



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

[Advanced manufacturing \(2\)](#)

[Advanced materials \(4\)](#)

[Autonomous systems & robotics \(3\)](#)

[Communications technology \(1\)](#)

[Cyber security \(1\)](#)

[Energy \(3\)](#)

[Environmental science \(3\)](#)

[Explosives \(1\)](#)

[Forecasting \(1\)](#)

[Materials science \(3\)](#)

[Medical sciences \(1\)](#)

[Microelectronics \(2\)](#)

[Neuroscience \(2\)](#)

[Quantum science \(6\)](#)

[S&T policy \(3\)](#)

[Science without borders \(1\)](#)

[Sensors \(2\)](#)

FEATURE ARTICLES

[Third Bell loophole closed for photons](#)

[Physics World, 23APR2013](#)

An international team of researchers (US, Austria, Germany) has shut what is called the “fair sampling” loophole, which says that classical—rather than quantum—effects could be responsible for measured correlations between entangled pairs of photons. The photon is now the first system in which the violation of “Bell’s inequality” has been unambiguously established.

[TECHNICAL ARTICLE](#)

Tags: Quantum science, Quantum science, S&T Germany, S&T USA, Featured Article

[Laser-Made Magnetic Vortices](#)

[American Physical Society Spotlight, 22APR2013](#)

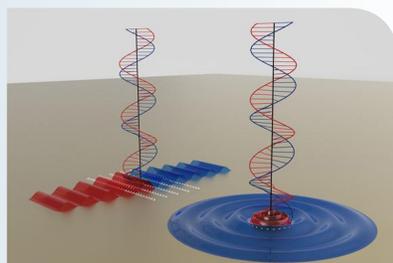
New experiments by researchers in Italy have generated magnetic structures, or vortices called “skymions” using laser pulses directed at a thin magnetic film. By varying the strength of the pulse, the researchers created individual skymions and even “molecules” made from multiple skymions which may find use in future forms of computer memory. [TECHNICAL ARTICLE](#)

Tags: Materials science, Information technology, Featured Article

[Physicists find right \(and left\) solution for on-chip optics: Nanoscale router converts and directs optical signals efficiently](#)

[Science Daily, 22APR2013](#)

Researchers at Harvard University have created a new type of nanoscale device that converts an optical



Two different devices based on the heringbone pattern were presented in the Science paper: a rectangular array and a ring-shaped array (both interpreted in this illustration). (Credit: Image courtesy of Jiao Lin and Samuel Twist)

signal into waves that travel along a metal surface. Significantly, the device can recognize specific kinds of polarized light and accordingly send the signal in one direction or another. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, Optical communication, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

[Additive Manufacturing](#)

[MIT Technology Review, 23APR2013](#)

General Electric is preparing to produce a fuel nozzle for a new aircraft engine by printing the part with lasers rather than casting and welding the metal. The technique could transform how GE designs and makes many of the complex parts that go into everything from gas turbines to ultra-sound machines.

Tags: Advanced manufacturing

[9 Materials That Will Change the Future of Manufacturing \[Slide Show\]](#)

[Scientific American, 22APR2013](#)

Scientific American’s May special report [How to Make the Next Big Thing](#) presents several new materials under development to help inventors and engineers deliver next-generation technologies.

Tags: Advanced manufacturing

ADVANCED MATERIALS

[Near-field behavior of semiconductor plasmonic microparticles measured](#)

[Science Daily, 22APR2013](#)

Researchers at the University of Illinois have measured nanometer-scale infrared absorption in semiconductor plasmonic microparticles using a technique that combines atomic force microscopy with infrared spectroscopy. This gives us a clear window into the optical behavior of this new class of materials on a length scale much smaller than the wavelength of light. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Semiconductors

continued...

[BACK TO TOP](#)

[Revolutionary new device joins world of smart electronics: New flexible, transparent, photosensitive device](#)

Science Daily, 19APR2013

Researchers at the University of Exeter, UK, have developed a new photoelectric device that is both flexible and transparent. The device converts light into electrical signals by exploiting the unique properties of the recently discovered materials graphene and graphExeter. GraphExeter is the best known room temperature transparent conductor and graphene is the thinnest conductive material. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Flexible electronics

[Technique unlocks design principles of quantum biology](#)

Science Daily, 19APR2013

University of Chicago researchers have created a synthetic compound that mimics the complex quantum dynamics observed in photosynthesis and may enable fundamentally new routes to creating solar-energy technologies. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Biomimetics

[Plasmomechanics - an emerging field that combines nanoplasmonics with nanomechanical resonators](#)

Nanowerk Spotlight, 18APR2013

By integrating optical nanoantennas directly on nanomechanical resonators, researchers at the University of Pennsylvania have now shown that it is possible to achieve very efficient interactions between light and nanomechanical resonators. This hybrid approach enables novel functionalities in various applications. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

[Israel air force on track to develop drones that can do everything piloted aircraft do by 2050-2060](#)

Next Big Future, 23APR2013

There is a process happening now of transferring tasks from manned to unmanned vehicles. In a decade or two they should be able to carry out a third or half of all missions. But there are still certain things you cannot do without a piloted plane.

Tags: Autonomous systems & robotics

[Video Friday: iCub Rides a Roomba, PR2 Can Hear You Now, and ROBOGAMES!](#)

IEEE Spectrum, 19APR2013

Coralbots (currently a project on Kickstarter) is a way to potentially use robots to help repopulate coral reefs that have been damaged by humans.

Tags: Autonomous systems & robotics

[Robot Hands Gain a Gentler Touch: Tactile Sensing Technology Builds On Tiny Barometer Chips](#)

Science Daily, 18APR2013

Researchers at Harvard University have developed a very inexpensive tactile sensor for robotic hands that is sensitive enough to turn a brute machine into a dextrous manipulator.

Tags: Autonomous systems & robotics

CYBER SECURITY

[Chinese Hackers Seek Drone Secrets](#)

Information Week, 22APR2013

A notorious cyber-espionage gang is being blamed for a set of recently discovered spear-phishing attacks that aim to steal information relating to unmanned aerial vehicles.

Tags: Cyber security, S&T China

ENERGY

[Bugs produce diesel on demand](#)

EurekaAlert, 22APR2013

A team of researchers from the University of Exeter, with support from Shell, has developed a method to make bacteria produce diesel on demand. While the technology still faces many significant commercialisation challenges, the diesel, produced by special strains of E. coli bacteria, is almost identical to conventional diesel fuel and so does not need to be blended with petroleum products as is often required by biodiesels derived from plant oils.

Tags: Energy

[Made in IBM Labs: Collaboration Aims to Harness the Energy of 2,000 Suns](#)

IBM, 22APR2013

On Earth Day, scientists announced a collaboration to develop an affordable photovoltaic system capable of concentrating solar radiation 2,000 times and converting 80 percent of the incoming radiation into useful energy. The system can also provide desalinated water and cool air in sunny, remote locations where they are often in short supply.

Tags: Energy, Solar energy

[New solar-cell coating could enable a major boost in efficiency](#)

Science Daily, 18APR2013

Researchers at MIT have demonstrated a new technique in which each photon can knock two electrons loose. This makes the process much more efficient. Thus they have overcome the Shockley-Queisser efficiency limit which posits that the ultimate conversion efficiency can never exceed 34 percent for a single optimized semiconductor junction. [TECHNICAL ARTICLE](#)

Tags: Energy, Solar energy

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“I can no longer laugh at ignorance or stupidity. Those are our chief enemies, and it is dangerous to make fun of them.” CHARLES RICHTER

ENVIRONMENTAL SCIENCE

Biological activity alters the ability of sea spray to seed clouds

Science Daily, 22APR2013

Ocean biology alters the chemical composition of sea spray in ways that influence their ability to form clouds over the ocean. That's the conclusion of a team of scientists led by the University of California at San Diego using a new approach to study tiny atmospheric aerosols that can influence climate by absorbing or reflecting sunlight and seeding clouds.

Tags: Environmental science, Climatology

Hurricane may have triggered earthquake aftershocks

Nature News, 19APR2013

Researchers in Utah reported that hurricane Irene, a powerful storm that ran north along the US East Coast five days after a magnitude 5.8 earthquake rattled Virginia, may have triggered some of that earthquake's aftershocks. Instead of declining in a normal pattern, the rate of aftershocks following the 23 August, 2012, earthquake near Mineral, Virginia, increased sharply as Irene passed by.

Tags: Environmental science

Superstorm Sandy shook the U.S., literally

Science Daily, 18APR2013

Researchers at the University of Utha detected seismic waves created by oceans waves hitting the East Coast and smashing into each other, with the most intense seismic activity recorded when Sandy turned toward Long Island, New York and New Jersey. Seismic tracking of storms might allow observations that satellites can miss, and perhaps could help researchers understand how climate is changing and how it is affecting our oceans.

Tags: Environmental science

EXPLOSIVES

Fertilizer that fizzles in a homemade bomb could save lives around the world

Sandia Laboratory News, 23APR2013

Researchers at Sandia National Laboratory developed a fertilizer formula as good as, if not better, than ammonium nitrate, but not detonable. When iron sulfate is mixed with ammonium nitrate, the iron ion "grabs" the nitrate and the ammonium ion takes the sulfate ion producing a non-detonable fertilizer. Ammonium sulfate and iron nitrate are not detonable, even when mixed with a fuel.

Tags: Explosives

FORECASTING

10 Breakthrough technologies for 2013

MIT Technology Review, 23APR2013

MIT Technology Review's annual list of 10 Breakthrough Technologies that we believe will expand the scope of human possibilities.

Tags: Forecasting

MATERIALS SCIENCE

New research findings open door to zinc-oxide-based UV lasers, LED devices

Science Daily, 23APR2013

Researchers from the North Carolina State University have solved a long-standing materials science problem, making it possible to create new semiconductor devices using zinc oxide -- including efficient ultraviolet lasers and LED devices for use in sensors and drinking water treatment, as well as new ferromagnetic devices. TECHNICAL ARTICLE

Tags: Materials science

Germanium is now laser compatible

Science Daily, 22APR2013

A team of researchers from Germany and Italy have jointly developed a manufacturing technique to render the semiconductor germanium laser-compatible through high tensile strain. In the future, this could enable microprocessor components to communicate light, which will make computers faster and more efficient. TECHNICAL ARTICLE

Tags: Materials science, S&T Germany, S&T Italy

MEDICAL SCIENCES

Special Report: The Genetic Revolution

IEEE Spectrum, 22APR2013

Sixty years ago this month, researchers James Watson and Francis Crick described the double helix shape of DNA. Ten years ago this month, researchers completed sequencing the human genome, putting the roughly 3 billion letters that make up a molecule of human DNA in order. On April 25, researchers celebrate DNA Day to mark the accomplishments of the past, and to marvel at the progress made since those historic milestones.

Tags: Medical Sciences, Biology

MICROELECTRONICS

First light from molybdenite transistors

Physics World, 19APR2013

A team of researchers at IBM has shown that 2D molybdenite emits light when excited with an electrical current. The result confirms that it is possible to build light sources

continued...

and other photonic elements from 2D semiconductors such as molybdenite. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Advanced materials, Materials science

[Ultra-thin transistors spread like butter on toast](#)

[Nanowerk](#), 18APR2013

Cornell scientists have helped develop a novel process of spreading extremely thin organic transistors, and used synchrotron X-rays to watch how the films crystallize. Their actual materials were a solution of a semiconducting molecule called TIPS pentacene, a silicon wafer kept at a specific temperature for the substrate, and the highly polished edge of a second silicon wafer acting as the knife.

[TECHNICAL ARTICLE](#)

Tags: Microelectronics

FEATURED RESOURCE

[SciCentral](#)

Only content freely accessible to online readers is considered. Publications that produce high-quality content but do not offer a significant amount of online materials on a free access basis are not included.

NEUROSCIENCE

[Lost your keys? Your cat? The brain can rapidly mobilize a search party](#)

[Science Daily](#), 22APR2013

Scientists at the University of California, Berkeley, have discovered that our brains are much more dynamic than previously thought, rapidly reallocating resources based on behavioral demands, and optimizing our performance by increasing the precision with which we can perform relevant tasks. [TECHNICAL ARTICLE](#)

Tags: Neuroscience

[Erroneous decision? Blame noisy information, not your brain](#)

[KurzweilAI](#), 17APR2013

Princeton University researchers have found that making an erroneous decision is caused by errors, or “noise,” in the information coming into your brain, rather than errors in how your brain accumulates or processes that information.

[TECHNICAL ARTICLE](#)

Tags: Neuroscience

QUANTUM SCIENCE

[Nanoscientists provide ‘new spin’ on emerging quantum technologies](#)

[Nanowerk](#), 23APR2013

An international team of scientists (USA, France, UK) was able to demonstrate that through many-body interactions, a macroscopic collection of spins in the quantum wells can behave as a single entity with a single macroscopic quantum spin, making this much less susceptible to decoherence caused by spin-orbit fields. In the future, it may be possible to use these excitations as signals to transport or elaborate information at the quantum levels.

[TECHNICAL ARTICLE 1, 2](#)

Tags: Quantum science, Communications Technology

[Researchers discover an ‘almost psychic’ photonless communication](#)

[Nanowerk](#), 20APR2013

It’s been believed that if two parties want to communicate, something needs to be sent, and something is allowing for its passage. In an experimental setup researchers at Texas A&M show where that does not seem to be the case. Hence it is ‘almost psychic.’ [TECHNICAL ARTICLE](#), [Related article](#)

Tags: Quantum science

[Scientists spin photons to send light in one direction \(w/video\)](#)

[PhysOrg.com](#), 19APR2013

Researchers at King’s College London have achieved previously unseen levels of control over the travelling direction of electromagnetic waves in waveguides. Their groundbreaking results could have far-reaching benefits for the way light is controlled in optical waveguides and fibres, significantly improving integration, efficiency and speed.

[TECHNICAL ARTICLE](#)

Tags: Quantum science, Photonics, S&T UK

[A New Twist for Quantum Systems](#)

[Science Daily](#), 17APR2013

Scientists in Switzerland are using “artificial atoms” made of electronic circuits, which they control with microwave pulses. These circuits comprise superconducting components and typically measure fractions of a millimeter. This new type of control should be useful in situations in which quantum systems must be precisely controlled, not least in the context of quantum computers. [TECHNICAL ARTICLE](#)

Tags: Quantum science

[Quantum Computing Taps Nucleus of Single Atom](#)

[Science Daily](#), 17APR2013

A team of Australian engineers has demonstrated a quantum bit based on the nucleus of a single atom in silicon, promising dramatic improvements for data processing in ultra-powerful quantum computers of the future. [TECHNICAL ARTICLE](#)

Tags: Quantum science

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S&T POLICY

China plans to build 100 new humanities and social science key research bases

China NOST News, 23APR2013

The main tasks include: Further deepen reform on higher education systems, building academic demonstration centres and stimulating research activities, to establish new scientific research mechanism adapted with current university system with Chinese characteristics. The plan also will strive to further expand long-term cooperation academic exchanges with institutions at home and abroad.

Tags: *S&T policy, S&T China*

Tibet to Get Top-notch Telescope

Chinese Academy of Science, 22APR2013

KOSMA telescope in the Swiss Alps was dismantled in 2009 and relocated in Tibet at an altitude of 4,300 meters. The initiative is dedicated to joint research between several Chinese institutes and Germany's University of Cologne. Under the agreement, the telescope will be owned by China but the University of Cologne will be given 20 percent of observation time after it goes operational.

Tags: *S&T policy, Astronomy, S&T China, Terahertz technology*

Significant funding for multi-disciplinary solar nanotechnology research project

Nanowerk, 20APR2013

University of Ulster scientists have secured over a million dollars from the Engineering and Physical Sciences Research Council (EPSRC) for the research project which could herald a new era for solar energy harvesting by using low cost, non-degradable, non-toxic, environmentally-friendly materials.

Tags: *S&T policy, Energy, S&T UK*

SCIENCE WITHOUT BORDERS

Model Suggests Link between Intelligence and Entropy

American Physical Society Spotlight, 19APR2013

A team of researchers from MIT, Harvard and the University of Hawaii explore a mathematical extension of the principle of the second law of thermodynamics that focuses not on the arrangements that the system can reach now, but on those that will become accessible in the future. They argue that simple mechanical systems that are postulated to follow this rule show features of intelligence hinting at a connection between this most-human attribute and fundamental physical laws. **TECHNICAL ARTICLE**

Tags: *Science without borders*

SENSORS

On-Chip Cytometry using Plasmonic Nanoparticle Enhanced Lensfree Holography

Nature Scientific Reports, 23APR2013

To bring molecular specificity to lensfree on-chip imaging researchers at UCLA demonstrate the use of plasmon-resonant metallic nanoparticles to automatically recognize different cell types based on their plasmon-enhanced lensfree holograms, detected and reconstructed over a large field-of-view.

Tags: *Sensors*

DNA biosensors fabricated with carbon nanotubes

Nanowerk, 20APR2013

Researchers from Alzahra University, Iran, produced an electrochemical DNA biosensor by studying interactions between antimicrobial drug and double stranded DNA on the surface of glassy carbon electrode modified with multi-walled carbon nanotube. The most important applications of DNA biosensors are the diagnosis of chemical species such as cancer agents, drugs, and pollutants. **TECHNICAL ARTICLE**

Tags: *Sensors* ■

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