



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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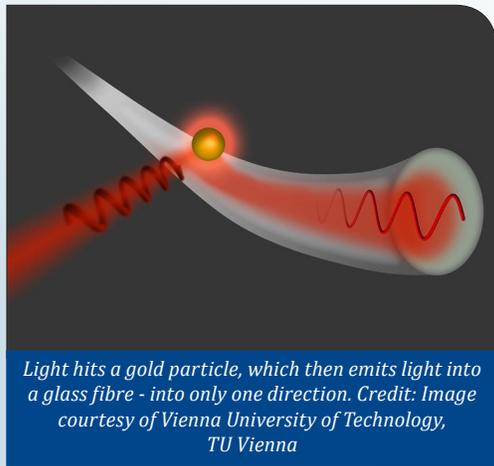
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FEATURE ARTICLES

[Nanoparticles break the symmetry of light](#)

Science Daily, 06OCT2014



According to researchers in Austria a particle in free space will always emit as much light in one particular direction as it emits in the opposite direction. Using spin-orbit coupling of light, they have succeeded in breaking the symmetry of emission using gold nanoparticles coupled to ultra-thin glass fibres. The incident laser light determines whether the light emitted by the particle travels left or right in the glass fibre. This new kind of optical switch has the potential to revolutionize nanophotonics. [TECHNICAL ARTICLE](#)

Tags: Photonics, Breakthrough technology, Featured Article

[New particle is both matter and antimatter](#)

Nature, 03OCT2014

Since the 1930s scientists have been searching for particles that are simultaneously matter and antimatter. Researchers at Princeton University have found strong evidence for one such entity inside a superconducting material. The discovery could represent the first so-called Majorana particle, and may help researchers encode information for quantum computers. [TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Advanced materials, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Crumpled graphene could provide an unconventional energy storage](#)

MIT News, 03OCT2014

Researchers at MIT have demonstrated that by crumpling a sheet of graphene paper into a chaotic mass of folds, they can make a supercapacitor that can be easily bent, folded, or stretched to as much as 800 percent of its original size. They have made a simple supercapacitor using this method as a proof of principle.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials, Flexible electronics

[Photonic crystals: how defects lead to a prison for light](#)

Nanotechweb, 03OCT2014

Researchers in the Netherlands have devised a structure that can be made in silicon and results in a 3D photonic bandgap cavity. Potential future applications of the technique include lasing, LEDs, information storage, sensors and quantum computing, as well as fundamental studies of the behaviour of light in optical cavities.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Nanoparticles give up forensic secrets](#)

Science Daily, 02OCT2014

Researchers in Switzerland have provided evidence contesting the commonly accepted theory that nanoparticles are attracted to fingerprints electrostatically. They believe a more fundamental understanding of the interactions between nanoparticles and fingerprints will promote the development of more precise targeting methods and increase the chances of detecting previously undetectable fingerprints. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, S&T Switzerland

Simultaneous imaging of ferromagnetic and ferroelectric domains

Nanowerk, 02OCT2014

An international team of researchers (USA, Switzerland) has discovered a new way to simultaneously image both the ferromagnetic and the ferroelectric domain structures of multilayer devices in which a ferromagnetic film is grown on a ferroelectric substrate. These structures have attracted significant recent interest due to their ability to efficiently use voltage to change the magnetization in low-energy magnetic devices. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Materials science*

AUTONOMOUS SYSTEMS & ROBOTICS**Pressing the accelerator on quantum robotics**

Science Daily, 06OCT2014

An international team of researchers (Spain, Austria, Croatia) has focused on using quantum computing to accelerate machine learning. They report that using algorithms introduced by quantum mechanics, which are much quicker and more secure in transferring information, can be applied to robots, automatons and the other AI agents. [TECHNICAL ARTICLE](#)

Tags: *Autonomous systems & robotics, Quantum science*

Rise of the Reapers: A brief history of drones - Part One - the early years

Drone Wars (UK), 06OCT2014

The real origins of today's drones lie in the development of the first recoverable and reusable radio-controlled aircraft in the 1930s. The Royal Navy, looking for aircraft to shoot at for gunnery practice, developed out of the De Havilland Tiger Moth a remote-controlled aircraft dubbed 'the Queen Bee.'

Tags: *Autonomous systems & robotics*

Video Friday: Open Source Humanoid, HelloSpoon, and Drone Versus the Volcano

IEEE Spectrum, 03OCT2014

In a classic example of things that we build robots to do so that we don't have to die trying to do them ourselves, a DJI Phantom and a GoPro fly over a volcano.

Tags: *Autonomous systems & robotics*

Robot researcher combines nature to nurture 'superhuman' navigation

Science Daily, 01OCT2014

Researchers in Australia use new computer algorithms to enable robots to navigate intelligently, unrestricted by high-density buildings or tunnels. They are taking the eyes of a human and linking them up with the brain of a rat. The research would also study how the human brain degrades, in particular how it fails to recognize familiar places.

[TECHNICAL ARTICLE](#)

Tags: *Autonomous systems & robotics, Neuroscience, S&T Australia*

COMMUNICATIONS TECHNOLOGY**Breakthrough technique offers prospect of silicon detectors for telecommunications**

Science Daily, 03OCT2014

Researchers in the UK developed a laser processing technique for their silicon optical fibre platform to demonstrate that it is possible to completely crystallise the core material, while at the same time writing in large stresses to modify the optoelectronic properties, achieving extreme bandgap reductions from 1.11 eV down to 0.59 eV, enabling optical detection out to 2,100 nm. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology, S&T UK*

ENERGY**Batteries included: A solar cell that stores its own power**

Science Daily, 03OCT2014

Researchers at Ohio State University combined a battery and a solar cell into one hybrid device. Key to the innovation is a mesh solar panel, which allows air to enter the battery, and a special process for transferring electrons between the solar panel and the battery electrode. Inside the device, light and oxygen enable different parts of the chemical reactions that charge the battery. [TECHNICAL ARTICLE](#)

Tags: *Energy, Battery, Solar energy*

ENVIRONMENTAL SCIENCE**Space debris expert warns of increasing small satellite collision risk**

Science Daily, 30SEP2014

Researchers in the UK used Debris Analysis and Monitoring Architecture to the Geosynchronous Environment (DAMAGE) model to simulate three future CubeSat launch traffic scenarios until the year 2043. By comparing these with close approach data from 2005 to 2013, the team found CubeSats are estimated to be involved in millions of close approaches over the next 30 years, with a handful leading to a collision.

Tags: *Environmental science, S&T UK, Satellite technology, Space technology*

INFORMATION TECHNOLOGY**Some details on Japan's Flagship 2020 Exaflop Supercomputer project**

Next Big Future, 04OCT2014

Fujitsu and the Riken research center have been chosen to develop an exascale supercomputer, which at 1,000 petaflops would be about 30 times faster than the leading supercomputer today. Planning documents suggest using over 10 million CPU cores and reaching 1 exaflop. The

“No amount of experimentation can ever prove me right; a single experiment can prove me wrong.” ALBERT EINSTEIN

machine is planned for April, 2021. The new flagship computer will be used to work on innovative solutions to current scientific and social issues.

Tags: Information Technology, S&T Japan

Data smashing' could unshackle automated discovery

PhysOrg.com, 03OCT2014

Data smashing developed by researchers at Cornell University for comparing data streams involves two steps. First, the data streams are algorithmically “smashed” to “annihilate” the information in each other. Then, the process measures what information remains after the collision. The more information remains, the less likely the streams originated in the same source. Data smashing principles may open the door to understanding increasingly complex observations, especially when experts do not know what to look for. [TECHNICAL ARTICLE](#)

Tags: Information Technology

Snowflake-shaped networks are easiest to mend

New Scientist, 03OCT2014

An international team of researchers (UK, USA, France) reports that the best networks are made from partial loops around the units of the grid, with exactly one side of each loop missing. All of these partial loops link together, back to a central source. These have a low repair cost because if a link breaks, the repair simply involves adding back the missing side of a loop. [TECHNICAL ARTICLE](#)

Tags: Information Technology

New frontier in error-correcting codes

Science Daily, 01OCT2014

Researchers at MIT have developed the first interactive coding scheme to approach the optimum on all three measures - noise tolerance, transmission rate and time required for encoding and decoding processes. [TECHNICAL ARTICLE](#)

Tags: Information Technology, Mathematics

MATERIALS SCIENCE

Exotic matter: A closer look at the perfect fluid sheds light on what happened microseconds after the Big Bang

Science Daily, 02OCT2014

By combining data from two high-energy accelerators, researchers at Lawrence Berkeley National Laboratory have refined the measurement of a remarkable property of quark-gluon plasma. The findings reveal new aspects of the ultra-hot, ‘perfect fluid’ that give clues to the state of

the young universe just microseconds after the Big Bang. [TECHNICAL ARTICLE](#)

Tags: Materials science, Particle physics, Science without borders

PHOTONICS

Excited “plasmonic lens” converts tunnel electrons into CV beam

Nanotechweb, 01OCT2014

Researchers in France have developed a new way to create cylindrical vector (CV) beams by electrically exciting a “plasmonic lens” with low-energy tunnel electrons. CV beams are important in a variety of research fields and technology applications ranging from fundamental studies in quantum optics to more practical areas including optical microscopy, manipulating nano-objects, and in optical data storage and communication. [TECHNICAL ARTICLE](#)

Tags: Photonics, S&T France

Ultrafast remote switching of light emission

Science Daily, 30SEP2014

An international team of researchers (The Netherlands, Germany, Denmark) has developed a way of remotely controlling nanoscale light sources at an extremely short timescale. These light sources are needed to be able to transmit quantum information. [TECHNICAL ARTICLE](#)

Tags: Photonics, Quantum science

QUANTUM SCIENCE

New approach to on-chip quantum computing

Science Daily, 02OCT2014

An international team of researchers (Canada, Australia, Hong Kong) has developed a technique to generate “mixed up” photon pairs from devices that are less than one square millimeter in area. It could form the core of the next-generation of quantum optical communication and computing technology. The research will be presented at OSA’s 98th Annual Meeting later this month.

Tags: Quantum science

Quantum environmentalism: Putting a qubit’s surroundings to good use

Science Daily, 02OCT2014

Superposition of qubit is a fragile condition, and the manipulation and final readout of its states are in danger of being undone if the qubit interacts with its environment. An international team of researchers (UK, USA, France) addresses this problem by demonstrating a new type of qubit control, one that actually makes productive use of a qubit’s proximity to its surroundings.

Tags: Quantum science

continued...

Platinum meets its match in quantum dots from coal: New catalyst for fuel cells outperforms platinum

Science Daily, 01OCT2014

Researchers at Rice University combined graphene quantum dots drawn from common coal with graphene oxide, nitrogen and boron into a catalyst for fuel cells that outperforms platinum. Graphene quantum dots grab onto graphene platelets like barnacles attach themselves to the hull of a boat making them better than platinum catalysts for certain reactions within fuel cells. [TECHNICAL ARTICLE](#)

Tags: Quantum science

FEATURED RESOURCE

TechCast Global

The forecasting method used is science-based, integrating empirical background data and expert knowledge into a powerful form of collective intelligence. The expert panel includes hundreds of leading authorities who work at the cutting edge of advanced fields.

S&T POLICY

China considers a naval stealth fighter based on Chengdu J-20

Defense Update, 06OCT2014

Eventually, China's future carrier air wing may come equipped with 25 stealthy, 5th generation fighters such as the navalized J-20s, which will become the carriers' first line strike fighter, capable of attacking denied or contested enemy airspace or naval forces. Additionally, it will have 25 J-15B 4th generation fighters, which will provide second line attack, self-defense, electronic attack and refueling support.

Tags: S&T policy, Military technology, S&T China

Physics World Focus on Big Science 2014

Physics World, 01OCT2014

This focus issue of Physics World tackles some of the challenges in building upcoming "big science" facilities. We kick off by looking at CERN's Large Hadron Collider (LHC), which is set to restart next year following an upgrade and maintenance programme.

Tags: S&T policy

SCIENCE WITHOUT BORDERS

What It Will Take for Computers to Be Conscious

MIT Technology Review, 02OCT2014

In an interview, the lead researcher at Allen Institute for Brain Science in Seattle explains that consciousness could be explained by something called "integrated information theory," which asserts that consciousness is a product of structures, like the brain, that can both store a large amount of information and have a critical density of inter-connections between their parts.

Tags: Science without borders

Improvements to classical graph theory have potential to impact modern-day problem solving

PhysOrg.com, 30SEP2014

Parallelization is a challenging research problem with no easy solutions. Hence, an international team of researchers (Norway, USA) is exploring a new class of algorithms for maximum matching that have direct implication for other algorithms, such as network flows. [TECHNICAL ARTICLE](#)

Tags: Science without borders, Mathematics

SENSORS

Making Invisible Cracks Visible

American Physical Society Spotlight, 03OCT2014

Researchers in the UK developed a system to locate acoustic nonlinearities in a simple and practical manner. Their system combines "parallel" and "sequential" methods. The technique could make it easier for engineers to find dangerous defects in bridges or airplane wings.

[TECHNICAL ARTICLE](#)

Tags: Sensors

Scientists design an imaging system capable of obtaining twelve times more information than the human eye

Science Daily, 03OCT2014

An international team of researchers (Spain, Italy) have developed sensors called Transverse Field Detectors (TFD) which are capable of extracting the full colour information from each pixel in the image without the need for a layer of colour filter on them. Each photon penetrates to a different depth depending on its wavelength. By collecting photons at different depths on the silice surface of the sensor, the different channels of colour can be separated without the necessity of filters. [TECHNICAL ARTICLE](#)

Tags: Sensors

World's smallest microphone is made from a single molecule

Science Alert (Australia), 03OCT2014

The minuscule microphone developed by researchers in Sweden works by embedding a single molecule of a substance called dibenzoterrylene (DBT) in a tiny crystal of a hydrocarbon material called anthracene. When the crystal is exposed to sound waves, the DBT molecule is disturbed by the vibrations, and it vibrates in response.

TECHNICAL ARTICLE

Tags: Sensors, S&T Sweden

MEMS gas sensors jump into motion

Nanotechweb, 02OCT2014

Detecting the resultant tiny frequency shifts in MEMS sensor is complicated when operated in a viscous media, such as ambient air. An international team of researchers (the Netherlands, UK) has demonstrated a method to enhance the sensitivity of such resonant vibrating gas sensors by making use of nonlinearity in the vibrational response. TECHNICAL ARTICLE

Tags: Sensors

Sensor network tracks down illegal bomb-making

Science Daily, 01OCT2014

Researchers in Germany have developed a sensor network as part of the EU project "Emphasis" which can detect activity early on and locate it precisely by the remains of the synthetic fertilizer on stairs, doorknobs, air ducts and sewerage.

Tags: Sensors, S&T EU

DARPA Technology Identifies Counterfeit Microelectronics

DARPA News, 30SEP2014

The ASOM (Advanced Scanning Optical Microscope) technology developed by SRI International will provide forensic analysis of microelectronics, including integrated circuits confiscated by law enforcement officials. The ASOM operates by scanning IC using an extremely narrow infrared laser beam, which probes microelectronic circuits at nanometer levels, revealing information about chip construction as well as the function of circuits at the transistor level.

Tags: Sensors, Military technology

Supersensitive nanodevice can detect extremely early cancers

Science Daily, 29SEP2014

Researchers at the University of Alabama have designed a supersensitive nanodevice that can detect trace levels of cancer biomarkers in the blood. A 125 micron diameter nanoprobe with gold nanodots on a 4-micron fiber core is at the heart of the device. TECHNICAL ARTICLE

Tags: Sensors, Biotechnology ■

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