Volume 3, Issue 19 ■ 10MAY2013

S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Hearing the Russian Meteor in America

Georgia Institute of Technology, 03MAY2013

The meteor that crashed into Russia was strong enough that its explosive entry into our atmosphere was detected almost 6,000 miles away in Lilburn, Ga., by infrasound sensors—a full 10 hours after the meteor's explosion. A Georgia Tech researcher has modified the signals and made them audible, allowing audiences to "hear" what the meteor's waves sounded like as they moved around the globe on February 15. HEAR THE METEOR

Tags: Science without borders, Featured Article

Best of both worlds: Towards a quantum Internet with combined optical and electrical technique

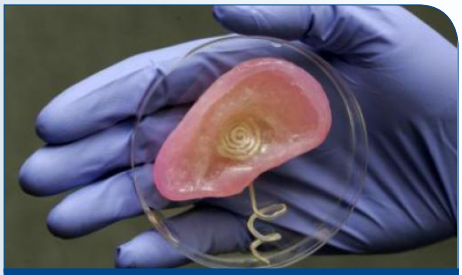
Science Daily, 02MAY2013

An international team of researchers (UK, Australia) has achieved a breakthrough in quantum science that brings the prospect of a network of ultra-powerful quantum computers—connected via a quantum internet—closer to reality. The team is the first to have detected the spin, or quantum state, of a single atom using a combined optical and electrical approach. TECHNICAL ARTICLE

Tags: Quantum science, Featured Article

Printable functional 'bionic' ear melds electronics and biology

Science Daily, 02MAY2013



Scientists used 3-D printing to merge tissue and an antenna capable of receiving radio signals. (Credit: Photo by Frank Wojciechowski)

Princeton University researchers' primary purpose was to explore an efficient and versatile means to merge electronics with tissue. The scientists used 3D printing of cells and nanoparticles followed by cell culture to combine a small coil antenna with cartilage, creating what they term a bionic ear. TECHNICAL ARTICLE

Tags: Advanced manufacturing, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Researchers Develop Unique Method for Creating Uniform Nanoparticles

Science Newsline, 07MAY2013

University of Illinois researchers have developed a unique approach for the synthesis of highly uniform icosahedral nanoparticles made of platinum (Pt). This is important both in fundamental studies—nanoscience and nanotechnology—and in applied sciences such as high performance fuel cell catalysts. TECHNICAL ARTICLE

Tags: Advanced manufacturing

ADVANCED MATERIALS

Do-it-yourself invisibility with nanotechnology and 3D printing

Nanowerk, 06MAY2013

Researchers at Duke Universtiy made a small disk-like cloak. Algorithms determined the location, size and shape of the holes to deflect microwave beams. When microwave beams were aimed at an opaque object placed in the open space in the center of the disk the cloak made it disappear.

Tags: Advanced materials

Microwave oven cooks up nanocrystal solar cell material

Nanowerk, 06MAY2013

University of Utah metallurgists used an old microwave oven to produce a nanocrystal semiconductor called CZTS (Copper, Zinc, Tin and Sulfur) rapidly using cheap, abundant and less toxic metals than other semiconductors. They hope it will be used for more efficient photovoltaic

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solar cells and LED lights, biological sensors and systems to convert waste heat to electricity. TECHNICAL ARTICLE

Tags: Advanced materials, Solar energy

New metamaterial doubles up on invisibility (w/video)

Nanowerk, 06MAY2013

Stanford engineers have taken an important step toward designing a broadband metamaterial that more than doubles the range of wavelengths of light that can be manipulated. The new material can exhibit a refractive index well below anything found in nature. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

Wave-Shaping Surfaces

American Physical Society Spotlight, 06MAY2013

Ultrathin screens made of metamaterials can bend or reshape a wave transmitted through them without generating any reflection. TECHNICAL ARTICLE

Tags: Advanced materials

Graphene's high-speed seesaw

Science Daily, 02MAY2013

Researchers in the UK have developed the first graphene-based transistor with bistable characteristics, which means that the device can spontaneously switch between two electronic states. Such devices are in great demand as emitters of electromagnetic waves in the high-frequency range between radar and infra-red, relevant for applications such as security systems and medical imaging. TECHNICAL ARTICLE

Tags: Advanced materials, S&T UK

Researchers tackle collapsing bridges with new technology

Science Daily, 02MAY2013

An international team of researchers has proposed a new technology that could divert vibrations away from load-bearing elements of bridges to avoid catastrophic collapses. The "wave bypass" technique has many similarities to invisibility cloaks, which exploit metamaterials to bend light around objects.

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

More than a good eye: Carnegie Mellon robot uses arms, location and more to discover objects

Bright Stuff Physics, 07MAY2013

The Lifelong Robotic Object Discovery (LROD) process developed by a research team at Carnegie Mellon University enabled a two-armed, mobile robot to use color video, a Kinect depth camera and non-visual information to discover more than 100 objects in a home-like laboratory.

Tags: Autonomous systems & robotics

Robotic insects make first controlled flight (w/video)

Harvard University, 04MAY2013

Last summer in a laboratory an insect, half the size of a paper clip, weighing less than a tenth of a gram, leapt a few inches, hovered for a moment on fragile, flapping wings, and then sped along a preset route through the air. This is the culmination of more than a decade's work by Harvard University researchers.

Tags: Autonomous systems & robotics

Robots take part in a space simulation

Science Daily, 04MAY2013

The two robots Flobi and Nao worked full time for three weeks in an isolation study in Cologne. Scientists were studying how these intelligent assistance systems can help astronauts to keep fit—both physically and mentally.

Tags: Autonomous systems & robotics, S&T Germany

BIOTECHNOLOGY

Scientists create hybrid flu that can go airborne

Nature News, 02MAY2013

A team of scientists in China has created hybrid viruses by mixing genes from H5N1 and the H1N1 strain behind the 2009 swine flu pandemic, and showed that some of the hybrids can spread through the air between guinea pigs.

Tags: Biotechnology, Biology, S&T China

ENERGY

Doubling the efficiency of thermoelectric materials

Nanowerk, 05MAY2013

Thermoelectric materials can be used to turn waste heat into electricity or to provide refrigeration without any liquid coolants. University of Michigan researchers improved upon the state-of-the-art in organic semiconductors by nearly 70 percent, achieving a figure-of-merit of 0.42 in a compound known as PEDOT:PSS. That's about half as efficient as current inorganic semiconductors. TECHNICAL ARTICLE

Tags: Energy, Materials science

ENVIRONMENTAL SCIENCE

Organic vapors affect clouds leading to previously unidentified climate cooling

PhysOrg.com, 05MAY2013

The number of particles and their size control how bright the clouds appear from the top, controlling the efficiency with which clouds scatter sunlight back into space. University of Manchester scientists discovered that natural emissions and manmade pollutants affect the number of droplets in a cloud and hence its brightness, so affecting climate. TECHNICAL ARTICLE

Tags: Environmental science

continued...

"Nothing is less predictable than the development of an active scientific field." CHARLES RICHTER

Ocean Wave Breaking Stirs Up Atmosphere

American Physical Society Spotlight, 04MAY2013

Researchers in Italy found that about three-quarters of the breaking wave's energy ended up in the air. Much of this energy went into vortices which could transport aerosols into the atmosphere where they could seed clouds. Since clouds absorb incoming sunlight as well as thermal radiation from the Earth, the results may also affect climate modeling. TECHNICAL ARTICLE

Tags: Environmental science

FORECASTING

Mapping the online landscape to predict tipping points

PhysOrg.com, 07MAY2013

What if we could identify digital tipping points before they induced potentially massive chain reactions? UC Santa Barbara computer scientists hope to model different types of information networks and discern the shared dynamics that could make predictions possible.

Tags: Forecasting, Government S&T

IMAGING TECHNOLOGY

Super-Resolution Microscopes Crack the Diffraction Limit

IEEE Spectrum, 06MAY2013

Researchers at Purdue University have developed saturated transient absorption microscope (STAM), a tool for seeing objects tinier than a half wavelength without the need for secondary labels. According to the researchers the technique offers contact-free imaging that is much faster than STM or NFSOM, and is inherently adapted to three-dimensional super-resolution imaging.

Tags: Imaging technology

Quantum-assisted Nano-imaging of Living Organism Is a First

DARPA News, 03MAY2013

A team of Harvard University-led researchers working on DARPA's Quantum-Assisted Sensing and Readout (QuASAR) program demonstrated imaging of magnetic structures inside of living cells. Using equipment operated at room temperature and pressure, the team was able to display detail down to 400 nanometers, which is roughly the size of two measles viruses.

Tags: Imaging technology

INFORMATION TECHNOLOGY

Broadcast Video Will Soon Be Packed into Smartphone Signals

MIT Technology Review, 06MAY2013

Early next year, an emerging wireless technology known as LTE Broadcast could change all that, essentially making it possible for carriers to put a TV-like broadcast stream within LTE cellular signals. RELATED ARTICLE

Tags: Information Technology, Disruptive technology, Emerging technology

MATERIALS SCIENCE

Intriguing state of matter previously predicted in graphene-like materials might not exist after all

PhysOrg.com, 04MAY2013

Condensed matter physicists have theorized that it may be possible to achieve a state called a quantum spin liquid, in which quantum-mechanical effects or the structure of the atomic lattice hinder the development of atomic order while retaining strong electronic interactions. Researchers in Japan have now shown through detailed calculations that achieving the quantum spin liquid state may be more difficult than previously thought. TECHNICAL ARTICLE

Tags: Materials science, S&T Japan

MEDICAL SCIENCES

Pathogen turns protein into a virulence factor in one easy step

Science Daily, 08MAY2013

Researchers at Emory University have now uncovered this previously unknown virulence factor in Pseudomonas aeruginosa, one of the most common causes of hospital-acquired pneumonia. The pathogen takes an ordinary protein usually involved in making other proteins and adds three small molecules to turn it into a key for gaining access to human cells. TECHNICAL ARTICLE

Tags: Medical Sciences, Biology

MICROELECTRONICS

Perfectly designed microelectronics

Nanowerk, 02MAY2013

Researchers in Germany have developed a production process that makes it possible to miniaturize a certain type of microchip even further: programmable oscillators. These are responsible for temporal synchronization and the transmission of information in electronic devices.

Tags: Microelectronics, S&T Germany

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NEUROSCIENCE

Scientists Get a Head Start on BRAIN Initiative

Science NOW, 07MAY2013

At a recent meeting neuroscientists from around the country discussed possible directions for the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative.

Tags: Neuroscience, S&T Policy

Memory implants

KurzweilAI, 04MAY2013

Researchers at the University of Southern California in Los Angeles envision a day in the not too distant future when a patient with severe memory loss can get help from an electronic implant.

Tags: Neuroscience

Mathematicians help to unlock brain function

PhysOrg.com, 03MAY2013

Mathematicians from Queen Mary, University of London will bring researchers one-step closer to understanding how the structure of the brain relates to its function in two recently published studies. Papers 1, 2

Tags: Neuroscience, S&T UK

Featured Resource

Science Source

Stocks close to 1 million photographs, illustrations and clips from all fields of the natural and physical sciences, medical images, history images, wildlife, space and environmental imagery.

PHOTONICS

Enhanced energy storage in chaotic optical resonators

Nature Photonics, 05MAY2013

Researchers in Saudi Arabia combine analytic theory with ab initio simulations and experiments in photonic-crystal resonators to show that a chaotic resonator can store six times more energy than its classical counterpart of the same volume.

Tags: Photonics, Photonics

QUANTUM SCIENCE

Commercial Quantum Cryptography Satellites Coming

IEEE Spectrum, 06MAY2013

Satellites capable of performing quantum cryptography don't even exist outside of the lab yet, but researchers at the Institute for Quantum Computing (IQC), in Waterloo, Ont., Canada, are engineering the technology as you read this, and they say they could have a working prototype this year.

Tags: Quantum science, S&T Canada

Government Lab Reveals Quantum Internet Operated Continuously For Over Two Years

MIT Technology Review, 06MAY2013

Researchers at Los Alamos National Labs reveal an alternative quantum internet, which they say they've been running for two and half years. Their approach is to create a quantum network based around a hub and spoke-type network. All messages get routed from any point in the network to another via this central hub. TECHNICAL ARTICLE

Tags: Quantum science, Government S&T

Joining the quantum state of two photons into one

Nature Photonics, 05MAY2013

Researchers in Italy introduce and demonstrate experimentally a physical process, named 'quantum joining', in which the two-dimensional quantum states (qubits) of two input photons are combined into a single output photon, within a four-dimensional Hilbert space. The inverse process is also proposed, in which the four-dimensional quantum state of a single photon is split into two photons, each carrying a qubit. Both processes can be iterated.

Tags: Quantum science, S&T Italy

How to frustrate a quantum magnet: 16 atomic ions simulate a quantum antiferromagnet

Science Daily, 04MAY2013

According to the researchers at the University of Maryland, a quantum simulator presents an attractive alternative for gaining insight into the behaviors of complex material. With just 30 or so qubits, we should be able to study ordering and dynamics of this many-body system that cannot be predicted using conventional computers. TECHNICAL ARTICLE

Tags: Quantum science

continued...

Quantum physics: Security on the move

Nature China, 04MAY2013

Researches in China have carried out three more demonstration experiments, one on a turntable, one in a hot-air balloon and one in a high-loss medium. Using their QKD system, they have successfully established secure communication over distances of 40 kilometres, 20 kilometres and 96 kilometres, respectively. TECHNICAL ARTICLE

Tags: Quantum science, S&T China

Use of laser light yields versatile manipulation of a quantum bit

Science Daily, 02MAY2013

In contrast to conventional electronics, researchers at UC Santa Barbara have developed an all-optical scheme for controlling individual quantum bits in semiconductors using pulses of light. This offers an intriguing opportunity for processing and communicating quantum information with photonic chips. TECHNICAL ARTICLE

Tags: Quantum science, Photonics

SCIENCE WITHOUT BORDERS

Global networks must be redesigned, experts urge

Science Daily, 02MAY2013

The increasing interdependencies between the world's technological, socio-economic, and environmental systems have the potential to create global catastrophic risks. We may have to redesign global networks,or else they could turn into "global time bombs," experts say. TECHNICAL ARTICLE

Tags: Science without borders

SENSORS

An electronic nose can tell pears and apples apart

Science Daily, 08MAY2013

Swedish and Spanish engineers have created a system of sensors that detects fruit odours more effectively than the human sense of smell. For now, the device can distinguish between the odorous compounds emitted by pears and apples. TECHNICAL ARTICLE

Tags: Sensors

'Smart' paper and antennaless RFID tags

Science Daily, 02MAY2013

Researchers North Dakota State University, Fargo, have developed a method to embed ultra-thin, ultra-small RFID chips on paper or other flexible substrates, which could lead to ways to reduce counterfeiting. The research focuses on developing spherical sensor platforms that can communicate using RFID protocols, regardless of orientation. This is useful for sensors that cannot be deployed with a guaranteed orientation, such as those dropped from aircraft.

Tags: Sensors ■

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