



S&T NEWS BULLETIN

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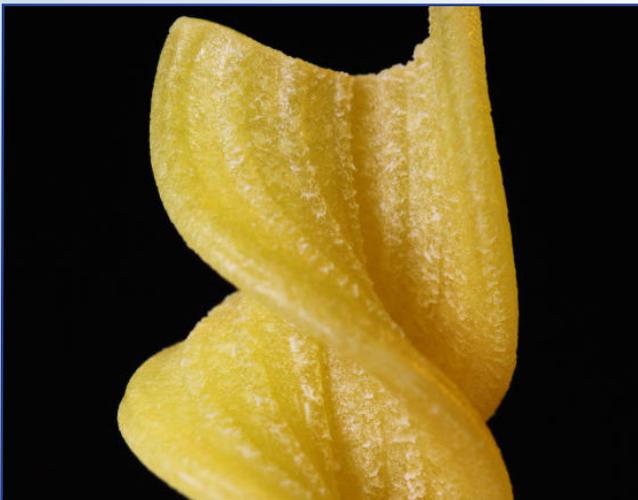
FEATURE ARTICLES

[Pasta-Shaped Radio Waves Beamed Across Venice](#)

[Science Daily, 02MAR2012](#)

A group of Italian and Swedish researchers appears to have solved the problem of radio congestion by cleverly twisting radio waves. A potentially infinite number of channels can be broadcast and received. A wave can twist about its axis a certain number of times in either a clockwise or anti-clockwise direction, meaning there are several configurations that it can adopt. In a three-dimensional perspective, this phase twist looks like a fusilli-pasta-shaped beam. Each of these twisted beams can be independently generated, propagated and detected even in the very same frequency band, behaving as independent communication channels. **TECHNICAL ARTICLE:** Fabrizio Tamburini, et al., [Encoding many channels on the same frequency through radio vorticity: first experimental test](#)

Tags: Communications Technology, Featured Article



Researchers may have solved the problem of radio congestion by cleverly twisting radio waves into the shape of fusilli pasta. (Credit: iStockphoto)

[Proposed Cloaking Device for Water Waves Could Protect Ships at Sea](#)

[Science Magazine, 02MAR2012](#)

The weird science of invisibility has entered uncharted waters. By altering the sea floor in just the right way, it should be possible to hide an object floating on the sea from passing waves. The technique might help to protect ships and floating structures from rough seas. And because the scheme works entirely differently from the “cloaks” developed to hide objects from light and other electromagnetic waves, it breaks new ground for research.

Tags: Breakthrough technology, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Oxide Thin Films To Create New Field Of Oxide Electronics](#)

[Newswise, 07MAR2012](#)

Researchers have developed the first functional oxide thin films that can be used efficiently in electronics, making new high-power devices and sensors possible. This is the first time researchers have been able to produce positively-charged and negatively-charged conduction in a single oxide material, launching a new era in oxide electronics.

Tags: Advanced materials, Materials science, Microelectronics

[Physicist tackles atomtronics](#)

[PhysOrg.com, 06MAR2012](#)

Atomtronics is a relatively new science devoted to creating artificial tailored materials consisting of neutral atoms held in an array with laser beams, or atoms moving along a desired track under electric or magnetic influence. Researchers at UCal Riverside show how a simple “joystick” consisting of an adjustable magnetic field can create several new phases of atomtronic matter, several of them never seen before.

Tags: Advanced materials, Materials science

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Researchers Discover New Method of Making Nanoparticles

[Newswise](#), 06MAR2012

Using successive thermal treatments, researchers at the University of Arkansas characterized optical and structural features of an inexpensive, molecule-to-molecule, bottoms-up approach to create thermally stable, gold-nanoparticle ensembles on silica. Their method also allows faster preparation than self-assembly or lithography and allows directed assembly of nanoparticle ensembles on 3D surfaces.

Tags: Advanced materials, Nanomaterials

New nanoglue is thin and supersticky

[EurekaAlert](#), 05MAR2012

Engineers at UC Davis have invented a superthin “nanoglue” that could be used to stick silicon wafers into a stack to make new types of multilayered computer chips. Conventional glues form a thick layer between two surfaces. Nanoglue which conducts heat and can be printed, or applied, in patterns, forms a layer the thickness of only a few molecules. The nanoglue is based on a transparent, flexible material called polydimethylsiloxane.

Tags: Advanced materials, Materials science, Nanomaterials

Smart, Self-healing Hydrogels Open Far-reaching Possibilities in Medicine, Engineering

[Science Newsline](#), 05MAR2012

UC San Diego bioengineers have developed a self-healing hydrogel that binds in seconds, as easily as Velcro, and forms a bond strong enough to withstand repeated stretching. The material has numerous potential applications, including medical sutures, targeted drug delivery, industrial sealants and self-healing plastics.

Tags: Advanced materials, Materials science

All-carbon-nanotube transistor can be crumpled like a piece of paper

[PhysOrg.com](#), 02MAR2012

A team from Japan has made an all-carbon-nanotube transistor that can be crumpled like a piece of paper without degradation of its electrical properties. The new transistor is the most bendable reported to date that doesn't experience a loss in performance.

Tags: Advanced materials, Flexible electronics

AUTONOMOUS SYSTEMS & ROBOTICS

DARPA's “Cheetah” Sets Land Speed Record for Legged Robots

[DARPA](#), 05MAR2012

The robot's movements are patterned after those of fast-running animals in nature. The robot increases its stride and running speed by flexing and un-flexing its back on each step, much as an actual cheetah does. The current version of the Cheetah robot runs on a laboratory treadmill where it is powered by an off-board hydraulic pump, and uses a boom-like device to keep it running in the

center of the treadmill. Testing of a free-running prototype is planned for later this year. The “Cheetah” robot gallops at speeds of up to 18 mph, setting a new land speed record for legged robots. The previous record was 13.1 mph, set in 1989. [VIDEO](#)

Tags: Autonomous systems & robotics, DARPA, Government S&T, Robotics

BIOTECHNOLOGY

Unraveling biological networks

[EurekaAlert](#), 05MAR2012

A new approach to disentangling the complexities of biological networks, such as the way in which proteins interact in our body's cells has been developed by researchers in China. The team's algorithm could allow biologists and biomedical researchers to unravel new clues about how cells work and what goes awry with such networks in various diseases, such as Alzheimer's disease and cancer.

Tags: Biotechnology, Medical Sciences

Neural Implants Made of Carbon

[Next Big Future](#), 03MAR2012

One of the greatest challenges yet to be addressed is designing the interface between medical technology and human tissue. In order to overcome the limitations of existing models, scientists from Forschungszentrum Jülich and eleven other institutions will develop novel biointerfaces made of carbon.

Tags: Biotechnology, Medical technology

How do you stop a synthetic-biology disaster?

[EurekaAlert](#), 29FEB2012

Experts argue that at least \$20 million to \$30 million in government research is needed over the next decade to adequately identify and address the possible ecological risks of synthetic biology. While similar questions were raised about genetically modified crops, the products of synthetic biology will be altered in more sophisticated and fundamental ways (such as elimination of metabolic pathways), making them potentially more difficult to regulate, manage and monitor.

Tags: Biotechnology, Synthetic biology

BREAKTHROUGH TECHNOLOGY

Scientists revolutionize electron microscope

[EurekaAlert](#), 05MAR2012

The new method, called electron ptychography, dispenses with the lens and instead forms the image by reconstructing the scattered electron-waves after they have passed through the sample using computers. The process has no fundamental experimental boundaries and may transform sub-atomic scale transmission imaging. The key breakthrough has been to develop a way to calculate the phase of the waves from their intensity alone.

Tags: Breakthrough technology, Biotechnology, Imaging Technology

continued...

“The impossible sometimes happens and the inevitable sometimes does not.” KAHNEMAN

COMMUNICATIONS TECHNOLOGY

World's first field trial of 10Gbit/s-100km class high speed and wide area optical access

[PhysOrg.com, 07MAR2012](#)

Nippon Telegraph and Telephone Corporation has succeeded in the field trial of an optical amplification technology that realizes 10Gbit/s-100km class high speed and wide area optical access networks.

Tags: Communications Technology

Graphene-based optical modulators poised to break speed limits in digital communications

[EurekAlert, 01MAR2012](#)

Researchers have demonstrated a graphene-based optical modulator with a broad optical bandwidth (1.35-1.6 μm), a small device footprint (25 μm^2), and high operational speed (1.2 GHz at 3dB) under ambient conditions—all of which are essential for optical interconnects for future integrated optoelectronic systems. Looking into future applications, graphene-based modulators could be very compact and potentially perform at speeds up to 10 times faster than today's technology allows.

Tags: Communications Technology, Optical communication

COUNTER WMD

Responding to the radiation threat

[PhysOrg.com, 07MAR2012](#)

Berkeley Lab researchers are developing a promising treatment for safely decontaminating humans exposed to radioactive actinides from a major radiation exposure event, such as a nuclear reactor accident or a “dirty bomb” terrorist attack. The treatment, which can be administered as a pill that can result in the excretion of approximately 90-percent of the actinide contaminants within 24 hours, has been advanced through the initial pre-clinical phases.

Tags: Counter WMD, Medical Sciences, Medical technology

ENERGY

Startup announces big breakthrough for electric vehicle batteries

[PhysOrg.com, 06MAR2012](#)

Envia Systems has announced it has achieved a critical milestone: a rechargeable lithium-ion battery with an “energy density” of 400 watt-hours per kilogram, the highest energy density known to be recorded. The basic guts of a battery include a negatively charged anode, a positively charged cathode and the electrolyte. When a battery is fully charged, the lithium ions are concentrated

in the anode. As the battery discharges, the ions flow to the cathode and current flows through the electric circuit, releasing energy.

Tags: Energy, Battery

LED's efficiency exceeds 100%

[PhysOrg.com, 05MAR2012](#)

For the first time, researchers have demonstrated that an LED can emit more optical power than the electrical power it consumes. Although scientifically intriguing, the results won't immediately result in ultra-efficient commercial LEDs since the demonstration works only for LEDs with very low input power that produce very small amounts of light.

Tags: Energy

A tour of the US's clean energy future

[Nature News, 01MAR2012](#)

The third annual ARPA-e summit showcases potentially transformative energy technologies.

Tags: Energy, Alternate energy, S&T Policy

Meeting Biofuel Production Targets Could Change Agricultural Landscape

[Newswise, 29FEB2012](#)

Almost 80 percent of current farmland in the U.S. would have to be devoted to raising corn for ethanol production in order to meet current biofuel production targets with existing technology, a new study has found. An alternative, according to a study in ACS' journal Environmental Science & Technology, would be to convert 60 percent of existing rangeland to biofuels.

Tags: Energy, Renewable energy

ENVIRONMENTAL SCIENCE

Emissions from Asia put US cities over the ozone limit

[Nature News, 05MAR2012](#)

Satellite data could warn of incoming air pollution. Researchers at Princeton University show that Asian emissions directly contribute to ground-level pollution in the United States. They found that the majority of US ground pollution came from local sources, but as much as 20% was attributable to Asian emissions.

Tags: Environmental science

'Light meter in the sky' opens a window into the secret world of clouds

[PhysOrg.com, 05MAR2012](#)

Atmospheric scientists from Reading's Department of Meteorology have designed a sunlight-measuring instrument that uses the natural swinging and spinning motion of a

rising weather balloon to distinguish clouds from clear air. The device may provide higher-resolution measurements of clouds than is currently possible, particularly for thin clouds - which could help meteorologists provide more accurate weather forecasts.

Tags: Environmental science, Climatology

FEATURED RESOURCE

[e! Science News](#)

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FORECASTING

[Google boss lays out future vision at world's top tech fair](#)

[PhysOrg.com](#), 05MAR2012

Google's executive chairman Eric Schmidt cast a science-fiction vision of the future as the world's top tech fair opened Monday, with the German IT sector predicting record sales in 2012. "Translating .. voice recognition, electronic books. The people who predict that intelligent robots, virtual reality or self-driving cars will soon be commonplace are right," he added.

Tags: Forecasting, Information technology

[Mining Social Media For Intelligence](#)

[Aviation Week](#), 02MAR2012

For the past two years, Northrop has been working on its own proprietary technology that it describes as an "open source ingest engine," which collects publicly available data, such as Twitter posts. "One of the nastiest data problems that we have is open-source data," says Northrop pointing to the deluge of data available on the Web, ranging from simple Google searches to the so-called "deep web."

Tags: Forecasting

GOVERNMENT S&T

[Developing Robots That Can Teach Humans](#)

[NSF](#), 05MAR2012

Researchers are programming robot teachers to gaze and gesture like humans. The team hopes their work will transform how humanoid robots and animated characters interface with people, especially in classrooms. They can design technology that really benefits people in learning, in health and in well-being, and in collaborative work.

Tags: Government S&T, NSF, Robotics

[Sixteen 16 square inches of DARPA Geckskin can stick to glass and support 700 pounds](#)

[Next Big Future](#), 05MAR2012

"Geckskin" is one output of the Z-Man program. It is a synthetically-fabricated reversible adhesive inspired by the gecko's ability to climb surfaces of various materials and roughness, including smooth surfaces like glass. The program aims to develop biologically inspired climbing aids to enable warfighters to scale vertical walls constructed from typical building materials, while carrying a full combat load, and without the use of ropes or ladders.

Tags: Government S&T, Military technology

INFORMATION TECHNOLOGY

[How your body can transmit data \(Video\)](#)

[BBC](#), 05MAR2012

Swedish communications giant Ericsson develops a device which transmits data via the human body.

Tags: Information Technology

[New Computers Respond to Students' Emotions, Boredom](#)

[Science Daily](#), 02MAR2012

AutoTutor is an Intelligent Tutoring System (ITS) that helps students learn complex technical content in Newtonian physics, computer literacy and critical thinking by holding a conversation in natural language; simulating teaching and motivational strategies of human tutors; modeling students' cognitive states; using its student model to dynamically tailor the interaction to individual students; answering students' questions; identifying and correcting misconceptions; and keeping students engaged with images, animations and simulations.

Tags: Information Technology, STEM

[ORNL Completes First Phase of Titan Supercomputer Transition](#)

[Newsweek](#), 29FEB2012

Oak Ridge National Laboratory's Jaguar supercomputer has completed the first phase of an upgrade that will keep it among the most powerful scientific computing systems in the world.

Tags: Information Technology, Government S&T, Supercomputer

NEUROSCIENCE

[Scientists Search for Source of Creativity](#)

[Science Newsline](#), 05MAR2012

It takes two to tango. Two hemispheres of your brain, that is. USC researchers are working to pin down the exact source of creativity in the brain—and have found that the left hemisphere of your brain, thought to be the logic and math portion, actually plays a critical role in creative thinking.

Tags: Neuroscience, Science without borders

MATERIALS SCIENCE

Engineer Discovers Spider Silk Conducts Heat as Well as Metals[Newswise, 05MAR2012](#)

A research team at Iowa State University found that spider silks—particularly the draglines that anchor webs in place—conduct heat better than most materials, including very good conductors such as silicon, aluminum and pure iron. Spider silk also conducts heat 1,000 times better than woven silkworm silk and 800 times better than other organic tissues. The discovery could lead to spider silk helping to create flexible, heat-dissipating parts for electronics, better clothes for hot weather, bandages that don't trap heat and many other everyday applications.

Tags: Materials science

PHOTONICS

A New Way to Channel Light[American Institute of Physics, 02MAR2012](#)

Light hitting a surface exerts a tiny pressure. Ordinarily these forces have little effect, but a report in Physical Review Letters describes theoretically how radiation pressure can be harnessed to make light traveling through narrow glass "strips" focus itself into beams. The system works for any wavelength and provides a new technique for shaping and controlling light.

Tags: Photonics, Science without borders

QUANTUM SCIENCE

Quantum conveyance: Electrical circuits talk to single atoms[Nanowerk, 06MAR2012](#)

If a practical quantum computer is ever to be realized, conventional electronic devices will have to interface with the delicate quantum systems such as atoms or ions in traps or wisps of magnetism near superconducting sensors. Researchers in Australia and USA propose a way to achieve this kind of quantum interface. They show how an electrical circuit can be used to enable the transfer of quantum information encoded in a single ion to other quantum systems, such as another isolated ion.

*Tags: Quantum science***Quantum-dot laser produces multiple wavelengths for terahertz generation**[THz Science and Technology, 06MAR2012](#)

A single quantum-dot (QD) laser diode developed by a group at the University of Dundee, Scotland, generates stable dual and/or multiple longitudinal modes in the near-infrared. The device has potential for production of terahertz radiation via optical difference-frequency generation.

*Tags: Quantum science***Optical Device is More Than 100% Efficient**[American Institute of Physics, 27FEB2012](#)

Physicists have known for decades that, in principle, a semiconductor device can emit more light power than it consumes electrically. Experiments published in Physical Review Letters finally demonstrate this in practice, though at a small scale. Heating the light emitters increases their output power and efficiency, meaning they are like thermodynamic heat engines, except they come with the fast electrical control of modern semiconductor devices.

Tags: Quantum science

SCIENCE WITHOUT BORDERS

Elusive Higgs boson may nearly be cornered[Science Daily, 07MAR2012](#)

New measurements announced by scientists from the CDF and DZero collaborations at the U.S. Department of Energy's Fermi National Accelerator Laboratory indicate that the elusive Higgs boson may nearly be cornered. After analyzing the full data set from the Tevatron accelerator, which completed its last run in September 2011, the two independent experiments see hints of a Higgs boson.

*Tags: Science without borders***Proposed National Goal of enabling Moore's Law of Space Launches - doubling launches every year**[Next Big Future, 03MAR2012](#)

George Nield, associate administrator for commercial space transportation at FAA, thinks it's possible to double the number of permit-holding private launches every year for the rest of the decade. That exponential increase would lead to 1,280 liftoffs in 2019—an average of 3 1/2 per day. In addition to laying the foundation for future lunar colonies and orbiting "gas stations," this effort could help the U.S. private spaceflight industry get off the ground.

*Tags: Science without borders, Space technology***Researchers develop 'SpeechJammer' gun that can quash human utterances**[PhysOrg.com, 02MAR2012](#)

The idea is based on the fact that to speak properly, we humans need to hear what we're saying so that we can constantly adjust how we go about it, scientists call it delayed auditory feedback. Trouble comes though when there is a slight delay between the time the words are spoken and the time they are heard. If that happens, people tend to get discombobulated and stop speaking, and that's the whole idea behind the SpeechJammer. TECHNICAL ARTICLE: [Kazutaka Kurihara, Koji Tsukada, SpeechJammer: A System Utilizing Artificial Speech Disturbance with Delayed Auditory Feedback](#)

Tags: Science without borders

Simulator computes evacuation scenarios for major events

EurekaAlert, 01MAR2012

A research group with scientists from Technische Universität München has developed a simulator that can be used to compute different scenarios. The program can simulate the behavior of tens of thousands of people. The microscopic simulation represents every individual in a ten-thousand strong crowd, thus enabling security and emergency services to meticulously track the consequences of specific decisions in real-life situations.

Tags: Science without borders, Simulation and modeling

Mechanical engineers study snakes' sophisticated frictional properties to build more nimble rescue robots

PhysOrg.com, 29FEB2012

Snakes! Love them or hate them, everyone can agree they are superb at sliding over complex terrain. Learning the slithery reptiles' tricks can provide valuable tips for designing rescue robots to help locate survivors trapped in rubble after a major disaster strikes.

Tags: Science without borders

Ants and us: can society take a leaf from the leaf-cutter's book?

The Conversation, 14FEB2012

One of the intriguing similarities between ant societies and our own involves the construction of transport infrastructure to move the raw materials on which the economy depends. In a study of leaf-cutting ants in Central America, researchers discovered cleared trails become less effective at promoting the flow of resources as ant colonies grow larger. Human societies may be under similar constraints. It is known the total length of roadways scales less than proportionately with the geographic size of countries: a doubling in area is accompanied by less than a doubling in total road length.

Tags: Science without borders

SENSORS

When Your Ship Comes in - Make Sure You Know What It's Carrying Before There's Trouble

Newswise, 05MAR2012

The DHS Science and Technology Directorate (S&T) and its Transportation Security Laboratory (TSL) in Atlantic City, NJ, have developed a way to test technical solutions to this need: the Container Security Test Bed (CSTB) – an outdoor “laboratory” allowing researchers and developers from government, academia, and industry to explore novel ways to detect threats in a cargo container.

Tags: Sensors ■

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