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Science-Switzerland, October – November 2022

News on Swiss science, technology, education and innovation

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Switzerland Remains Top of Global Talent Competitiveness Index

(INSEAD, November 04, 2022)

Switzerland topped the INSEAD's 2022 Global Talent Competitiveness Index, as it has in all 8 previous editions, followed by Singapore and Denmark. Zurich, Lausanne and Geneva appear in the top 10 cities, with Zurich reaching 4th place. This annual benchmarking report measures how countries and cities grow, attract and retain talent. Switzerland shines in particular in enabling and retaining talent, and boasts a large pool of vocational and technical skills. It is also good at attracting talent, although improving gender parity would further increase attractiveness. It also excels in formal education as well as lifelong learning.
/web/2022/00-221104-47

Scientists Identify Neurons that Restore Walking after Paralysis

(EPFL, November 11, 2022)

A new study by scientists at the .NeuroRestore research center, led by Grégoire Courtine, EPFL professor, and Jocelyne Bloch, CHUV neurosurgeon, has identified the type of neuron involved in paralysis recovery. This discovery, published in Nature, marks a fundamental clinical breakthrough. The multi-year research program focused on patients who had been paralyzed by a spinal cord injury, and to whom the scientists were able to restore some motor function through epidural electrical stimulation. This improvement lasted even after the stimulation ended, which suggested that the nerve fibers used for walking had reorganized. The scientists identified a family of neurons, which express the Vsx2 gene, that were essential for the recovery of motor function after spinal cord injury. This discovery paves the way to more targeted treatment for paralyzed patients.
/web/2022/00-221111-40

Switzerland Has New ESA Astronaut

(State Secretariat for Education, Innovation and Research, November 23, 2022)

ESA announced their new class of astronauts on Nov 23, 2022, featuring five career astronauts, eleven reservists, and one astronaut with a disability who will be part of a feasibility project. This was the first call for astronauts since 2008. Marco Alain Sieber, a Bernese practicing medical doctor, was selected as one of the five career astronauts of this new class out of more than 22,000 applications. After training, he will take part in flights linked to ESA programs run in cooperation with NASA, which may include the ISS, the Lunar Gateway and ARTEMIS.
/web/2022/00-221123-34

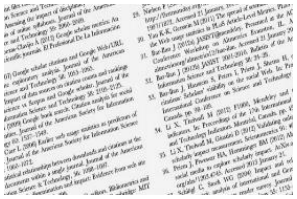
Water-Activated Paper Battery in TIME's Best Inventions List

(Empa, November 11, 2022)

Gustav Nyström and his team from Empa's Cellulose & Wood Materials Laboratory made it onto the TIME's list of the most important inventions of the year with their disposable paper battery. Their invention consists in a strip of paper onto which multiple different inks are printed, containing graphite flakes zinc powder, and/or carbon black. Salt is dispersed on the paper and one end is dipped in wax on the side that connects to wires. When wet with a drop of water, the salt dissolves and charged ions are released, which activates the battery. The redox reactions with ambient oxygen generate an electrical current that can be used to power an electrical device. This invention, which could be made to be biodegradable, could significantly minimize the impact of disposable, low-power electronics.
/web/2022/12-221111-85

112 Swiss-based Researchers in 2022's Highly Cited Researchers List

(ETH Zurich, November 15, 2022)



The Highly Cited Researchers, a list compiled by the Institute for Scientific Information, highlights which researchers have been cited most by their peers, regarded as a measure of how influential they are. This year's list of 6,938 researchers are the top 1% of their field by that metric. In 2022, 112 of those top 1% were based in Switzerland, which means that 1.6% of the world's most influential researchers are linked to Swiss institutions. This solidifies Switzerland's place on the global research and talent stage.
/web/2022/12-221115-88

1. Policy

Swiss Entrepreneurial Activity Remains High

(startupticker.ch, October 06, 2022)

Despite the impending energy crisis, the pandemic measures, and the escalating insecurity, starting a business is still popular in Switzerland. In the first nine months of the current year, 37,092 new companies were registered with the Swiss Commercial Register, according to the a recent study by the IFJ . This represents a slight decrease of -1.6% from the previous year, but an 8.5% increase over the previous five years. In this context, Public Health (+12.3%) and Transport & Logistics (+10.9%) constitute the top-growing industries. In addition, an overview of the previous five years reveals a steady increase in the number of new companies founded in the first three quarters of each year, despite a slight decline in the overall number of companies. The first three quarters of 2022 were significantly above the average of the previous five years (+8.5%).
/web/2022/11-221006-5d

2. Education

Summer Camps Promote Altruism in Children

(University of Geneva, November 07, 2022)

A UNIGE research team, led by Dr. Jennifer Malsert and Yves Gerber, conducted a comparative study on a cohort of school-aged children, some of which attended summer camps, and found that these social holidays favored their development and increased the altruism they displayed. The study followed 256 children aged 6 to 16, of which 145 took part in overnight holiday summer camps. They completed a questionnaire both before and after their camp experience, answering questions that reflected their self-esteem and their altruism. Analyzing the results showed an increase in altruism from the 'camp' group, and a decrease from the 'home' one. The children's self-esteem remained stable in both groups. Further studies would need to be conducted on longer time spans, to estimate how durable the positive impacts are.
/web/2022/02-221107-17

Cognitive Flexibility Enhances Mathematical Reasoning

(University of Geneva, November 29, 2022)

A research team from the University of Geneva studied the effect of cognitive flexibility on students' proportional reasoning. They conducted an experiment involving 28 classes over the course of one school year, with one group receiving 12 mathematics lessons based on multiple categorization while the other

received traditional lessons. Multiple categorization is the ability to adopt several points of view on the same problem. Results showed that students in the experimental group performed better and proposed more diversified strategies, regardless of socio-economic backgrounds. This suggests that multiple categorization can help improve cognitive flexibility, enabling students to reinterpret mathematical statements more accurately and effectively. This could provide a way to overcome preconceived ideas which limit learning in mathematics and other disciplines.
/web/2022/02-221129-19

3. Life Science

Novel Radionuclide-Based Method to Diagnose Tumors

(Paul Scherrer Institute, October 03, 2022)

A team of researchers led by Dr. Martin Behe from the Paul Scherrer Institute, as well as ETH Zurich Professor Viola Vogel, recently exploited a molecular trick to significantly reduce the potential-side effects of an innovative method to diagnose tumors, which is based on so-called radiopharmaceuticals – medicines, administered by injection, that can be used to detect and attack tumors in the body. However, despite their promising potential, the radionuclide not only accumulates in the tumor, but also in the kidneys, which in turn interferes with imaging, as well as can damage the kidneys. To address this issue, the team therefore modified a peptide known as FnBP5 with a special protein that can be split apart a soon as the modified drug reaches the kidneys, thereby enabling the radionuclide to go directly into the urinary tract so it can be excreted.
/web/2022/03-221003-c9

Discovery of New Antibiotic Against Resistant Pathogens

(University of Basel, October 11, 2022)

An international team of researchers, among which University of Basel Professor Sebastian Hiller's research group, have used computer analysis to discover a new antibiotic, effective against resistant bacteria. Many bacteria produce antibiotic peptides to fight each other, which are encoded into the bacterial genome. Researchers screened the entire genome of such bacteria, looking for characteristic features previously identified in other peptide antibiotics. A new antibiotic, named Dynobactin, was discovered, and shown to be extremely effective against resistant bacteria in studies conducted on mice. The discovery of new antibiotics is crucial given the surge of antibiotic-resistant bacteria, leading to complications even in routine surgical interventions, and this computer-based screening approach may boost antibiotic identification in the future.
/web/2022/03-221011-05

Rice Genetically Engineered for Enhanced Nutrition Grown in the Philippines

(ETH Zurich, November 29, 2022)

The first harvest of Golden Rice, a grain genetically engineered to provide daily requirements of beta-carotene, was carried out in the Philippines. This marks the first time genetic engineering on plants is used for humanitarian rather than commercial purposes. ETH Zurich Professor Emeritus Ingo Potrykus created Golden Rice in the 1990s to fight against malnutrition. The rice is enriched in beta-carotene, which is converted into Vitamin A by the human body. Vitamin A deficiency is a major health problem in many Southern countries, causing children to go blind, suffer cognitive impairments and die of a weak immune system. It took two decades for Golden Rice to be approved for open field cultivation, then for a government to accept its wide-scale cultivation.
/web/2022/10-221129-37

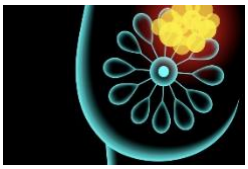
How Motivation Affects Decision-Making

(University of Geneva, October 14, 2022)

A team of researchers led by Assistant Professor Sami El-Boustani of University of Geneva and Professor Carl Petersen of EPFL made breakthrough discoveries on how motivation levels affect not only decision-making, but also the perception of sensory information itself. They conducted tests on mice with increasing levels of thirst, aiming to study how motivation (thirst) influenced their decision-making (licking the water spout). They found that neurons in decision-making circuits were flooded with electrical signals in hyper-motivation cases, impairing their ability not only to make the decision, but to receive the stimuli information in the first place. These results open up interesting perspectives for the study of decision-making. In particular, it highlights the need to decouple the acquisition of information from its processing.
/web/2022/03-221014-1e

Turning Cancer Cells into Near-Normal Cells

(University of Basel, October 18, 2022)



A team of researchers led by Dr Vulin and Professor Bentires-Alj, of the University of Basel, have identified compounds that artificially mature breast cancer cells of the highly aggressive triple negative subtype and convert them to a state that resembles normal cells. 75% of all breast cancers are caused by estrogen receptor-positive cancer cells, for which highly effective therapies exist. Of the remaining 25%, the triple-negative breast cancer subtype lacks effective treatment options. The researchers initially set out to "mature" triple-negative cancer cells into estrogen receptor-positive cancer cells, which are more easily treated. However, this did not make the cancer cells more manageable – it turned them into near-normal cells! These results open a new path towards treating triple-negative breast cancer, in combination with immunotherapies.
/web/2022/03-221018-21

Revolutionary Method to Observe Cell Transport

(University of Geneva, October 24, 2022)

A team of scientists from the University of Geneva and the University of Zurich, led by Prof. Enrica Bordignon and Associate Prof. Markus Seeger, has developed an innovative strategy for studying membrane proteins, the targets of many drugs, in their native environment: the cell. The proteins attached to cell membranes represent more than 60% of current drug targets. However, they were thus far impossible to observe in situ. The research team developed a new method for studying membrane proteins in action in living cells, relying on nanobodies equipped with small magnetic probes that can be detected using electron paramagnetic resonance spectroscopy. They were able to obtain a clear picture of a membrane protein in its real environment. This method is easily transposable to mammalian cells.
/web/2022/03-221024-3d

Regulation of a Key Immune Protein

(EPFL, October 26, 2022)

An international research effort, including Professor Andrea Ablasser's group at EPFL, has uncovered the mechanisms by which a specific protein, key to our immune system, is regulated within the cell to prevent autoinflammatory diseases. When a cell detects an infection, it activates a specific signaling molecule called STING (for Stimulator of interferon genes), which turn the cell's defense mechanisms on. This process must then be terminated to prevent autoinflammatory diseases. Ablasser's group identified the specific protein, AP-1, that ends STING's activity. By using cryo-electron microscopy, the scientists were able to determine the structure of AP-1 and show that it regulates the phosphorylation of STING, thereby turning it on and off. Further confirming their findings, the team also showed that when AP-1 is suppressed, STING-induced immune responses become worse.
/web/2022/03-221026-96

Fighting Tumors with Magnetic Bacteria

(ETH Zurich, October 26, 2022)

A team of researchers led by Simone Schürle, Professor of Responsive Biomedical Systems at ETH Zurich, have developed a way of controlling certain bacteria to use them as “ferries” to carry anti-cancer drugs through the bloodstream and into tumors. The researchers have chosen to work with naturally magnetic bacteria of the Magnetospirillum genus, which can therefore be controlled from outside the body using magnets. Schürle and her team have now shown that a rotating magnetic field provides three advantages over a static one: its propulsion effect is more powerful; the constant movement it induces in the bacteria makes them more likely to encounter gaps between vessel wall cells; and it does not need to be readjusted once it has been positioned.
/web/2022/03-221026-83

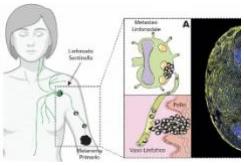
Groundbreaking Device for Early Diagnosis of Degenerative Eye Disorders

(EPFL, October 31, 2022)

A research team shared between EPFL and Jules-Gonin Eye Hospital, among which lead author Laura Kowalczuk, have developed a prototype device that can be used to diagnose some degenerative eye disorders long before the onset of the first symptoms. This novel technique allows the observation of the retinal pigmentary epithelium (RPE), a layer of cells that sits behind the photoreceptors. The deterioration of this RPE layer is responsible for degenerative eye disorders that can lead to blindness, among which age-related macular degeneration. However, it has thus far been impossible to observe this RPE layer in-vivo, making diagnosis of degenerative eye disorders impossible before the apparition of irreversible symptoms. The prototype device, which can produce a reliable diagnosis image in 5 seconds, represents incredible progress for ophthalmology.
/web/2022/03-221031-9a

Antibodies to Fight Melanoma Metastases

(Universita della Svizzera italiana, November 06, 2022)



An international research effort, led by Dr. Santiago González of the Università della Svizzera Italiana’s Institute for Research in Biomedicine, has discovered that some antibodies could contribute to anti-melanoma therapies. Melanoma progress by spreading tumor cells across the body via the lymphatic system, migrating from the skin to sentinel lymph nodes, where they first form metastases. Lymph nodes are part of the immune system, and as such, should be a hostile environment for the tumoral cells. The study found that an inflammatory protein, named interleukin-1α (IL-1α), got released in the lymph nodes in the presence of tumor cells, which contributed to their proliferation. Inactivating IL-1α with a blocking antibody significantly reduced metastatic growth.
/web/2022/03-221106-df

Measuring Protein Digestibility in the Laboratory while Reducing Animal Testing

(Agroscope, November 07, 2022)

Researchers from Agroscope, the Swiss Confederation's center of excellence for agricultural research, have elaborated a method that can reliably measure the protein digestibility of different foods in the laboratory. They simulated the human digestive process in a laboratory and measured the protein digestibility of seven foods in humans, in pigs and in the test tubes, then compared the results. Those were found to be very similar, with only a 0.2% deviation from one another. This method can therefore be used to determine the protein digestibility of a variety of food without relying o animal and human testing. This development will be crucial, as the protein digestibility of a food impacts how environmentally friendly it is, and may soon be required to appear on food packaging.
/web/2022/03-221107-f1

A Chip to Replace Animal Testing

(Empa, November 17, 2022)

A team of Empa researchers led by Dr. Tina Bürki, in collaboration with ETH Zurich and the Cantonal Hospital of St. Gallen, is developing a medical chip that will allow to test the effect of substances on babies in the womb. The medical chip houses placenta cells cultivated on a porous membrane, as well as a small tissue sphere of embryonic stem cells, respectively modeling a placental barrier and an embryo. Substances to be tested can be added to the maternal side to study how they are transported across the placental barrier. This project's breakthrough consists in utilizing human primary and stem cells. This new technology will accelerate new therapies, by integrating safe-by-design principles. It will also significantly reduce the need for animal testing, making for more humane research.
/web/2022/04-221117-f7

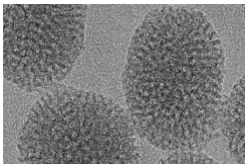
Selective Decontamination of the Digestive Tract to Improve ICU Care

(SUPSI, November 08, 2022)

Professor Gian Luca Di Tanna of SUPSI co-authored a crucial article on Selective Decontamination of the Digestive Tract (SDD). SDD is a preventive infection control strategy that usually involves administering topical antimicrobial agents, with or without the administration of a short-term course of intravenous broad-spectrum antibiotics. SDD is encouraged in patients undergoing mechanical ventilation in intensive care units (ICU), primarily to reduce the incidence of ventilator-associated pneumonia. The research focuses on a systematic literature review and a bayesian meta-analysis, showing that among adults in ICU treated with mechanical ventilation, the use of SDD compared to standard care or placebo reduces hospital mortality. This is particularly relevant given the increase in mechanical ventilation patients related to the Covid-19 pandemic.
/web/2022/03-221108-b4

New Nanoparticle to Act at Heart of Cells

(University of Geneva, November 08, 2022)



A team of researchers from UNIGE and Ludwig-Maximilians-Universität München developed a transport nanoparticle to make an anti-inflammatory drug much more effective and less toxic. The effectiveness of a drug, and the limitation of its side effects, can be increased by delivering it precisely where it needs to act, which can be achieved by encapsulating it in a nanoparticle to protect it while it journeys through the body. However, the right nanoparticle varies from drug to drug. The researchers focused on necrosulfonamide (NSA), a molecule that has anti-inflammatory effects, but which is not currently available as a drug due to traveling poorly in the bloodstream and potentially targeting other cells. The study identified a fully biodegradable nanoparticle capable of delivering NSA directly into macrophages. This was done using in vitro screening, limiting animal testing.
/web/2022/03-221108-93

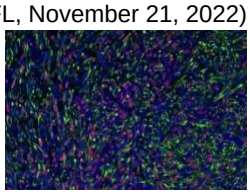
How Covid-19 Causes Neurological Damage

(University of Basel, November 14, 2022)

A team of researchers led by Professor Gregor Hutter, from the University of Basel, have studied how Covid-19 can cause damage to the nervous system. Some Covid-19 infections cause strong and long lasting effects on patients' nervous systems, such as concentration problems and strokes, despite the virus not infecting nerve cells directly. They identified a link between neurological symptoms and an excessive immune response, as well as a weakening of the blood-brain barrier. They hypothesized that antibodies cross the porous blood-brain barrier into the brain. They are now aiming to develop a blood test that could predict serious cases, such as long Covid or neuro-Covid, at the start of an infection. They also believe there is a potential for drugs aimed at preventing consequential nervous system damage.
/web/2022/03-221114-91

The Protein Behind Immunotherapy Resistance

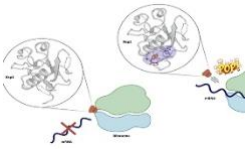
(EPFL, November 21, 2022)



A research team of scientists from EPFL, Ludwig Institute of Cancer Research, and CHUV, led by Douglas Hanahan's group, have identified a key protein that helps tumors evade attacks by the immune system. Immunotherapy consists in treating cancer by turning the patient's own immune system on tumors, but some of them remain unaffected by evading the immune cell's detection. The researchers identified the key protein FMRP that contributes to a tumor's stealth; it was found to be specifically and highly expressed in cancer cells. Mice with compromised immune systems showed the same survival rates with or without FRMP, while mice with healthy immune systems lived longer and grew tumors slower if FRMP was suppressed. This study, published in Nature, presents FRMP as a new therapeutic target for cancer.
/web/2022/03-221121-db

Covid-19: Spike Protein No Longer Only Target

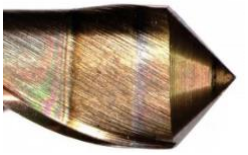
(University of Geneva, November 23, 2022)



A research team led by University of Geneva's Prof. F. L. Gervasio reveals a hidden cavity on a key SARS-CoV-2 protein to which drugs could bind. In the development of therapies against SARS-CoV-2, the proteins on the surface of the virus or involved in its replication are the preferred therapeutic targets, like the Spike protein targeted by vaccines. The protein Nsp1, which has been little studied until now, was the subject of this research project, in which scientists found a 'hidden'' cavity on the surface of Nsp1, which could be the target of future drugs against SARS-CoV-2. The research team identified one molecule in particular that could bind to this cavity. These results pave the way for the development of new treatments targeting the Nsp1 protein, not only against SARS-CoV-2 and its variants but also against other coronaviruses in which Nsp1 is present.
/web/2022/03-221123-3f

Sensitive Drill for Cochlear Implant Surgery

(Empa, November 30, 2022)



Empa researchers, among which Kerstin Thorwarth from the Surface Science and Coating Technologies lab, have developed a smart drill that shuts off when getting too close to nerves. Cochlear implants, which can restore hearing in people whose auditory nerve is still intact, require extremely precise surgical procedures that involve drilling through a nerve-rich area. This novel drill will function by irritating the facial nerve with an electric tip, and shutting off if the response is too strong. It has a conductive tip, with conductive and insulating hard coatings of titanium nitride and silicon nitride applied by magnetron sputtering. This smart drill will be part of a surgical robot developed by Stefan Weber's group at the University of Bern, which aims to insert cochlear implants more gently than surgeons.
/web/2022/03-221130-b8

Cutting Needless Antibiotics Prescriptions

(Swiss National Science Foundation, October 06, 2022)

A team of University of Basel researchers led by Professor Heiner Bucher recently developed a novel method for physicians to monitor antibiotics prescription – all without creating additional work. Specifically, by aggregating anonymized billing data from health insurance companies, they were able to identify medical practices that prescribed more antibiotics than average and to send feedback to these physicians. This is an important development, because despite the fact that unnecessary prescriptions of antibiotics constitute a major factor in the emergence of antibiotic resistance, their use has, until now, not been systematically recorded. Encouragingly, the novel method could even be expanded to a nationwide monitoring system, although additional technical solutions for data merging would need to be developed first.
/web/2022/01-221006-07

4. Nano / Micro Technology / Material Science

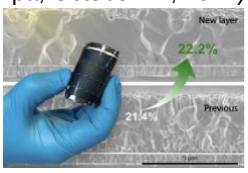
Salt-Based 3D Printing Process

(ETH Zurich, October 03, 2022)

An interdisciplinary team of researchers led by ETH Zurich material scientists Nicole Kleger and Simona Fehlmann recently developed an innovative 3D printing process to create complex structures from a wide variety of materials, such as biomedical silicone, light metals, degradable elastomers, or fiber composites. To achieve this, the novel process employs a special, light-sensitive, salt-based ink, which makes it possible to build complex structures with a stereolithography device, which can serve as a mold, or a negative template, to be filled with another material. In this context, this novel method could be used for a range of impactful applications, including the production of customized jaw and bone implants, the production of three-dimensional scaffolds for cell cultures, as well as the manufacturing of lightweight metal components for spaceships or rockets.
/web/2022/04-221003-ec

Flexible Solar Cells Reach New Record Efficiency of 22%

(Empa, October 11, 2022)



A team of researchers led by Dr Romain Carron and Prof. Ayodhya Tiwari of the Empa have announced a new efficiency record in the development of their flexible CIGS solar cells on polymer films. These flexible cells were improved by alloying the light absorbing semiconductor layer to improve its electronic properties. This change brings their power conversion efficiency to 22.2%, an improvement from their previous 2021 record of 21.4%. For comparison purposes, the best rigid crystalline silicon solar cells reach a conversion efficiency of 26.7%. These improvements were observed regardless of the method used to alloy the semiconductor layer, paving the way for industrial-scale manufacturing in different implementations. Flexible solar cells are especially interesting for application on roofs and facades, vehicles and airships, or portable electronic devices.
/web/2022/04-221011-4c

Renewable Cellulose-Based Fillers

(Empa, October 19, 2022)

A collaboration between Empa and the Datwyler Schweiz AG, as part of an Innosuisse project, developed a novel, environmentally friendly filler that can be used in rubber products, such as pump diaphragms. The researchers set out to replace the petrochemical materials usually added to rubber with microfibrillated cellulose, which is more sustainable, but is a challenge to blend with water-repellent rubber. They developed an industrial process for the surface modification of MFC to solve this challenge, replacing petrochemical aramid fibers with modified MFCs; they reached good compatibility between the MFC filler and the rubber matrix with strong reinforcing effects, even better than those achieved with conventional compounds. The development of these novel fillers will allow rubber products, such as pump diaphragms, to be more sustainable.
/web/2022/04-221019-3a

Sustainable Clean Drinking Water Solution

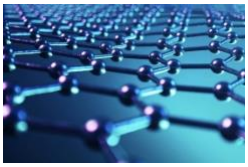
(ETH Zurich, November 02, 2022)

Olivier Gröninger, a postdoc in Professor Wendelin Stark's group at ETH Zurich, has developed a lightweight, cheap, efficient and environmentally-friendly water filtering device. His project Openversum now aims to export not only his filters, but the knowledge necessary to build and repair them, to developing countries in need for clean water access. The water filter itself is made of three layers: activated carbon traps unwanted compounds and pesticides; a microporous membrane filters out bacteria and other

microbiological contaminants; finally, ferric hydroxide powder binds heavy metals and phosphate. He has developed a special filter membrane that is manufactured without organic solvents, is extremely cheap and robust, and can easily be disposed of after use because it is biodegradable.
/web/2022/04-221102-a0

New Quantum Component from Graphene

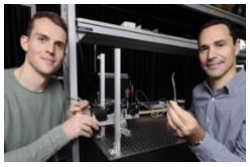
(ETH Zurich, November 03, 2022)



A cross-border team of researchers from ETH Zurich and Tsukuba National Institute for Materials Science produced the first superconducting quantum interference device, or SQUID, from twisted graphene. Conventional SQUIDs are already used to measure subtle changes in magnetic fields. Graphene is a two-dimensional crystal consisting of just one layer of carbon atoms. The SQUIDs, built with two superposed sheets of graphene twisted at exactly the right angle, are remarkable in that they show superconductive behavior can be obtained with graphene. The graphene's behavior can be controlled by biasing an electrode, making it insulating, conducting or superconducting. While the graphene SQUIDs are not superior to their conventional counterparts in sensitivity or ease of use, they show a breakthrough in the application of graphene.
/web/2022/04-221103-fc

Steerable Soft Robots to Enhance Medical Applications

(EPFL, November 30, 2022)



Researchers from EPFL and Imperial College, led by Fabien Sorin, have created fiber-based soft robots with advanced motion control as well as medically relevant capabilities. The catheter-shaped soft robots aim to facilitate and speed up the process of inserting catheters into the body for surgery, by providing a tool that can be remotely guided to its destination, or even semi-automated to find the way on its own. The fibers used are created using the thermal drawing process commonly used to produce fiber optic cables. The final product integrates motion control, sensing, and drug delivery. The robotized catheters' production can be scaled up easily, and the soft fibers could be used in a wide array of other applications, such as smart mattresses or soft prosthetics.
/web/2022/04-221130-dc

5. Information & Communications Technology

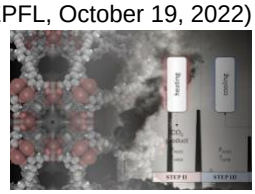
Using Social Media to Gather Flood Information

(Eawag, October 04, 2022)

A team of researchers led by Eawag environmental engineer João P. Leitão, together with Salvador Peña-Haro from the ETH Zürich spin-off photrack AG, recently developed an automatic image processing method, which makes it possible to use mobile phone videos posted on the Internet as an important source of data during floods. To achieve this, the team used thousands of flood images to train their algorithm, thereby enabling it to first localize selected classes of objects whose size is approximately known, such as people or cars, before subsequently using these values to reliably estimate the water level. This is an exciting development, because be providing near-real time information about a flood, this novel method enables rescue forces to take highly targeted protection measures, as well as warn the population, at an early stage.
/web/2022/05-221004-ba

Machine Learning Predicts Heat Capacities of MOF Materials

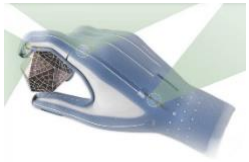
(EPFL, October 19, 2022)



An international research team, among which the group of Prof. Berend Smit at EPFL, trained a machine learning algorithm to predict the heat capacities of a class of materials called metal-organic frameworks or MOFs. These materials are used for a wide range of applications. Previously, MOFs were assumed to all have the same heat capacity. The research group performed a few expensive calculations on the vibrations of each atom in a MOF and how the its chemical composition changes that. They related these vibrations to the material's heat capacity, and trained a machine learning algorithm on this data. They then compared these predictions with experimental data to ensure it was in agreement with reality.
/web/2022/05-221019-88

3D Printed Gloves to Touch Virtual Reality

(Empa, November 08, 2022)



A team of researchers from Empa, EPFL and ETHZ are developing next generation VR gloves that will make virtual worlds tangible. A semi-automated production, using 3D printers, will allow these gloves to be tailored to each user individually. The large-scale project called "Manufhaptics", led by EPFL's Herbert Shea, is attempting to create a glove that makes virtual surfaces feel real and objects tangible at the right size. Three types of actuators are integrated in the glove, that replicate the texture, size and pressure of virtual objects. Nubs in the fingertips can grow to mimic specific textures; electrostatic brakes can stiffen the finger joints to simulate size; and finally, dielectric elastomer actuators tighten the back of the glove to give the illusion of pressure and allow a perfect fit.
/web/2022/05-221108-92

6. Energy / Environment

2022 Summer Droughts Linked to Climate Change

(ETH Zurich, October 07, 2022)

An international team of climate scientists led by ETH Zurich Professor Sonia Seneviratne recently published a new study, which estimated that human-caused climate change made the 2022 drought conditions at least 20 times more likely. To come to this conclusion, the team analyzed soil moisture levels in Western and Central Europe in June, July and August 2022, and found that the main factor driving drought risk was the increasing temperature, with rainfall shortage taking a backseat. This is an important finding, because given that intense summer droughts cause widespread water shortage, wildfires and crop failures, diminishing food supplies, this analysis underlines the urgency of taking global action to lower our dependence on fossil fuels and limit the impact of climate change on food and water supplies.
/web/2022/06-221007-7d

Accurately Tracking How Plastic Biodegrades

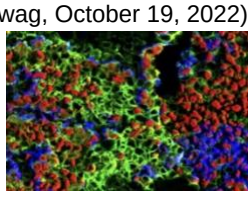
(ETH Zurich, October 14, 2022)

A team of researchers, led by Dr Taylor Nelson and Professor Michael Sander of ETH Zürich, have developed a new approach to accurately track the degradation of plastics in soil, allowing a precise determination of where the polymer carbon winds up after degradation. This new approach uses stable carbon isotopes (13C) to label a polymer, polybutylene succinate (PBS), allowing selective tracking of its biodegradation. In addition to determining mineralization to 13CO2, the researchers were able to obtain complete closed mass balances for the PBS carbon, determining its location – in the soil or in the air –

after the incubation period. This novel approach will make a significant contribution towards reducing plastic waste, especially from agricultural practices that rely on plastic mulch film.
/web/2022/06-221014-74

How Rusting Iron Removes Arsenic From Water

(Eawag, October 19, 2022)



A research group from Eawag's Water Resources and Drinking Water department, led by Dr. Andreas Voegelin, studied the exact process by which iron –widely used in simple water filters around the world– filters arsenic out of water. Arsenic of natural origin is a groundwater contaminant in many regions of the world, but it can be filtered using iron, often in combination with sand. The iron rusts, forming iron oxides that strongly bind with arsenic. The research team observed a filter model with alternating quartz sand and iron grains strips, and were able to demonstrate how the distribution of the iron and quartz sand grains and the water flow through the filter influence the arsenic removal. In particular, they found that alternating flowing and stagnant periods improved the efficiency of the filter.
/web/2022/06-221019-da

"Grätzel" Solar Cells Achieve New Record

(EPFL, October 27, 2022)

A team of EPFL scientists from Michael Grätzel's and Anders Hagfeldt's groups have achieved an improvement in the power conversion efficiency of "Grätzel cells" beyond 15% in direct sunlight and 30% in ambient light conditions. The world-famous "Grätzel cells" are dye-sensitized solar cells (DSCs) which convert light into electricity through photosensitizers. DSCs are transparent, low cost, can be multiple colors, and are already being used in skylights, greenhouses or glass facades. Lightweight flexible versions of DSCs also exist, powering portable electronic devices. The research team focused on cosensitization, an approach that produces DSCs with two or more different dyes that have complementary optical absorption. They improved the packing of two newly designed photosensitizer dye molecules, which enhances the DSC's photovoltaic performance.
/web/2022/06-221027-bb

Food Security Thanks to Feces and Waste

(ETH Zurich, November 24, 2022)

ETH Zurich researchers, in partnership with collaborators in Ethiopia, Rwanda, the Democratic Republic of the Congo and South Africa, are creating circular systems that use processed organic waste and human excreta as fertilizer or animal feed, resulting in higher crop yields and new jobs. The low crop yields in multiple African territories, due to a lack of nutrients in the soil, lead to a major problem of malnourishment. Simultaneously, rapid urbanization is overstraining the waste and sanitary infrastructure in many sub-Saharan cities. The Runres projects piloted innovative solutions, composting human waste into fertilizer or recycling organic waste to feed larvae that are then used as livestock feed. These projects are carried out by involving local actors from the start, setting them up for successful and self-sustaining integration into the local economy.
/web/2022/06-221124-13

Unraveling Secrets of Microplastics Released by Tires

(EPFL, November 25, 2022)

Scientists from EPFL, Ecotox and Eawag conducted research on the toxicity of particles released by tires and roadwear and how readily they're absorbed by living organisms. These particles released into the environment by roadwear and tires are one of the biggest sources of microplastics released into the environment, but the chemical compounds found in them, as well as their effects, remain largely unstudied. The scientists focused on the solubilization and bioaccessibility of tire-particle

compounds in the digestive systems of rainbow trout. They used an innovative in vitro approach based on simulated gastric and intestinal fluids, analyzing eleven compounds for their solubilization rates. The conclusions they draw will be helpful for tire manufacturers to create tires that, when degrading in contact with the road, will be less harmful to the environment.
/web/2022/06-221125-fa

Uncovering Plastic-Degrading Microbes in Cold Alpine Soils

(WSL, November 30, 2022)

A study conducted by Joel Rüthi and Beat Frey from the Swiss Federal Institute for Forest, Snow and Landscape Research WSL investigated plastic-degrading microbes in cold alpine soils. Plastic was buried in soil samples taken from 3,000 meters above sea level in the Engadine and after five months, showed holes and microbial growth. Results showed that plastic-degrading microbes are present in the Alps and can become active, with new DNA sequences from which plastic-degrading enzymes could be obtained. These enzymes can break down plastic into its building blocks, potentially leading to a circular economy for plastic, by breaking down plastic into its building blocks and then using these again to produce new plastics - without the need for fresh fossil oil.
/web/2022/06-221130-e8

A Sunflower Society: Aligning Demand with Renewable Supply

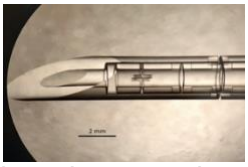
(Empa, October 20, 2022)

A study by Empa's scientists Dr Harald Desing and Rolf Widmer highlights the need for the shift to a so-called "sunflower society" in order to keep global warming below the 1.5°C threshold. This consists in aligning energy demand and supply, ensuring energy-hungry tasks are done when renewable energy is plentiful – for example, running the washing machine at lunchtime rather than overnight. This study calculates that if we wanted to maintain our current energy use habits, we would exceed the 1.5°C target with at least a 50% probability. Making demand patterns more flexible through intelligent appliance control, without having to change users' energy behavior, would reduce that probability to 14%. Finally, an energy industry that requires hardly any storage could reduce the probability of exceeding the 1.5 degree target to just 3%.
/web/2022/01-221020-b1

7. Engineering / Robotics / Space

Flexible Surgical Needle Offers Enhanced Precision

(EPFL, October 23, 2022)



An interdisciplinary team of researchers comprised of Charles Baur, an engineer at EPFL's Instant-Lab, as well as Lennart Rubbert, of Strasbourg University and Juan Verde, of Strasbourg IHU, have developed a surgical needle with a flexible, button-controlled tip, allowing trajectory changes mid-surgery. The innovative needle is composed of two nested tubes, which can slide against each other to allow the needle to curve at the press of a button. This is a crucial development for performing minimally invasive surgeries. Surgeons could use this new technology to correct the trajectory of a needle without reinserting it, to reach tissue behind an organ, or to reach multiple targets per insertion. The flexible surgical needles are almost ready for preclinical trial, and the research team is actively looking for companies to partner with.
/web/2022/07-221023-9b

Miniaturized Infrared Detectors

(Empa, October 25, 2022)

A Team of scientists at Empa (led by Empa researcher Ivan Shorubalkohas), ETH Zurich, EPFL, the University of Salamanca, Spain, the European Space Agency (ESA) and the University of Basel developed a cost-effective miniaturization process for infra-red spectrometers based on a quantum dot photodetector, which can be integrated on a single chip. Infrared detectors have, thus far, relied on bulky and expensive materials and technologies. However, miniature IR detectors would be critical in many applications, such as in smartphones (allowing food control, detection of hazardous chemicals or air pollution monitoring), wearables or ultra-small satellites. The research team built a proof-of-concept miniaturized Fourier-transform waveguide spectrometer that incorporates a subwavelength photodetector as a light sensor. This ultra-compact spectrometer design allows the integration of optical-analytical measurement instruments into consumer electronics and space devices.
/web/2022/07-221025-46

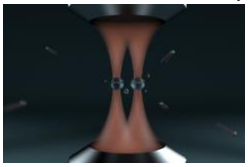
Tackling High-Voltage Needs of Next-Gen Satellites

(EPFL, November 04, 2022)

In a research effort co-funded by ESA, scientists from EPFL and Beyond Gravity, a Swiss company specialized in Slip Rings, have developed a slip ring assembly that can more than triple the operational voltage of new-generation, high-voltage satellites. Slip ring assembly is a component designed to transfer low voltage electrical power to the satellite's systems that require it. However, newer satellites are improving and requiring higher power and lower electrical losses to function. The researchers successfully developed a slip ring assembly that allows higher voltages in satellites, raising the range from the current 28-100 V to 300-600 V. Their assembly proved to function in the wide range of pressures that a satellite is subjected to between the high-pressure launch and space vacuum, and to keep its high efficiency even after a long usage period.
/web/2022/07-221104-cb

Cooling Multiple Nanoparticles to Near-Absolute Zero

(ETH Zurich, November 21, 2022)



A team of ETH researchers, led by Prof. Lukas Novotny, have developed a technique to cool several nanoparticles simultaneously to temperatures of just a few thousandths of a degree above absolute zero. Up until then, cooling techniques could only bring atoms or molecules down to such low temperatures. More recently, larger nanoparticles could be cooled down; however, this was only possible with single, electrically charged nanoparticles. The new technique developed by the researchers allows the cooling of two nanoparticles simultaneously, without requiring them to be electrically charged. This would allow the study of quantum entanglement between nanoparticles, which up until then has mainly been achieved with photons or single atoms. Their neutrality also allows for more sensitive sensors.
/web/2022/07-221121-55

Small Asteroids are Probably Young

(University of Bern, November 30, 2022)

A research project conducted by Dr. Martin Jutzi and Dr. Sabina Raducan, from the Physical Institute of the University of Bern, Department for Space Research and Planetology (WP), has recently succeeded in gaining new insights regarding the formation and development of asteroids. They used data and samples from the Hayabusa2 spacecraft, a Japanese mission that investigated the asteroid Ryugu two years ago. They found that the asteroid probably has a very loose internal structure and is only held together by very small cohesive forces and gravitational interactions, which indicates that it must be very young. Their work will be important for the "Double Asteroid Redirection Test" (DART) mission by NASA, the first full test in the world regarding planetary defense against the possible impact of asteroids on Earth.
/web/2022/07-221130-75

8. Physics / Chemistry / Math

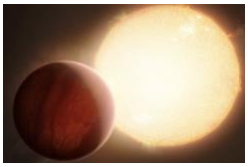
Solving Polaron Localization in Density Functional Theory

(EPFL, October 11, 2022)

Student Stefano Falletta and Prof. Alfredo Pasquarello of EPFL have published a theoretical formulation that solves a longstanding problem of density functional theory (DFT), a method used to study the electronic structure of many-body systems like atoms and molecules. DFT is a powerful tool used to describe the interactions of electrons in materials, but it has its shortcomings. The quasi-particle named polaron, formed by the interaction of an electron with a structured crystal lattice, is susceptible to be incorrectly described by DFT, due to the so-called “self-interaction problem”, interactions of the electron with itself. Falletta and Prof. Pasquarello introduced a theoretical formulation for this electron self-interaction that solves that localization problem, allowing more accurate calculations. This opens up new research possibilities in physics, chemistry and material sciences.
/web/2022/08-221011-2f

Barium Detected in Exoplanet Atmosphere

(University of Geneva, October 16, 2022)



An international team including researchers from the University of Geneva, led by Professor Francesco Pepe, have detected barium in the atmosphere of the ultra-hot gas giants WASP-76 b and WASP-121 b. Barium is the heaviest element –2.5 times heavier than iron– ever found in an exoplanet atmosphere. The study was conducted using the ESPRESSO instrument, a spectrograph largely developed with the University of Geneva’s expertise and mounted on the Very Large Telescope of the European Southern Observatory in Chile. This is a surprising discovery, as these exoplanets have a very strong gravity that should, in theory, pull such a heavy element down deep into their inner layers. There must therefore be an unknown process that keeps barium in the upper layer of the atmosphere, which could be the subject of further study.
/web/2022/08-221016-a0

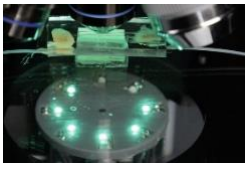
ALICE Explores the Hidden Charm of Quark–Gluon Plasma

(CERN, October 20, 2022)

The international ALICE collaboration at CERN’s Large Hadron Collider (LHC) have investigated how quark–gluon plasma affects different bound states of a charm quark and its antimatter counterpart. These bound states, named charmonia or hidden-charm particles, are held together by the strong interaction. In quark-gluon plasma, their production is suppressed by the large number of quarks and gluons present, a phenomenon known as “screening” which is expected to affect different charmonia to varying degrees. The first measurements of the ALICE collaboration show that a specific charmonia, the ψ(2S) state, is suppressed about twice as much as the J/ψ state. This is the first observation that shows suppression hierarchy in charmonia at the LHC. Future studies of charmonia may lead to a better understanding of the strong interaction.
/web/2022/08-221020-f8

Researchers Open Door to Stain-free Labeling of Cellular Components

(EPFL, November 13, 2022)

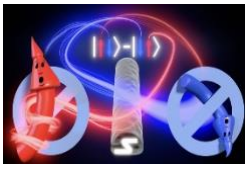


A team of researchers, among which scientists from EPFL’s Optics Laboratory, have developed a new method to screen individual cells quickly and reliably without fluorescence labeling. This fast and reliable alternative consists in observing the phase delay incurred as the microscope’s light beam passes through the matter that makes up the cell. This is repeated at multiple angles, and the data is then run through a neural network to generate a 3D map of the refractive index of the object, which is influenced by the density and nature of each molecule. They can then identify clusters of elements with similar refractive

index, obtaining classifiable shapes. They also found a way of imaging the cells without immobilizing them. This new method achieves a transverse resolution ½ to 1 micron.
/web/2022/08-221113-17

Spin Correlation Between Paired Electrons Demonstrated

(University of Basel, November 24, 2022)



In an important step toward further experimental investigations of quantum mechanical phenomena, a research group of physicists at the University of Basel, led by Prof. Dr. Schönenberger and Dr. Baumgartner, have demonstrated that there is a negative correlation between the two spins of an entangled pair of electrons from a superconductor. Entanglement, a phenomenon of quantum physics, designates two particles whose properties are linked, even at a distance. In a superconductor, two electrons can become entangled, forming so-called Cooper pairs, which causes their spins to be linked. It has long been theoretically expected that Cooper pairs emerge from a superconductor with opposite spins, which the physicists were able to demonstrate using an innovative experimental setup consisting of quantum dot "gates" and tiny magnets.
/web/2022/08-221124-5d

9. Architecture / Design

New Reshapeable Composite Material

(ETH Zurich, October 25, 2022)

Giada Risso, a doctoral student supervised by Professor Paolo Ermanni from ETH Zurich, has developed a new composite material that can be reshaped at will and that remains stable in multiple shapes. That material is made of a pre-stretched, soft, thermoplastic film of polyurethane onto which a flat composite frame is applied, and can be bent from its original flat shape into a variety of shapes with bare hands. A large piece is made of multiple smaller squares. Risso tested many different materials for the flat composite frame, concluding that carbon fiber produced the best results. This is of great interest for multiple industries, such as civil engineering, robotics, or the space industry. It could be made more versatile by using different base shapes instead of just squares, as well as miniaturizing the process.
/web/2022/09-221025-df

Stylish Sensors to Wear

(Empa, November 24, 2022)

In a collaboration between Empa and designer Laura Deschl, sponsored by the Textile and Design Alliance (TaDA) of Eastern Switzerland, researchers from the Biomimetic Membranes and Textiles laboratory have developed innovative clothing that integrates biomedical monitors. This innovation relies on flexible sensors which are integrated in items of clothing such as a t-shirt or a belt, providing subtle, continuous monitoring throughout the day. Sensors that are comfortable, easy to handle, and look good - or at least unobtrusive - are essentially for patient acceptance and use. The prototype item, a shirt that measures breathing activity throughout the day, is of particular interest for patients during the recovery phase after surgery, as well as patients with respiratory issues such as sleep apnea or asthma.
/web/2022/09-221124-d3

Scrimber: Innovative Timber Construction Product

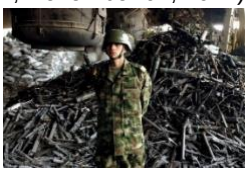
(Bern University of Applied Sciences, November 28, 2022)

Scrimber, an innovative and sustainable timber construction product that upcycles inexpensive timber products and subpar quality wood, won the main prize in the "KliWa Ideas Pool" innovation competition organized by the Canton of Bern, and with it funding of CHF 50,000.–. Scrimber performs the same functions in construction as reinforced concrete, but with a considerably lower carbon footprint. The CO2 absorbed by trees during their lifetime remains trapped in the building, and its processing does not emit additional CO2, in contrast to cement-based materials. These characteristics are already obtained with cross-laminated timber, but that material is expensive to produce and requires a certain quality of wood. Scrimber is based on an innovative machining technology that allows the use of lower-quality input materials, including recycled wood.
/web/2022/09-221128-12

10. Economy, Social Sciences & Humanities

Why Conflict Parties Cease Fighting

(ETH Zurich, November 04, 2022)

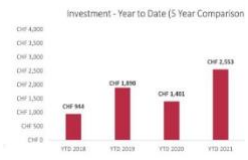


An international project involving ETH researchers, among which co-author Dr. Govinda Clayton, has analyzed the civil wars of the past 31 years to comprehend what brings conflict parties to cease fighting for a period of time. Their findings show that ceasefires occur most often in the bloodiest months of a civil war, in the first month of a conflict, or after an average of four years of war. Changes in the political balance or external political justifications also increase the chances of conflicting parties to cease fighting. Finally, ceasefires are often used to achieve political or military objectives that are incompatible with a peaceful resolution of the conflict. This study comes at a time of high tension throughout Europe, and brings very valuable insights to the table.
/web/2022/10-221104-80

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

CHF 3.4 Billion Invested in Swiss Startups in 2022

(VentureLab, October 11, 2022)



With Q3 numbers in, the total funds raised by Swiss startups this year surpass the 2021 total to date, with Fintech, ICT and Biotech attracting the highest investments. The Swiss startup ecosystem faces a relatively stable financing environment, although the current global crises make it increasingly challenging. Of the record CHF 3.4 billion in venture capital invested into Swiss startups, close to CHF 1 billion went to Climeworks, a startup dedicated to capturing CO2 from air, and wefox, which focuses on insurance comparison. Q3 also showed an increase in early-stage investment rounds and a decrease in later-stage rounds, as well as an increase in American investment into Swiss startups, due to lower valuations.
/web/2022/11-221011-fd

Swiss Startups Take Lead on Global Stages

(startupticker.ch, October 27, 2022)

Switzerland came out on top this year, with Swiss startups winning multiple innovation competitions, awards, and acceleration programs in Switzerland, Germany, Luxembourg and beyond. Skypull, developers of high-altitude, low-impact wind energy production, won the Grand Prix Möbius Suisse 2022. Exeon Analytics was awarded the Cybersecurity & Privacy Solution of the Year Award at Cyber Security Week in Luxembourg. Flowbone, who have developed a new generation of injectable gel for the strengthening of fragile bones, will be joining the Heraeus Accelerator program in Germany. Rimon Technologies and Modulos AG will be joining the first edition of the Swiss Beyond Gravity incubator program. CelsiusPro, Riskwolf and dacadoo made it to the Insurtech 100, a global list recognizing the 100 most innovative Insurtech companies worldwide. Transcality, builders of traffic digital replicas, won the International Entrepreneurs' Night pitching competition in Munich.
/web/2022/11-221027-54

Venture Kick Second Stage Winners for 40’000 CHF

(VentureKick, November 30, 2022)

Venture Kick’s second stage of financial and entrepreneurial support recently selected three winners who will receive 40’000 CHF to develop their activities. The selected startups are: Apheros, which provides metal foams for cooling and filtration applications. Their unique steel, copper, and nickel foams feature a microstructure that make them ideal for these applications. Meteore Watches, which craft complex watches using flexure blades instead of cogs and wheels. Easy to assemble, robust and reliable and as thin as paper, their patented mechanism allows for some unique applications, such as ultra-slim watches. STEVmotion, for the project VineaTrac, an autonomous vineyard vehicle that allows winemakers to automate the performance of repetitive tasks.
/web/2022/11-221130-49

12. General Interest

World’s Longest Passenger Train

(CNN, October 30, 2022)

The world’s longest passenger train recently undertook a 25 km voyage through the bridges, tunnels and switchback tracks of the UNESCO World Heritage Albula Line, in Eastern Switzerland. Operated by the Rhaetische Bahn, the almost 2 km-long train reached an impressive top speed of 35 km/h. The train was constructed from multiple new “Capricorn” train units, commissioned in 2019 and electrically powered. In descents, these units control their speed using regenerative braking, feeding current back into the overhead supply lines. The 2’990 tonnes convoy produced exceptional amounts of energy, showing off the robustness of the power installation. The record also demonstrated the sturdiness of the material. In an increasingly climate-conscious world, the country’s choice to invest in electric, reliable public transportation appears more and more judicious.
/web/2022/12-221030-82

13. Calls for Grants/Awards

Torsten Hoefler Receives Sidney Fernbach Memorial Award

(ETH Zurich, October 04, 2022)

The IEEE Computer Society – arguably the world's most influential association in the field of computer science – recently presented ETH Zürich Professor Torsten Hoefler with the highly prestigious Sidney Fernbach Memorial Award in recognition of his pioneering contributions to large-scale parallel processing systems and supercomputers. Hoefler's pioneering work has in particular focused on improving the efficiency of parallel computing with the aim of enabling deep learning and high-performance computing (HPC) applications to be run efficiently on highly parallel systems with several million computing cores. In this context, Hoefler has contributed to numerous techniques for the application-aware design of HPC algorithms, systems, and architectures, which now constitute a core component for constructing, running, and programming supercomputers.
/web/2022/13-221004-08

Enhancing Radiotherapy With Nanoparticles

(Empa, October 04, 2022)

Lukas Gerken was recently awarded an Empa Young Scientist Fellowship to continue his research to not only make radiation therapy more effective, but also gentler, for cancer patients. To achieve this, Gerken's work centers on the development of nanoparticle radioenhancers – specially developed metal oxide nanoparticles, which selectively increase the radiation absorption cross-section of tumor tissue in which they are embedded. In this context, Gerken has not only already demonstrated the effectiveness of the nanoparticles during preliminary laboratory experiments with the team of Professor Inge K Herrmann (Empa/ETH Zurich), but he also established a manufacturing process using flame synthesis, which is paving the way for industrial production.
/web/2022/13-221004-f0

Upcoming Science and Technology Related Events

World Economic Forum
January 16-20, 2023
https://is.gd/1ZXk0p
Business, Economy, Collaboration
Davos

CROSS Final Event
January 18, 2023
https://is.gd/R8aj7t
Science, Research, Development
Bern

International Symposium Hydrogen & Energy
January 22-27, 2023
https://is.gd/1BgfPS
Hydrogen, Fuel Cells, Batteries
Emmetten

International Swiss Talent Forum
February 7-11, 2023
https://is.gd/7W0BZs
Education, Training, Circular Economy
Lausanne

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