to engineer new membrane receptors that outperform their natural counterparts by being more stable at high temperatures and more efficient at binding signaling molecules. The team achieved this by altering receptors' "communication hubs," affecting their shapes and functions, then synthesizing and testing the most promising ones in cells. This innovation opens doors to precisely engineer membrane receptors, with significant implications for developing targeted therapies for diseases, including cancer and neurological disorders. Designing receptors that are more stable and efficient in signaling could transform drug discovery, synthetic biology, and biosensor creation for environmental monitoring.
/web/2025/03-250203-54

Cellular Atlas Gives New Insights into Obesity

(ETH Zurich, February 07, 2025)

Researchers from ETH Zurich and Leipzig University, led by Dr. Adhideb Ghosh and Dr. Isabel Reinisch, have created a detailed atlas that shows how obesity alters cells. Using the Leipzig Obesity Biobank, they gathered fat tissue from obese individuals and analyzed gene activity in each cell. They examined both subcutaneous and visceral fat tissues, revealing key differences in cell function and composition between healthy and unhealthy obesity, as well as between genders. This pioneering study sets the stage for identifying cellular markers critical for evaluating metabolic disease risk and developing new treatments. The atlas could lead to the discovery of biomarkers that transform treatment approaches, including the strategic use of new drugs.
/web/2025/03-250207-eb

Choosing the Best Medical Treatment with the Help of AI

(EPFL, February 07, 2025)

Researchers at EPFL, led by Prof. Dr. Charlotte Bunne, have created advanced AI algorithms to interpret the complex data of tissue layers and protein markers in individual cells. Their goal is to build a Virtual Cell model that simulates the behavior of molecules, cells, and tissues under various conditions. The team combines AI with biology and medicine by collaborating closely with clinicians and biologists. This ensures their AI tools integrate well into clinical workflows. Their approach improves AI models by designing algorithms and architectures tailored to the intricacies of biological data. It represents a major advancement in simulating biological systems, with AI predicting cellular responses to treatments and potentially reprogramming unhealthy cells.
/web/2025/03-250207-06

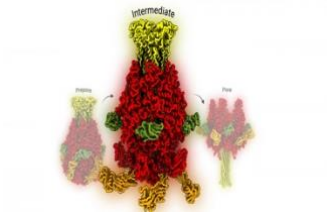
New Insights into Antibiotic Failure and Salmonella

(University of Basel, February 10, 2025)

Researchers from the University of Basel, led by Professor Dirk Bumann and Dr. Joseph Fanous, have discovered that the difficulty in treating Salmonella infections with antibiotics stems from the majority of bacteria being hard to kill due to nutrient starvation, not just a minority of persistent bacteria. They used innovative methods to monitor the effects of antibiotics on individual bacteria in real-time and analyzed antimicrobial clearance in Salmonella-infected mice and tissue-mimicking models. This research challenges the effectiveness of standard laboratory tests and deepens our understanding of how bacteria behave under antibiotic treatment.
/web/2025/03-250210-f2

Unraveling Bacterial Toxin Injection Mechanisms

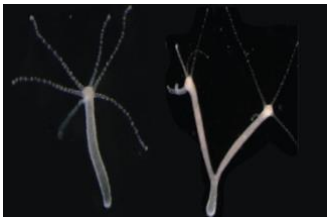
(University of Geneva, February 11, 2025)



A team of researchers from the University of Geneva, Max Planck Institute of Molecular Physiology, and University of Düsseldorf, led by Prof. Enrica Bordignon, Dr. Stefan Raunser, and Svetlana Kucher, has revealed how certain harmful bacteria inject toxins into their hosts. They used cryo-electron microscopy, single-molecule fluorescence spectroscopy, and electron paramagnetic resonance spectroscopy to show the complex steps of the infection process of a toxin named Tc. This method offered a detailed view of the toxin's operation on both the molecular and mass dynamics levels. This discovery paves the way for new biotechnological applications, such as biomedical devices or biopesticides.
/web/2025/03-250211-d4

Pressure Induces Dual Heads in Hydras

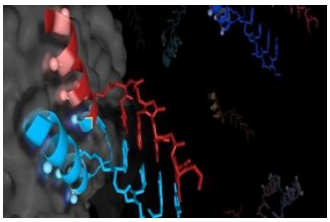
(University of Geneva, February 11, 2025)



Researchers at the University of Geneva, led by Dr. Yamini Ravichandran and Prof. Aurélien Roux, found that applying pressure to a hydra's body can create two heads. They achieved this by using agar gel to apply slight pressure for four days, revealing that "topological defects" in the actin network trigger this dual head formation. This method not only resulted in two heads but also shed light on how external forces can direct organism development by changing symmetry points. This discovery opens new avenues in understanding the interplay between genetics and tissue mechanics, potentially transforming tissue repair and regeneration strategies. These findings could set the stage for innovative regeneration therapies and deepen our comprehension of developmental biology.
/web/2025/03-250211-5d

Synthetic antibodies easier to produce

(University of Geneva, February 11, 2025)



Researchers at the University of Geneva, led by Prof. Nicolas Winssinger, have developed Self-Assembled Proteomimetics (SAPs) that mimic antibodies. These SAPs target and neutralize harmful proteins, such as cancer's HER2 and the Spike protein receptor of SARS-CoV-2. Designed as a two-part system, the components fit together like puzzle pieces, ensuring a stable structure that can tightly bind to target proteins. This design not only simplifies production but also overcomes many challenges associated with synthesizing antibodies. This innovation lays the basis for synthetic molecules that act like antibodies, offering a quicker and cheaper solution for treating diseases. The SAPs could transform the treatment of conditions like cancer and COVID-19, making therapies more accessible globally. University of Geneva's work in mimicking the body's natural defenses marks a significant advancement in medical biotechnology, promising to change how complex diseases are managed.
/web/2025/03-250211-10

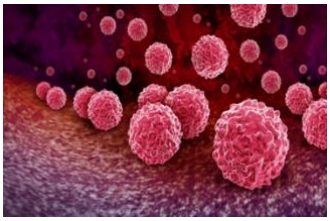
A New Switch for the Cell Therapies of the Future

(ETH Zurich, February 17, 2025)

Researchers at ETH Zurich, led by Prof. Martin Fussenegger, have created an innovative gene switch controlled externally by a nitroglycerine patch. This method applies a patch to the skin, which releases nitroglycerine. This substance then travels into the body to activate an implant filled with modified human kidney cells. These cells, engineered to respond to nitric oxide—a nitroglycerine byproduct, produce and release the hormone GLP-1. GLP-1 helps increase insulin release and reduce food intake, showcasing a new method to externally regulate bodily functions in a simple, non-invasive manner. The technology promises precise, personalized management of implanted cells, marking a significant advance in treating metabolic diseases like diabetes. Its reliance on human components reduces immune reaction risks and ensures compatibility with natural bodily processes. This development by ETH Zurich not only offers new ways of managing diabetes, but also holds potential for treating a range of other conditions, including autoimmune and neurodegenerative diseases, by enabling dynamically regulated therapies that mirror the body's own regulatory systems.
/web/2025/03-250217-f4

Curbing the Global Spread of Sexually Transmitted Diseases

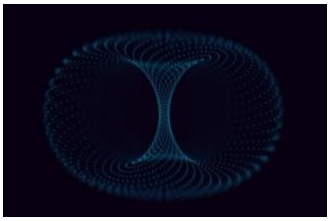
(University of Zurich, February 18, 2025)



Researchers from the University of Zurich and the University of Buenos Aires, led by Dr. Helena Seth-Smith and Dr. Karina Andrea Büttner, have discovered a new lineage of Chlamydia in Argentina. This strain (trachomatis, ompA-genotype L4), found in rectal samples from men who have sex with men, has unique genetic traits that set it apart from previously identified strains. The researchers used advanced "target enrichment" technology to isolate STI DNA from clinical samples, enabling detailed genomic analysis. This technique offers a clearer understanding of how these bacteria transmit and adapt.
/web/2025/03-250218-e5

A Geometric Deep Learning Method for Decoding Brain Dynamics

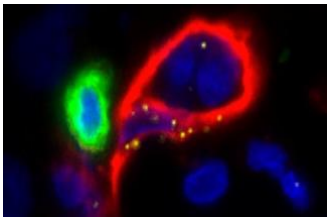
(EPFL, February 19, 2025)



Researchers at EPFL and the Medical University of Vienna, led by Prof. Dr. Pierre Vandergheynst and Dr. Adam Gosztolai, have developed a method that infers latent patterns of brain activity across different subjects. This method shows that animals using the same mental strategies exhibit similar brain dynamics, paving the way for a deeper understanding of how brain computations underlie behavior and enhancing neural decoding techniques. Their method uses a geometric neural network to break down electrical neural activity into dynamic motifs within curved spaces, mirroring the complex natural patterns of neuronal action.
/web/2025/03-250219-b6

An Enzyme to Disarm Tumors

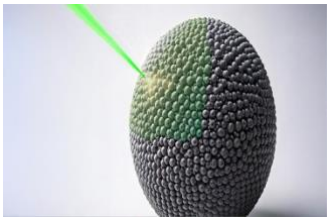
(University of Geneva, February 19, 2025)



Researchers at the University of Geneva have found that the enzyme CH25H, known for its role in antiviral immunity, is key in fighting cancer by disarming tumor defenses and boosting anti-tumor immunity. This groundbreaking discovery could change how immunotherapies are personalized for cancer patients. The team, led by Prof. Stephanie Hugues, discovered that CH25H, when expressed in cancerous lymphatic cells, converts cholesterol into 25-hydroxycholesterol. This metabolite disrupts tumor defense mechanisms, suggesting that CH25H could serve as a biomarker for immunotherapy success. The researchers conducted gene expression analyses on lymphatic endothelial cells from melanoma and healthy mouse skin. They found that higher levels of CH25H are linked to better outcomes in melanoma patients, particularly those treated with immune checkpoint inhibitors.
/web/2025/03-250219-03

Using Light to Activate Treatments in the Right Place

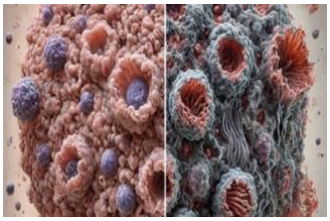
(University of Geneva, February 20, 2025)



A simple flash of light now precisely controls molecule activity, revolutionizing targeted treatments and reducing side effects. Researchers from the University of Geneva, led by Dr. Victoria von Glasenapp, Prof. Monica Gotta, and Prof. Nicolas Winssinger, have created a method to manipulate the activity of molecules in living organisms with unprecedented precision. They modified an inhibitory molecule of the protein Plk1 and activated it using light only. They engineered it to remain at the targeted site, achieving unparalleled control over cell division. The University of Geneva's approach promises to revolutionize disease treatment, like skin cancer, by activating drugs exactly where and when needed, offering researchers a new tool to study cellular processes with minimal side effects, while preserving surrounding tissue health.
/web/2025/03-250220-fb

Lipid Signatures Predict Chemotherapy Resistance

(University of Geneva, March 06, 2025)



A study by University of Geneva researchers, led by Associate Professor Patrycja Nowak-Sliwinska and Dr. George Mourad Ramzy, has found that specific lipid signatures in colorectal cancer cells can predict chemotherapy resistance. This discovery paves the way for targeted treatment strategies to counteract drug resistance, using lipid signatures as prognostic markers. Such an approach could significantly enhance the effectiveness of cancer treatments, marking a significant step forward in cancer research.
/web/2025/03-250306-f0

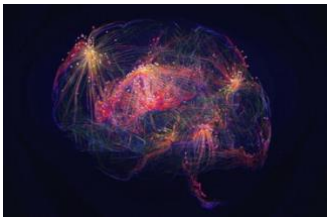
Nose Cells Revolutionize Knee Repair

(University of Basel, March 07, 2025)

Researchers at the University of Basel and University Hospital Basel, led by Dr. Marcus Mumme, MD and Dr. Anke Wixmerten, have found that cartilage engineered from nasal septum cells can effectively heal complex knee injuries, specifically "patellofemoral osteoarthritis." This innovative method could greatly enhance the quality of life for those affected by this severe condition, providing new hope for patients with few treatment options. The team conducted extensive clinical trials on cell-based therapies; they discovered that nasal septum cells have unique healing properties that, once transformed into cartilage, can mend damaged knee joints.
/web/2025/03-250307-df

Unraveling the Brain's Hidden Motor Networks

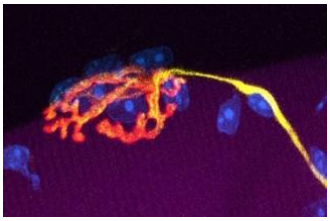
(EPFL, March 07, 2025)



Researchers have overturned a century-old belief about brain organization: the brain processes movement not in vertical columns, but through a network of horizontally distributed, neuron-type-specific modules that dynamically interact and reorganize during learning. Teams from EPFL, the University of Cambridge, and Kumamoto University, led by Dr. Keita Tamura, Pol Bech, and Prof. Carl Petersen, found distinct neural modules in the neocortex's motor area that control movement, challenging the traditional view of a vertically organized, and suggesting a more flexible, interconnected system. This discovery could transform our understanding of brain organization and advance new treatments for conditions like stroke or brain injuries by exploiting the brain's ability to rewire itself.
/web/2025/03-250307-1f

Numerous Genes Important for Muscle-nerve Connection Identified

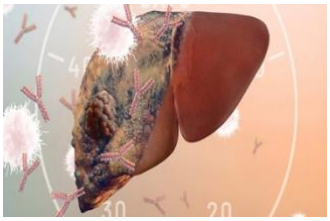
(University of Basel, March 11, 2025)



A team from the University of Basel has identified key genes necessary for muscle-nerve connectivity, offering new hope for treating neuromuscular disorders. Their work could dramatically change how we address these diseases, affecting millions worldwide. Using advanced genetic analysis, Prof. Dr. Markus Rüegg's team mapped muscle and nerve gene interactions, uncovering the genetic dance essential for these connections. The University of Basel's work on the genetic basis of muscle-nerve connections could potentially transform therapy for conditions like muscular dystrophy and spinal muscular atrophy.
/web/2025/03-250311-a8

Timing is Key in Liver Transplant Success

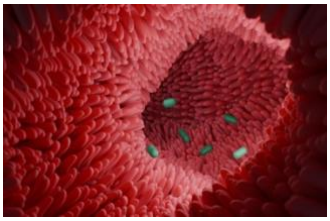
(University of Geneva, March 11, 2025)



Researchers at the Geneva University Hospital and the University of Geneva, led by Dr. Beat Moeckli and Dr. Christian Toso, found that waiting at least 50 days after ending immune therapy before getting a liver transplant significantly reduces rejection risk in liver cancer patients. This discovery could change how doctors treat liver cancer, combining immunotherapy with transplantation to better patient outcomes. Analyzing data from 119 patients across 29 top hospitals in Europe, Asia, and the USA, the team showed that the timing of treatment before a transplant is crucial for its success.
/web/2025/03-250311-be

Gut Bacteria Heal the Colon

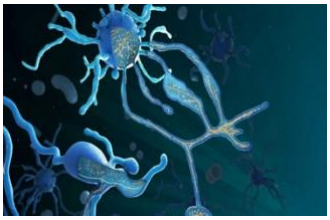
(EPFL, March 18, 2025)



Researchers from EPFL, University of Bern, and University of Lausanne, led by Dr. Antoine Jalil, have made a significant breakthrough in treating colitis, a chronic inflammatory bowel disease. They discovered that the gut bacterium Clostridium scindens can heal intestinal injuries in colitis-afflicted mice by balancing bile acids. This finding offers a new, sustainable treatment option for ulcerative colitis (UC) patients, moving away from current immunosuppressive therapies by targeting the root cause: impaired intestinal cell renewal due to imbalanced bile acids. The team introduced Clostridium scindens to mice with colitis and monitored their recovery, focusing on weight loss, colon inflammation, and intestinal healing.
/web/2025/03-250318-0f

Origin of Life: How microbes laid the foundation for complex cells

(ETH Zurich, March 24, 2025)



A decade ago, we didn't know about Asgard archaea. Today, they're seen as a crucial link in the evolution to complex life, hinting that eukaryotes, including humans, might descend from these ancient microbes. A team led by researchers from ETH Zurich and the University of Vienna, including Dr. Martin Pilhofer, Dr. Jingwei Xu, and Dr. Florian Wollweber, found that a type of Asgard archaea, Lokiarchaeum ossiferum, has proteins similar to those in complex beings, showing they could be our ancient ancestors. Using computer analysis and advanced microscopy, the team studied Lokiarchaeum ossiferum's structure and proteins, revealing similarities with eukaryotic cells.
/web/2025/03-250324-f8

ADHD May Be Associated with An Increased Risk of Dementia

(University of Geneva, March 27, 2025)

A new study reveals a link between ADHD and a higher dementia risk due to iron buildup and increased neurofilament levels in the brain, indicating that ADHD's effects reach beyond its immediate symptoms to pose serious long-term effects on health. Researchers led by Professor Paul G. Unschuld from Geneva University Hospitals and the University of Geneva found that adults with ADHD show greater iron accumulation in brain regions and higher blood levels of neurofilaments, markers linked to dementia. Using MRI to perform quantitative susceptibility mapping, the team compared iron levels in the brains of adults with ADHD to those of healthy individuals. These findings could help develop targeted dementia prevention strategies in people with ADHD, marking a significant step towards rethinking ADHD management in adults.
/web/2025/03-250327-55

Gut Microbiome Serves as a Second Brain Regulating our Bodies

(EPFL, March 27, 2025)

The gut microbiome significantly influences our health, to the extent that germ-free mice only survive three days outside a sterile environment. Assistant Professor Dr. Camille Goemans and her team at EPFL found that the microbiome affects digestion, immunity, metabolism, and mental health. This insight could lead to new treatments for allergies, obesity, autism, and auto-immune diseases by targeting the microbiome. The Goemans Lab used a new method to study how antibiotics and drugs alter gut bacteria and contribute to antibiotic resistance. Their research suggests that probiotics and fecal transplants could restore a healthy microbiome, offering innovative ways to fight infections and stressing the importance of diet and lifestyle in maintaining our health.
/web/2025/03-250327-9d

Open-label Placebos Improve Premenstrual Syndrome

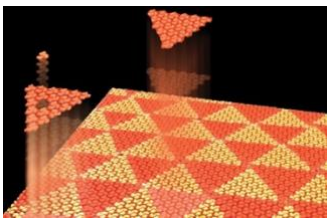
(University of Basel, March 28, 2025)

Researchers at the University of Basel have found that open-label placebos, or sugar pills known to patients as placebos, can significantly reduce premenstrual syndrome (PMS) symptoms, challenging the belief that placebos only work if patients are deceived. This study offers a new, ethical way to manage PMS without drugs, showing that the act of treatment alone can prompt a positive patient response, even when the treatment is known to be inactive. The team compared women with PMS who took placebo pills knowingly to those who received no placebo, demonstrating how psychological factors can influence physical health. This approach reveals that expectations and the ritual of taking medication can improve well-being, introducing a side-effect-free method to lessen PMS symptoms. This suggests a new way to treat PMS and possibly other conditions influenced by psychological factors, highlighting the role of the mind in healing.
/web/2025/03-250328-8a

4. Nano / Micro Technology / Material Science

Unique Molecular Arrangements on Silver Surfaces

(EMPA, February 17, 2025)

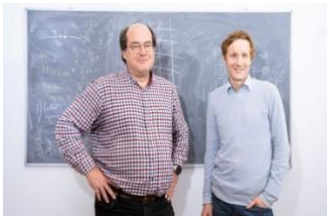


Researchers at Empa, led by Dr. Karl-Heinz Ernst and Dr. Jan Voigt, have found that a particular molecule forms irregular, non-repeating patterns on silver surfaces, challenging the usual expectations of molecular crystallization. By combining physics, mathematics, and experimental techniques, including computer simulations and physical models, the team showed how tetra-helicenebenzene molecules densely pack the silver surface. These molecules arrange themselves into triangles of varying sizes, with one size predominantly appearing in each experiment, despite their ability to change handedness. This discovery paves the way for exploring surfaces with unique atomic or molecular defects, potentially uncovering new physical phenomena. Empa's innovative approach opens up new possibilities for understanding electron behavior in aperiodic layers.
/web/2025/04-250217-50

5. Information & Communications Technology

Unique Quantum Simulator Opens Door to New Research

(Paul Scherrer Institute, February 07, 2025)



Researchers from the Paul Scherrer Institute, Google, and universities across five countries have developed and tested a groundbreaking digital-analogue quantum simulator. This simulator uses 69 superconducting qubits on a Google quantum chip, capable of operating in both digital and analogue modes. This combination offers unprecedented precision and flexibility, merging the accuracy of digital quantum computing with the capability of analogue quantum simulation to directly simulate physical processes. This advancement opens new doors in fields like solid-state physics and astrophysics by providing a more versatile and precise tool for simulating complex quantum phenomena. The team's work allows for detailed exploration of phenomena such as thermalization and magnetism.
/web/2025/05-250207-13

Designing Life with Artificial Intelligence

(EPFL, February 12, 2025)

Researchers at EPFL, led by Cris Darbellay, Mateo Schärer Gonzalez, and Sahand Jamal Rahi, have revolutionized the creation of proteins with customized functions using artificial intelligence. They integrated light-oxygen-voltage-sensing (LOV) domains into signaling proteins like kinases, enabling the regulation of their activity with blue light. They also created a fluorescent nanobody that penetrates cells, making it possible to observe protein interactions in living cells. This approach merges AI software design with hands-on lab experiments.
/web/2025/05-250212-f1

AI Diagnostics Not Outperforming in Emergency Medicine

(University of Bern, February 13, 2025)

A team led by Prof. Dr. Wolf Hautz from Inselspital, University Hospital Bern, and the University of Bern found that AI-based diagnostic tools, specifically "Isabel Pro," do not surpass traditional diagnostic methods in emergency medicine. Their research, involving 1204 patients across four Swiss emergency departments, directly compared AI-assisted diagnoses with conventional approaches. The study revealed no significant difference in diagnostic quality risks, serious adverse events, or resource use, challenging the expected benefits of AI in this area. The results highlight the need for alternative strategies and more research to improve diagnostic accuracy in acute medical settings. Despite high hopes for AI diagnostic tools, they have not enhanced diagnostic quality in emergency medicine as anticipated.
/web/2025/05-250213-15

Revolutionizing Genomic Studies with a Secure Data Framework

(EPFL, March 04, 2025)

Researchers from EPFL, Massachusetts Institute of Technology, and Yale University, led by Prof. Jean-Pierre Hubaux, have created a new cryptography framework called Secure Federated Genome-Wide Association Studies (SF-GWAS). This innovation allows for the extraction of valuable information from geographically scattered datasets without the need to share data or lose significant precision, marking a shift in secure medical research. SF-GWAS enables data collaboration across multiple institutions while protecting patient privacy and data security, promising to transform medical research worldwide.
/web/2025/05-250304-8d

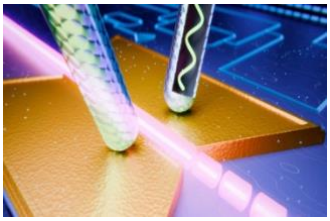
Key Discovery in Topological Quantum Computing

(University of Basel, March 13, 2025)

Researchers at the University of Basel and Cologne, led by Dr. Junya Feng, have discovered a rare quantum effect called long-range crossed Andreev reflection in a topological insulator nanowire connected to a superconductor. This discovery opens up new possibilities for error-free quantum computing. Using cutting-edge techniques, Feng's team studied how nanowires interact with superconductors. The University of Basel's work, focusing on long-range quantum effects in topological materials, could lead to the development of more reliable and powerful quantum computers.
/web/2025/05-250313-5e

Tiny Component Unleashes Terahertz Data Speeds

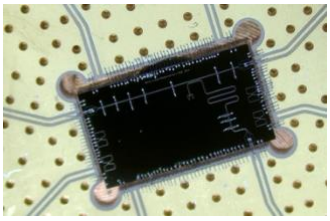
(ETH Zurich, March 14, 2025)



A single tiny component has shattered transmission speed records, achieving data transmission at terahertz frequencies. This breakthrough, developed by Dr. Yannik Horst and Prof. Dr. Juerg Leuthold's team at ETH Zurich, promises to revolutionize mobile communications, medical imaging, and high-speed data transfers. Their modulator transmits data at over a trillion oscillations per second, setting a new standard and potentially enhancing 6G mobile communications, along with medical and measurement technologies by ef-ficiently converting electrical signals into optical signals.
/web/2025/05-250314-e3

Unlocking the Secrets of Phase Transitions in Quantum Hardware

(EPFL, March 17, 2025)



For the first time, a team led by Guillaume Beaulieu at institutions including EPFL and Sapienza Università di Roma has captured elusive second-order dissipative phase transitions in quantum hardware, marking a potential revolution in quantum computing and sensor technology. They observed both first-order and second-order transitions using a superconducting Kerr resonator, highlighting phenomena like "squeezing"—where quantum fluctuations fall below empty space's natural background noise—and distinct hysteresis cycles, advancing our understanding of quantum systems in non-equilibrium. The team built a superconducting Kerr resonator with tunable quantum properties for a two-photon drive and varied detuning and drive amplitude to study quantum state transitions. Experiments conducted near absolute zero reduced background noise, enabling precise photon behavior monitoring from the resonator.
/web/2025/05-250317-cd

Ultra-broadband Photonic Chip Boosts Optical Signals

(EPFL, March 19, 2025)

Scientists from EPFL and IBM Research Zurich, led by Prof. Dr. Tobias Jan Kippenberg and Dr. Paul Seidler, have developed a compact optical amplifier on a photonic chip that outperforms traditional amplifiers in bandwidth and efficiency. By using gallium phosphide, this breakthrough offers a solution for the increasing need for fast data transmission across a broad range of wavelengths in data centers, AI accelerators, and high-performance computing. The team developed a traveling-wave parametric amplifier (TWPA) that leverages gallium phosphide's high Kerr nonlinearity and refractive index while minimizing two-photon absorption. This innovation promises significant advancements in optical sensing, metrology, and LiDAR systems for autonomous vehicles, moving towards more compact, efficient optical communication systems.
/web/2025/05-250319-f4

6. Energy / Environment

Learning to Shape the Future of the Energy Transition

(ETH Zurich, February 03, 2025)

Dr. Christian Schaffner, Prof. Dr. Gabriela Hug-Glanzmann, Prof. Dr. Christian Franck, and Dr. Gianfranco Guidati of ETH Zurich are developing a comprehensive program to understand energy technologies and their role in achieving net zero emissions. The CAS ETH Applied Technology in Energy program blends educational modules on current energy systems with in-depth studies on batteries, electricity grids, and the practical challenges of the energy transition. It emphasizes interdisciplinary exchange and real-life application, equipping individuals with the necessary skills to innovate within the energy sector. This initiative allows managers and executives to apply their knowledge in reducing greenhouse gas emissions in their companies, allowing them to become key innovators in the energy transition. ETH Zurich's program stands out by focusing on the practical application and understanding the complex interplay between societal, technical, and political challenges.
/web/2025/06-250203-d7

Storing CO2 Underground in Switzerland

(ETH Zurich, February 21, 2025)

Researchers at ETH Zurich, led by Dr. Adrian Martin and Assistant Professor Thanushika Gunatilake, have found that storing CO2 in Switzerland's underground rock through mineralization is not currently possible. They pinpointed suitable rock types but identified significant geological, technical, and economic obstacles that hinder this method's viability. This discovery is vital for Switzerland's ambition to achieve a net-zero climate target, underscoring the need to explore alternative CO2 storage solutions and the complexities involved in permanent CO2 sequestration. ETH Zurich's work is a crucial step towards understanding the feasibility of CO2 storage options, offering insights that could help Switzerland develop effective strategies to reach its net-zero climate objectives.
/web/2025/06-250221-b5

Jet Stream Responsible for Extreme Weather

(University of Bern, March 04, 2025)

Researchers at the University of Bern, led by Prof. Dr. Stefan Brönnimann, have found that the Atlantic-European jet stream's influence on extreme weather events like droughts and floods across Europe is largely driven by natural variability and fits within historical patterns. This finding shows that climate change has not yet significantly affected these atmospheric patterns, offering new insights into the jet stream's natural behavior over the past 600 years. Using a mix of numerical modeling, historical records, measurements, and natural climate indicators such as tree rings and ice cores, the team analyzed the jet stream using a new global three-dimensional climate reconstruction.
/web/2025/06-250304-78

Why the Ocean Temperature has Suddenly Risen

(University of Bern, March 14, 2025)

A recent sharp increase in global sea surface temperatures, unprecedented and surpassing all previous records, confirms the impact of ongoing global warming trends. Researchers from the University of Bern, including Dr. Jens Terhaar and Prof. Dr. Thomas Frölicher, attribute this rise between April 2023 and March 2024 entirely to human-caused global warming, emphasizing the accelerating effect of human activities on ocean temperatures and highlighting the urgent need for global climate action. By analyzing observational data, statistical models, and climate simulations, the team proved current climate models can accurately predict extreme climate events. This advancement allows for precise forecasting of climate-related disasters, aiding in the development of effective preparedness and mitigation strategies.
/web/2025/06-250314-cd

Buildings that Talk to the Power Grid

(EMPA, March 18, 2025)

Researchers from Empa's Urban Energy Systems Laboratory, led by Dr. Hanmin Cai and Dr. Federica Bellizio, have made a significant leap in building energy management. Their system cuts carbon emissions by over 10% and turns buildings into active participants in the energy grid, boosting supply reliability without compromising comfort. This advancement highlights a big step towards sustainable urban living by integrating renewable energy sources and stabilizing the grid. The team used a predictive control algorithm in a field experiment, combining photovoltaic systems, battery storage, heat pumps, and EV charging stations. This strategy ensures buildings use renewable energy efficiently while keeping occupants comfortable.
/web/2025/06-250318-0d

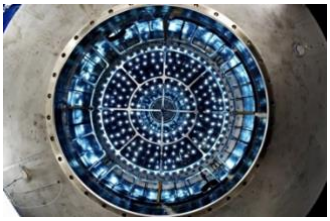
Glacier Melt Puts Unique Microbial Ecosystems under Threat

(EPFL, March 24, 2025)

As glaciers melt, the streams they feed are set to turn greener, teeming with more algae and bacteria, signaling a major shift in the microbial world vital to our environment. This change, led by a team from EPFL and other partner institutions, moves away from glacier-specific species adapted to harsh conditions. Such a shift could upset crucial ecological functions like water purification and nutrient cycling, highlighting the urgent need for conservation to combat climate change impacts. By analyzing genetic data from bacteria in 164 glacier-fed streams worldwide, the researchers predict how bacterial groups will react to climate change.
/web/2025/06-250324-1a

Pollutants Often Originate in the Air

(Paul Scherrer Institute, March 31, 2025)

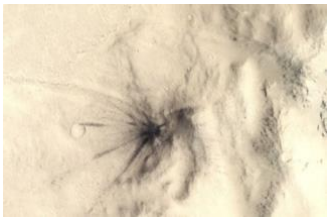


Researchers from the Paul Scherrer Institut and CERN, led by Dr. El Haddad Imad, have shown that harmful particulate matter from car emissions and biomass burning forms only after several oxidation steps, indicating that pollution affects a larger area than previously believed. This finding challenges the old idea that pollutants mainly form near their sources, revealing that substances like toluene and benzene transform into solid particles after multiple oxidation steps, thereby extending the theoretical reach of pollution. The team conducted their study in CERN's CLOUD simulation chamber, replicating urban air pollution to track organic aerosol formation. Through mobility analysis and mass spectrometry, they identified the size and molecular composition of particles and vapors, while monitoring precursor gases and their transformation. This breakthrough improves our understanding of organic aerosol formation and spread, offering hope for more effective pollution control measures.
/web/2025/06-250331-1c

7. Engineering / Robotics / Space

Mars Shakes More Than Expected

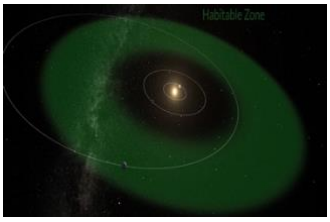
(University of Bern, February 04, 2025)



Researchers from the University of Bern, NASA Jet Propulsion Laboratory, Imperial College London, Brown University, and ETH Zurich, led by Dr. Valentin Bickel and Dr. Constantinos Charalambous, found that Mars experiences more intense and deeper seismic shaking from meteoroid impacts than previously thought. Using a machine learning method to analyze thousands of satellite images for new craters formed during the InSight mission's seismic monitoring period, and comparing these with seismic data, the team discovered 123 new impacts and linked 49 seismic events to them. This work challenges previous beliefs about how seismic waves travel through Mars and increases the estimated impact rate by 1.6 to 2.5 times. This breakthrough revises our understanding of Mars' internal structure and seismic activity, suggesting we need to update models of the Martian interior. It highlights the value of combining seismic data with orbital imagery to fully understand the planet's geophysical properties.
/web/2025/07-250204-29

Super-Earth Discovered in Variable Habitable Zone

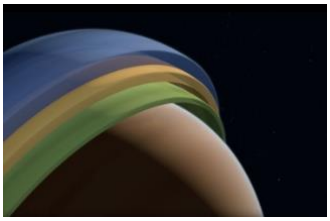
(University of Geneva, February 11, 2025)



A team led by Dr. Xavier Dumusque and Michaël Cretignier from the University of Geneva and Technology & Innovation Platform of NCCR PlanetS discovered HD 20794 d, a super-Earth with an orbit that occasionally enters the habitable zone. They achieved this by analyzing over two decades of data with the ESPRESSO and HARPS instruments, using YARARA, a UNIGE-developed algorithm, to sift through noise and spot planetary signals. This finding opens a new window for exploring life's potential conditions in the universe. HD 20794 d's varying habitable zone position lets researchers examine how water transitions from ice to liquid, crucial for life.
/web/2025/07-250211-24

This Exoplanet's Extreme Climate Defies All Models

(University of Geneva, February 19, 2025)



Researchers have discovered that winds on WASP-121b reach speeds of 70,000 km/h, far surpassing the most intense winds in our Solar System and revealing a climate that defies our imagination. The team, including scientists from the University of Geneva, European Southern Observatory (ESO), Lagrange laboratory, and the PlanetS National Research Center, led by Dr. Julia Victoria Seidel and Dr. David Ehrenreich, found a complex three-layer atmospheric structure. This structure includes iron vapors carried by strong updrafts, a rapid equatorial jet stream, and upper layers that expel lighter gases into space, challenging our current understanding of planetary weather.
/web/2025/07-250219-22

Tiny Robot Swims Silently, Carries Heavy Loads

(EPFL, February 26, 2025)

Researchers from the Max Planck Institute for Intelligent Systems and EPFL, led by Dr. Florian Hartmann and Prof. Dr. Herbert Shea, have created a swimming robot smaller than a credit card that can navigate tight spaces and carry loads much heavier than itself. Imitating marine flatworms, this 6-gram device moves silently through water at speeds of 12 centimeters per second, making it ideal for discreet ecological monitoring and pollution research. The team achieved this innovation by improving soft actuators and developing new locomotion methods, along with compact high-voltage electronics. This robot can autonomously follow light and move in any direction, showcasing unprecedented maneuverability and autonomy.
/web/2025/07-250226-77

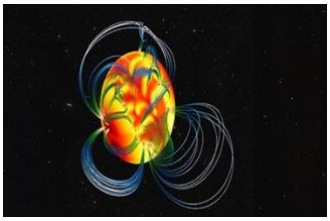
Rust-like Mineral Responsible for the Color of Mars

(University of Bern, February 26, 2025)

Scientists have uncovered why Mars is red, revealing a history of water that hints at a habitable past. The team, led by first author Dr. Adomas Valantinas from the University of Bern in collaboration with Brown University, found that ferrihydrite, a water-rich iron mineral, colors Martian dust red — not hematite as previously thought. This discovery suggests Mars was once wet and potentially habitable, given that ferrihydrite forms in water and needs oxygen to develop. The researchers, also including Prof. Dr. Nicolas Thomas and Dr. Antoine Pommerol, made these findings by analyzing data from space probes and Mars rovers, and creating Martian dust analogs in the lab.
/web/2025/07-250226-97

How the Universe's Strongest Magnets Are Born

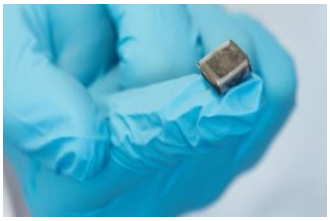
(University of Geneva, March 03, 2025)



Astronomers have unveiled how magnetars, the universe's most magnetic objects, form. The team led by Dr. Andrei Igoshev, including researchers from the University of Geneva, Dr. Paul Barrère, Dr. Jérôme Guilet, Prof. Raphaël Raynaud, simulated magnetar formation and evolution, showing that magnetars can arise from proto-neutron stars powered by supernova matter, even with weak magnetic fields. This finding overturns the previous belief that magnetar origins depend solely on their progenitors' spin, highlighting instead the role of accretion and magnetic dynamo processes. Using simulations, the team tracked a proto-neutron star's accelerated rotation from matter falling back onto it after a supernova, over a million years.
/web/2025/07-250303-71

3D Printed Artificial Muscles for Next-gen Robotics

(EMPA, March 12, 2025)



Researchers at Empa and ETH Zurich, led by Patrick Marcel Danner and Dr. Dorina Opris, have developed a method to create soft, elastic fibers that act like real muscles using 3D printing. This breakthrough could change robotics, prosthetics, and medical devices by giving them lifelike movement and durability. The team, including Tazio Pleij and Prof. Dr. Jan Vermant at ETH Zurich, used two silicone-based inks to print human-like artificial muscles that can contract and relax when powered by electricity. This innovation offers a quiet, lightweight alternative to traditional machinery actuators and could see applications in virtual reality or artificial organs.
/web/2025/07-250312-63

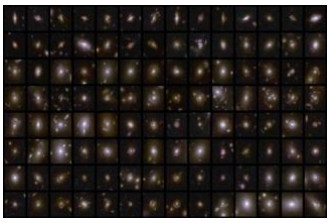
Robotics and Spinal Stimulation Restore Movement in Paralysis

(EPFL, March 14, 2025)

Researchers at NeuroRestore and the EPFL Biorobotics Laboratory, led by Dr. Gregoire Courtine and Dr. Jocelyne Bloch, have developed a system that combines an implanted spinal cord neuroprosthesis with rehabilitation robots. This system stimulates muscles in sync with robotic movements, greatly improving mobility immediately and aiding long-term recovery for spinal cord injury patients. This innovation not only brings new hope for mobility restoration but also proves its effectiveness in real-world applications, enabling patients to walk and cycle outside. The team designed a spinal cord stimulator that works with robotic-assisted movements, using wireless sensors to monitor limb motion and adjust stimulation instantly. This dynamic method marks a major step forward in rehabilitating spinal cord injuries.
/web/2025/07-250314-26

Euclid Telescope Unveils Cosmic Mysteries

(University of Geneva, March 20, 2025)



Mapping the last 10 billion years of cosmic history, researchers at the European Space Agency (ESA) and the University of Geneva, led by Dr. Stéphane Paltani and Dr. Martin Kunz, have used the Euclid space telescope to observe over 26 million galaxies. This mission provides a 3D view of dark matter distribution, challenging existing gravitational theories and possibly reshaping our understanding of dark matter, dark energy, and the expansion of the Universe. Euclid's advanced imaging technology captures detailed images of galaxies, enabling the team to analyze cosmic structures and phenomena with unprecedented clarity. This breakthrough has also led to the identification of approximately 100,000 strong galaxy-to-galaxy gravitational lenses, a hundredfold increase over previous discoveries.
/web/2025/07-250320-27

8. Physics / Chemistry / Math

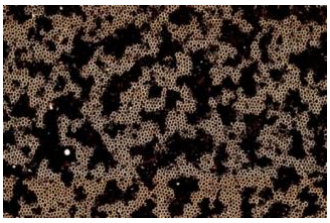
Ice Streams Move Due to Tiny Ice Quakes

(ETH Zurich, February 07, 2025)

Researchers from ETH Zurich and the Alfred Wegener Institute, including Professors Andreas Fichtner and Olaf Eisen, have discovered numerous tiny ice quakes deep within ice streams. They achieved this by inserting a fibre-optic cable into a 2,700-metre-deep borehole to capture seismic data. These recordings reveal weak quakes spreading over hundreds of metres, debunking the previous notion that ice streams flow smoothly. Instead, they exhibit a continuous stick-slip motion. This finding resolves the mismatch between computer simulations of ice stream flows and satellite observations, paving the way for more accurate predictions of ice mass loss and sea-level rise. Incorporating ice quake dynamics into simulations allows for finer estimates. Moreover, this discovery sheds light on the creation of fault planes between ice crystals, improving our understanding of ice stream deformation at a micro-scale.
/web/2025/08-250207-7f

Scientists Discover Mechanism Driving Molecular Network Formation

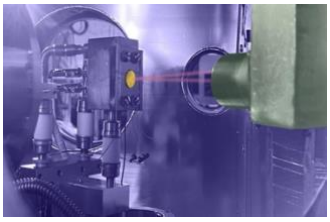
(EPFL, February 17, 2025)



Researchers at EPFL, led by Prof. Georg Fantner and Prof. Maartje Bastings, have found that interface flexibility, rather than chemical bond strength, plays a key role in the formation of crystalline supramolecular networks. By using nanoengineered DNA stars and adjusting the strand lengths, they were able to control their flexibility. Short, rigid arms encouraged the formation of stable hexagonal networks, while long, flexible arms did not. The team's findings open new doors for designing proteins and molecules for precise self-assembly, potentially transforming cellular nanotherapies. Manipulating interface flexibility could enable the construction of supramolecular networks from proteins or offer new ways to break down harmful molecular aggregations, such as those seen in Alzheimer's disease. This approach introduces a groundbreaking paradigm in molecular assembly and network formation, promising advancements in spintronics and the development of innovative electronics and therapeutic strategies.
/web/2025/08-250217-12

Quantum Interference Observed in Methane Collisions

(EPFL, March 03, 2025)



Nearly a century after scientists first observed quantum interference with electrons, a team from EPFL, the Max Planck Institute for Multidisciplinary Sciences, and The University of New Mexico has found a new type of quantum interference affecting the rotational and vibrational states of methane molecules during collisions with gold surfaces. This discovery challenges previous assumptions in classical physics, offering a new perspective on surface chemistry and materials science. The team used a pump laser to excite methane molecules into a specific quantum state before they collided with a pristine gold surface. After the collision, a tagging laser tuned to precise energy levels detected the scattered molecules' quantum states, uncovering quantum interference effects dictated by symmetry rules for state transitions. This breakthrough highlights the importance of quantum interference and symmetry in determining molecular behavior when interacting with surfaces, potentially transforming our approach to chemical processes at the nanoscale.
/web/2025/08-250303-c9

Breakthrough in the Recycling of Plexiglas

(ETH Zurich, March 05, 2025)

Researchers at ETH Zurich, led by Athina Anastasaki, have developed a groundbreaking method that recycles Plexiglas (PMMA) into its monomer components with a 94 to 98 percent recovery rate. This technique, which uses a chlorinated solvent and UV light to break down the polymer chains, tackles the global issue of managing the 3.9 million tonnes of Plexiglas produced yearly. It offers a sustainable path forward for this commonly used material by allowing the purified monomers to be reused in new Plexiglas production. The team's discovery came unexpectedly during a control experiment and has the potential to revolutionize Plexiglas recycling. Their process, which does not require specific catalysts, remains effective even with various additives, highlighting its versatility and efficiency.
/web/2025/08-250305-60

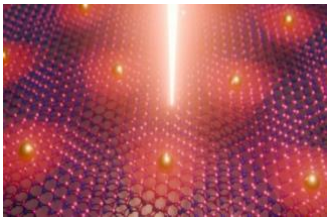
New Empa Laboratory to Unlock the Quantum Potential of Carbon

(EMPA, March 12, 2025)

Empa researchers Dr. Roman Fasel, Dr. Stepan Kovarik, and Dr. Yujeong Bae are harnessing new possibilities in quantum computing and related technologies. With the newly opened CarboQuant laboratory at Empa, their work will aim to fast track quantum technologies into the real world. The CarboQuant laboratory represents a significant step forward in carbon-based quantum research, and is supported by the Werner Siemens Foundation and the Swiss National Science Foundation. This cutting-edge facility is equipped with state-of-the-art scanning tunneling microscopes featuring high-frequency microwave capabilities, which allow researchers to visualize and manipulate individual atoms and their quantum states with unprecedented precision.
/web/2025/08-250312-ea

A New Method for Studying Electron Interactions in Materials

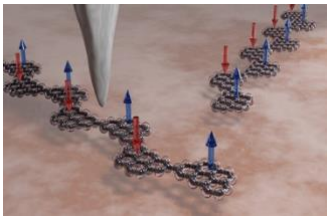
(ETH Zurich, March 12, 2025)



By twisting two layers of nearly diamond-hard material by less than 2 degrees, an ETH Zurich team led by Natasha Kiper and Dr. Ataç Imamoğlu, discovered a new way to control and explore electron interactions in semiconductors. Using two layers of hexagonal boron nitride, twisted slightly, they generated a unique field that simulates an artificial crystal lattice. This setup lets the researchers observe electron behavior via excitons, electron and hole pairs produced by light. Their breakthrough provides a controllable method to study electron interactions, promising advances in quantum technologies, material science, and superconductivity.
/web/2025/08-250312-c4

World First: Empa Scientists Bring Theoretical Heisenberg Models to Reality

(EMPA, March 17, 2025)



Empa researchers have brought theoretical quantum physics models to life using nanographenes, making quantum effects experimentally testable. This could revolutionize quantum technology development. Led by Prof. Dr. Roman Fasel and Dr. Pascal Ruffieux, the nanotech surfaces laboratory recreated the one-dimensional alternating Heisenberg model and its "sibling" model in the lab with synthetic materials. This achievement will facilitate the study quantum models and effects, moving technologies closer to practical use. The team used a synthetic bottom-up approach with nanographenes, such as so-called Clar's goblets and Olympicene molecules, to create alternating and homogeneous Heisenberg chains.
/web/2025/08-250317-8b

Rare Particle Decay Challenges Standard Model, Hints at New Physics

(EPFL, March 20, 2025)

EPFL scientists have observed the rarest particle decay ever recorded. Specifically, they have observed the decay of a kaon, a particle made from a quark and an antiquark, into a pion and a neutrino-antineutrino pair for the first time, challenging the Standard Model of physics. This rare event, detected by a team led by Dr. Radoslav Marchevski from CERN, occurred at a rate 50% higher than predicted, potentially hinting at further discoveries beyond the current model of physics. The breakthrough came from analyzing extensive data from CERN's NA62 experiment from 2016 to 2022 and using a new neutrino-tagging technique.
/web/2025/08-250320-82

Soda Lakes: Earth's First Cradle of Life?

(ETH Zurich, March 27, 2025)

Challenging conventional thinking, researchers at ETH Zurich's Centre for Origin and Prevalence of Life, led by Earth scientist Dr. Craig Walton, found that large soda lakes without natural runoff could sustain high phosphorus concentrations long enough to possibly be the cradle of life on Earth. This discovery sheds light on a plausible origin of life and the unique conditions that may have enabled life to emerge billions of years ago. The team conducted detailed laboratory experiments to identify the necessary conditions for prebiotic chemistry, focusing on phosphorus concentration. They explored how large soda lakes could have supported the chemical reactions necessary for the emergence of life, offering new insights into the early Earth environments capable of holding the building blocks of life.
/web/2025/08-250327-01

Listen to Quantum Atoms Talk Together Thanks to Acoustics

(EPFL, March 28, 2025)

Using sound, a team from EPFL's Laboratory of Wave Engineering, led by Mathieu Padlewski, Prof. Dr. Herve Lissek, and Associate Professor Dr. Romain Fleury, have developed a new acoustic system that explores condensed matter properties without the usual quantum state sensitivity issues, offering a promising route for quantum-inspired computing that processes vast data amounts simultaneously while preserving the fragile nature of quantum phenomena. The researchers designed a metamaterial with tunable "acoustic atoms" - small cubes linked with spaces for speakers or microphones.
/web/2025/08-250328-bf

AI in a Mini-lab or Putting Precision to the Test

(ETH Zurich, March 31, 2025)

Researchers at ETH Zurich, Charité University Hospital in Berlin, the University of Liège, have created "causal chambers," a breakthrough in AI testing. Led by Juan L. Gamella, Dr. Peter Bühlmann, and Prof. Dr. Jonas Peters, these mini-labs significantly improve AI's understanding and modeling of causal relationships, crucial for its accurate operation in real-life situations. This advancement opens new possibilities in fields like medicine, economics, and climate research by enabling AI systems to comprehend the complexities of natural systems. These mini-labs, acting as physical testbeds, mimic real-world conditions to rigorously evaluate AI algorithms. By focusing on causality—the interaction and impact of different system elements—they allow for enhanced AI model understanding and refinement.
/web/2025/08-250331-59

9. Architecture / Design

Holograms Boost 3D Printing Efficiency and Resolution

(EPFL, February 17, 2025)

Researchers from EPFL and the University of Southern Denmark, led by Dr. María Isabel Álvarez Castaño, Prof. Christophe Moser, and Prof. Jesper Glückstad, have transformed tomographic volumetric additive manufacturing (TVAM). They developed a method that projects a 3D hologram onto a spinning vial of resin. Their technique, named HoloTile, uses the phase of light waves to generate holograms, significantly enhancing energy efficiency and resolution by eliminating speckle noise, a frequent problem in holographic projections. This innovation allows for the swift creation of intricate 3D objects, including miniature boats and life-sized tissues, with unparalleled precision and a 25-fold decrease in optical power needs. It marks a significant leap forward, especially in biomedical applications, by making bio-printing faster, more precise, and energy-efficient. By manipulating holographic phases, EPFL's method not only sets a new benchmark for volumetric additive manufacturing systems but also promises rapid production of detailed and delicate structures in less than a minute.
/web/2025/09-250217-c9

10. Economy, Social Sciences & Humanities

Rising Wages Drive Innovation in Automation Technology

(University of Zurich, March 04, 2025)

A 1% increase in wages results in a 2% to 5% rise in automation innovation. Researchers from the University of Zurich, led by Associate Professor David Hemous, found that higher minimum wages for low-skilled jobs significantly push firms to invest in automation technologies, thus boosting innovation in this sector. On the other hand, higher wages for skilled labor can decelerate automation innovation due to the increased costs of operating and installing such technologies. This study reveals the complex link between labor costs and the speed of technological progress, especially in automation. The team merged a new classification of automation patents from European patent data with a comprehensive macroeconomic dataset from 41 countries. This method allowed them to track automation-related patents at the company level and examine how wage changes affect innovation trends worldwide. Their findings support the theory that labor costs drive technological progress and underscore the importance of minimum wage policies and labor market reforms in encouraging firms to innovate in automation technologies.
/web/2025/10-250304-f6

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

Smart Microphones Track Animal Calls

(EPFL, February 10, 2025)

EPFL researchers Olivier Stähli and Noah Schmid, through their startup Synature AG, have created a smart microphone system that uses artificial intelligence to identify different animal species and their calls, distinguishing even between adults and offspring. The system, built on a new transformer-based architecture, detects animal sounds more accurately with less data and extends battery life for longer recording times. It proved its effectiveness in tracking wolf populations among other uses. This innovation offers more accurate wildlife monitoring and ecosystem insights, revealing the impacts of habitat changes and aiding biodiversity. Synature AG's system could potentially improve wildlife tracking, and help policymakers make informed decisions in regard to environmental conservation efforts.
/web/2025/11-250210-0a

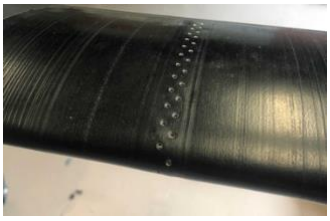
Bacteria Transform Construction with Use in Biocement

(EPFL, February 19, 2025)

A team led by Dr. Dimitrios Terzis from EPFL, alongside the University of Applied Sciences and Arts of Southern Switzerland and Swiss startup Medusoil, have discovered naturally occurring bacterial strains that cut biocement production costs by 40%. This breakthrough reduces expenses and slashes the carbon footprint by over 55%, offering a more eco-friendly alternative to traditional cement. The team screened 50 bacteria strains from farmlands in Ticino, identifying the most efficient one for producing the enzyme needed for carbonate formation. They then used this strain to solidify a 1.5-meter-high sand column, proving its biocementation effectiveness. This innovation paves the way for the construction industry to adopt sustainable practices, potentially transforming infrastructure building and maintenance. The applications of biocement also range from reinforcing dams to preventing soil erosion.
/web/2025/11-250219-44

Intelligent Plaster Boosts Wind Turbine Efficiency

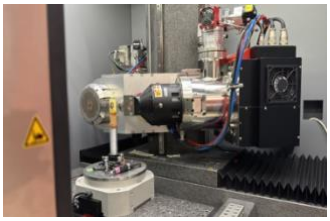
(ETH Zurich, February 21, 2025)



Aerosense, dubbed an "intelligent plaster" for wind turbine rotor blades, represents a significant advancement in sustainable energy technology. Developed by Dr. Imad Abdallah and his team at ETH Zurich spin-off RTDT Laboratories, this hardware/software solution boosts electricity production, reduces material consumption, and could lower wind turbine production costs. By refining rotor blade design, Aerosense aims to cut material use by five to ten percent, paving the way for more efficient and sustainable energy generation. The Aerosense system attaches to rotor blades to gather detailed aerodynamic, acoustic, and structural data, which it wirelessly transmits in real time. Initially aimed at predictive maintenance, this data collection has become key in enhancing wind turbine design.
/web/2025/11-250221-73

More Precise Cancer Diagnosis with 3D Imaging and Machine Learning

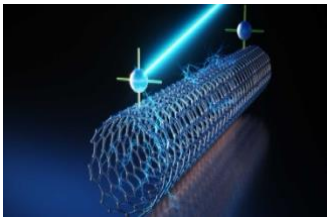
(EMPA, February 26, 2025)



Researchers from Empa, the University of Bern, and Inselspital Bern, led by Dr. Robert Zboray, are transforming thyroid cancer diagnosis with a new 3D tissue analysis method. This technique uncovers deep-layer tumor characteristics that traditional methods often overlook, greatly improving diagnosis accuracy and speed. This breakthrough allows for the examination of entire biopsy blocks without damaging the tissue, providing a detailed three-dimensional view of the tumor. This method integrates non-invasive X-ray phase-contrast micro-computed tomography (micro-CT) with machine learning, and enables a more streamlined diagnostic process. It could replace complex molecular analyses with a simpler, more effective imaging technique, significantly enhancing cancer care by offering a quicker, more accurate path to treatment decisions.
/web/2025/11-250226-fe

A Low-cost Sensor for Oxygen Level Measurement

(ETH Zurich, March 13, 2025)



ETH Zurich's Lionel Wettstein and Assistant Professor Dr. Máté Bezdek have pioneered a light-activated, low-cost sensor that accurately measures oxygen levels in gas mixtures. This innovative device, crafted from carbon nanotubes and titanium dioxide, offers unparalleled precision and efficiency at a low cost. Its standout feature is its ability to function optimally at room temperature, eliminating the need for additional heating. This advancement could enhance environmental monitoring, healthcare, and various industrial processes by providing sensitive, selective, and energy-efficient oxygen detection. The sensor's design mimics dye-sensitized solar cells and activates under green light to adjust its electrical resistance when it encounters oxygen. This feature facilitates real-time, portable oxygen monitoring, setting a new standard for devices that need to constantly check gas compositions.
/web/2025/11-250313-f4

Readying Robots for New Tasks

(ETH Zurich, March 28, 2025)

Robots are now quickly adapting to new tasks, and transforming traditional automation. Dr. Moritz Geilinger and Simon Huber from ETH Zurich and Flink Robotics have created an algorithm that improves robot packing and loading, an innovation that makes package handling more flexible and efficient, benefiting industries that rely on shipping. The breakthrough combines Geilinger's method for predicting object movements and Huber's technique for avoiding collisions. Together, these advancements enable robots to efficiently pack varied items and collaborate on lifting tasks.
/web/2025/11-250328-5a

12. General Interest

Women at a Disadvantage after Cardiac Arrest

(University of Basel, February 07, 2025)

Researchers at University Hospital Basel and the University of Basel, led by Dr. Caroline Gebhard and Dr. Simon A. Amacher, have found that women are 18% less likely than men to be admitted to an ICU following a cardiac arrest. They also receive less invasive care and have a higher mortality rate. Their analysis of 41,733 patients in Switzerland from 2008 to 2022, including trends in ICU mortality and the use of intensive care therapies, shows a clear gender gap in cardiac arrest treatment. This discovery signals a critical need to tackle gender disparities in healthcare. By ensuring equal care for all cardiac arrest patients, we could save more lives. The University Hospital Basel team's work underscores the importance of integrating gender considerations into medical protocols to erase treatment disparities and boost survival rates for women.
/web/2025/12-250207-73

Omega-3s Can Slow Down Aging Process

(University of Zurich, February 11, 2025)

Researchers at the University of Zurich and Altos Labs Cambridge, led by Dr. Heike A. Bischoff-Ferrari and Dr. Steve Horvath, found that omega-3 fatty acids can slow biological aging by up to four months. They observed an even greater effect when combining omega-3s with vitamin D and strength training. The team conducted the DO-HEALTH study with 777 participants over 70 years old, testing eight treatment combinations over three years. They used epigenetic clocks to measure biological age in blood samples, marking a significant advancement in aging research. This breakthrough suggests that a combination of dietary supplements like omega-3 fatty acids and vitamin D, along with regular strength training, can reduce cancer risk, prevent premature frailty, and slow down the aging process. The findings from the University of Zurich highlight the impact of non-pharmaceutical interventions on healthspan.
/web/2025/12-250211-e7

Trees in Cities Could Save Lives

(ETH Zurich, March 20, 2025)

Urban jungles with well-placed trees could extend lives. Dr. Chi Dengkai and his team from ETH Zurich and the National University of Singapore found that neighborhoods with plenty of well-arranged trees see fewer deaths than less green areas. This study shows that urban forestry can improve public health, especially where air quality is poor and temperatures are high, by more than just making cities look better. The researchers analyzed tree canopy data to study green space structure within a 500-meter radius of residents' homes, focusing on tree clusters' size, closeness, connectivity, shape complexity, and fragmentation. They linked this with the survival data of over six million adults in Switzerland from 2010 to 2019. Their findings underline the significance of not only the number of trees but also their spatial organization for health. This research advises urban planners that increasing tree coverage and thoughtful arrangement could lower death rates in cities globally.
/web/2025/12-250320-65

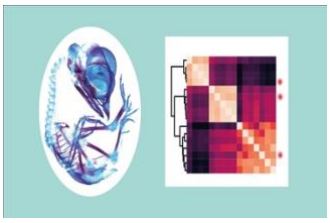
Unraveling The Origin of Bird Feathers

(University of Geneva, March 24, 2025)

Researchers at the University of Geneva, led by Dr. Rory Cooper and Prof. Michel Milinkovitch, discovered a key pathway in the development of feathers in birds, revealing how they developed since the time of the dinosaurs. By inhibiting a pathway during a critical embryonic stage, they created primitive feather structures similar to early bird ancestors. This finding, along with observing dormant follicles' spontaneous reactivation, highlights the genetic interactions essential for feather formation. This work offers new insights into the genetic networks that evolved, shedding light on birds' evolutionary paths and the development of new traits. The team showed that feather evolution reflects a delicate balance between genetic design and evolutionary innovation. Their study not only maps out the gene interactions that have transformed over time but also emphasizes the resilience and adaptability of feathers through evolutionary history.
/web/2025/12-250324-a3

Cartilage and Bone Development: Three Paths to Skeleton Formation

(University of Basel, March 31, 2025)



Researchers from the University of Basel, led by Dr. Menghan Wang and Dr. Ana Di Pietro Torres, have discovered that vertebrate skeletal cells vary significantly across different body regions, each possessing unique gene regulatory mechanisms. This finding challenges the previous belief that skeletal cells are uniform and highlights their importance as distinct cell types. This diversity in skeletal cells plays a crucial role in the evolutionary success of vertebrates, enabling them to adapt and survive in varied environments by evolving and specializing skeletal parts independently. Using single-cell analyses on chicken embryos, the team has mapped the gene regulatory mechanisms that guide skeletal cell development in various body regions. This approach not only clarifies the developmental pathways of skeletal cells but also opens up new possibilities for targeted treatments of bone diseases and developmental disorders.
/web/2025/12-250331-d5

Ketogenic Diet: A New Ally in Psychiatry and Cancer Treatment

(RTS Info, March 31, 2025)

A clinical trial has shown the ketogenic diet's significant benefits in managing psychiatric conditions, offering a fresh perspective beyond traditional treatments. Researchers from Geneva University Hospitals (HUG), the University of Pennsylvania, the University of Geneva, and Institut Ludwig, led by Dr. Christophe Kosinski and Dr. Mikaël Pittet, discovered that this high-fat, low-carb diet not only promotes weight loss and well-being in psychiatric patients but also enhances cancer immunotherapy and helps manage diabetes and epilepsy. This finding highlights the diet's role as a versatile therapeutic tool, emphasizing the need for medical supervision to ensure benefits outweigh risks. The study's approach involves a diet that cuts down sugar and carbs while boosting fat intake, leading to ketone body production. Recent research, including trials on psychiatry, shows its potential to improve cancer immunotherapy outcomes and lessen side effects in schizophrenia or bipolar disorders. The ketogenic diet's unique ability to induce ketone body production makes it a promising option for a variety of conditions, from hard-to-treat epilepsy to certain cancers.
/web/2025/12-250331-e7

13. Calls for Grants/Awards

Super-fast Computers for AI: Torsten Hoefler Awarded Prestigious ACM Prize

(ETH Zurich, March 27, 2025)

Prof. Torsten Hoefler, Chief Architect for AI and Machine Learning at the Swiss National Supercomputing Centre (CSCS), has been awarded the ACM Prize for his work, that enables AI models to train at unparalleled speeds using vast data volumes. Leading a team at ETH Zurich and CSCS, Hoefler has dramatically boosted parallel computer systems' performance, in a break-through that slashes costs and expands the capabilities of supercomputers, allowing for the swift processing of AI algorithms across hundreds of thousands of nodes. This will benefit scientific research and industry applications that depend on data analysis and machine learning. Hoefler's innovations in network architectures, routing algorithms, and data flow optimization have made efficient data exchange and processing possible across large computer networks. His methods are now integral to the world's top computers, like the Alps supercomputer at CSCS.
/web/2025/13-250327-fe

Upcoming Science and Technology Related Events

World Creativity and Innovation Day
April 21
https://is.gd/DmwINP
Industrial Products & Engineering
Palais des Nations, Geneva

IEEE Robosoft 2025
April 23-26
https://robosoft2025.org/
Scientific, Research & Development
SwissTech Convention Center, Lausanne

SCS Spring Meeting 2024
April 24
https://sm25.scg.ch/
Pharmaceutical & Biotechnology
University of Bern

Hybrid Superconductor-semiconductor Devices
April 27 – May 2
https://is.gd/eiQey7
Electronics & Electrical Goods
Eurotel Victoria Les Diablerets

Geneva Science Diplomacy Week
May 5-9
https://is.gd/1CQ0KV
Scientific, Research & Development
Venue to be announced, Geneva

Swiss Biotech Day
May 5-6
https://swissbiotechday.ch/
Pharmaceutical & Biotechnology, Scientific, Research & Development
Congress Center Basel

ntopConf '25
May 7-8
https://www.ntop.org/ntopconf25/
IT, Web & Electronic, AI
Venue to be announced, Zurich

Women in Data Science Zurich Conference
May 9
https://www.wids.ch/
IT, Web & Electronic, AI
Swiss Re Center for Global Dialogue, Rüschlikon

Startup Days
May 14
https://startupdays.ch/
Business & Economy, IT, Web & Electronic, AI
Kursaal, Bern

Innovations Forum Energie
May 15-16
https://is.gd/hr3WST
Power, Renewable & Storage Energy
Mariott Hotel, Zurich

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