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S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Invisibility cloak hides parts of objects, leaves other parts visible

PhysOrg.com, 02DEC2013

Researchers in China have designed and fabricated an invisibility cloak that can conceal some arbitrarily chosen parts of objects while leaving other parts visible, making it a localized invisibility cloak. TECHNICAL ARTICLE

Tags: Imaging technology, S&T China, Featured Article

A New Record for Terahertz Transmission

PhysOrg.com, 28NOV2013

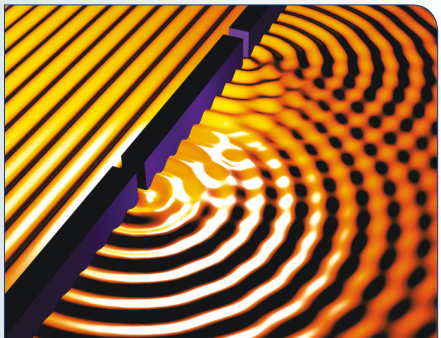
Researchers in Germany created a wireless connection at a frequency of 237.5 GHz between a transmitter and a receiver that were 20 meters apart. This frequency is in the millimeter-wave portion of the spectrum and tantalizingly close to the terahertz region. Subterahertz radiation is less affected by local conditions like fog or rain when compared with free-space optical transmission.

Tags: Communications Technology, S&T Germany, Featured Article

Physicists ask photons 'Where have you been?'

Physics World, 26NOV2013

By placing a double-slit experiment along one path of a larger double-slit experiment, researchers in Israel have shown that photons traverse a section of the apparatus that they neither enter nor exit. The effect, the team argues, is best understood by invoking a little-used interpretation of quantum mechanics that was first proposed in 1964. TECHNICAL ARTICLE



An artist's impression of the famous double-slit experiment. (Courtesy: Russell Kightley/Science Photo Library)

Tags: Quantum science, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Printed electronics process could support wafer-thin paper keyboards

Printed Electronics World, 03DEC2013

A company in the UK has developed a low-cost, manufacturing technology using standard print processes combined with capacitive touch technology. It would allow Bluetooth low energy wireless control to be added to everyday low cost materials such as paper, card, and plastic, for potentially just a few dollars.

Tags: Advanced manufacturing, S&T UK

ADVANCED MATERIALS

High-performance oil absorbent made from mesoporous nanofiber networks

Nanowerk, 02DEC2013

Researchers in Japan and China succeeded in developing a high-performance oil absorbent by creating a mesoporous material with pores of approximately 10 nm in diameter, using engineering plastics that are widely used as industrial materials. TECHNICAL ARTICLE

Tags: Advanced materials, S&T China, S&T Japan

AUTONOMOUS SYSTEMS & ROBOTICS

Carnegie Mellon Computer Searches Web 24/7 To Analyze Images and Teach Itself Common Sense

Carnegie Mellon University, 20NOV2013

NEIL (Never Ending Image Learner) leverages recent advances in computer vision that enable computer programs to identify and label objects in images, to

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characterize scenes and recognize attributes, such as colors, lighting and materials, all with minimal human supervision. In turn, the data it generates will further enhance the ability of computers to understand the visual world. NEIL

Tags: Autonomous systems & robotics, Artificial intelligence

BIG DATA

Data Mining Reveals the Secret to Getting Good Answers

MIT Technology Review, 03DEC2013

Researchers in China have developed an algorithm that weeds out less useful questions and answers as they are posted on websites such as Stack Overflow, a site that allows anybody to post a question related to programing and receive answers from the community. TECHNICAL ARTICLE

Tags: Big data

New Algorithm Finds You, Even in Untagged Photos

Science Daily, 02DEC2013

Researchers in Canada have developed a search tool which uses tag locations to quantify relationships between individuals, even those not tagged in any given photo. The nimble algorithm, called relational social image search, achieves high reliability without using computationally intensive object- or facial-recognition software.

Tags: Big data, S&T Canada

Uncovering hidden structures in massive data collections

PhysOrg.com, 02DEC2013

Researchers at Princeton University have developed a method that offers a solution to data overload. Using a mathematical method that calculates the likelihood of a pattern repeating throughout a subset of data, the researchers have been able to cut dramatically the time needed to find patterns in large collections of information such as social networks.

Tags: Big data

Enhancing Efficiency of Complex Computations

Karlsruhe Institute of Technology, 29NOV2013

Many computer applications model relationships between objects by graphs (networks) in the sense of discrete mathematics. An important method to manage complex computations on steadily growing networks is graph partitioning. Researchers in Germany have now released the Karlsruhe High Quality Partitioner (KaHIP). The solutions produced by this tool presently are the best worldwide. KaHIP

Tags: Big data, Mathematics, S&T Germany

Data Mining Social Media Opinions

Science Daily, 28NOV2013

A European collaboration has analyzed thousands of micro-blogging updates to help them develop an opinion detector for data mining the social media and extracting nuggets of information that could be gold dust for policy makers, marketing departments and others looking for emerging trends and attitudes.

Tags: Big data, S&T EU

BREAKTHROUGH TECHNOLOGY

Engineering antennas into solar panels

PhysOrg.com, 02DEC2013

Researchers in Switzerland have managed to combine antennas and solar cells to work together with unprecedented efficiency in the near future. This is a first step towards more compact and more lightweight satellites. The technology could also be deployed in the autonomous antenna systems used in the aftermath of natural disasters. TECHNICAL ARTICLE

Tags: Breakthrough technology, S&T Switzerland

ENERGY

Electricity Generated from Weight of Traffic and Pedestrians

Science Daily, 29NOV2013

The technology developed by Mexican entrepreneurs consists of a system that integrates a ramp-step that elevates to five centimeters above the level of the street. The impact of a vehicle exerts pressure on a set of bellows below. Air in the bellows is expelled at a certain pressure into a tank where it is compressed and relaunched to an electricity generating turbine.

Tags: Energy

A new energy conversion principle with potential to double the efficiency of today's engines

Asia Research News, 27NOV2013

Researchers in Japan have formulated a new compressive combustion principle that can yield thermal efficiency of 60% or more. The fundamental principle is that while thermal efficiency can be raised by reaching a high compression ratio, expanded uses and ranges of application were attained with the further addition of 3 new measures.

Tags: Energy, S&T Japan

Holistic Cell Design Leads to High-Performance, Long Cycle-Life Li/S Battery

Science Daily, 19NOV2013

Researchers at Berkeley Lab have demonstrated a lithium-sulfur (Li/S) battery that has more than twice the specific energy of lithium-ion batteries, and that lasts for more than 1,500 cycles of charge-discharge with minimal decay of the battery's capacity. This is the longest cycle life reported so far for any lithium-sulfur battery.

Tags: Energy, Government S&T

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"True Science teaches, above all, to doubt, and to be ignorant."

MIGUEL DE UNAMUNO

ENVIRONMENTAL SCIENCE

Elucidating Heavy Precipitation Events

Science Daily, 29NOV2013

Researchers in France investigated two phenomena that play a key role in meteorology: the microphysics of hydrometeors (rain, snow and ice pellets) and atmospheric turbulence. They have shown that these processes should be taken into account in low wind speed events. Their findings should help forecast these events, which repeatedly cause significant damage. TECHNICAL ARTICLE

Tags: Environmental science, Climatology, S&T France

FORECASTING

Indian Ocean phenomenon helping to predict extreme weather

PhysOrg.com, 29NOV2013

A better understanding of the relationship between the Indian Ocean Dipole and extreme weather events will enable farmers, industry, communities and governments to better anticipate and prepare for droughts and increased bushfire risk, up to six months in advance of the event.

Tags: Forecasting, Climatology

New generation of climate models capable of simulating abrupt climate change

PhysOrg.com, 29NOV2013

For the first time researchers in the UK have demonstrated that climate models are able to simulate past abrupt changes in the Earth's climate—giving more confidence in predictions of future global climate change.

Tags: Forecasting, Climatology, S&T UK

GOVERNMENT S&T

DARPA aims for a breakthrough in field communications

Defense Update, 02DEC2013

DARPA's DISARMER project calls for building a direct conversion receiver based on a photonics-enabled, analog-to-digital converter. Photonics projects aim to take advantage of the high sensitivity and large bandwidth of photonic components, as well as the ease of transmission of optical signals, to enhance sensing and communications. The project is expected to be completed by September 2016.

Tags: Government S&T, DARPA

IMAGING TECHNOLOGY

3-D images, with only one photon per pixel

MIT News, 28NOV2013

Researchers at MIT have developed a new lidar-like system that can gauge depth when only a single photon is detected from each location. The new system could yield substantial savings in energy and time—which are at a premium in autonomous vehicles trying to avoid collisions. The system can also use the same reflected photons to produce images of a quality that a conventional imaging system would require 900 times as much light to match—and it works much more reliably than lidar in bright sunlight. TECHNICAL ARTICLE

Tags: Imaging technology

MATERIALS SCIENCE

Microscale garbage truck cleans polluted water

Nanowerk, 02DEC2013

Researchers in Germany have reported the first example of micromotors for the active degradation of organic pollutants in solution. The novelty of this work lies in the synergy between internal and external functionality of the micromotors. TECHNICAL ARTICLE

Tags: Materials science

A self-healing satellite? Students seek your funds to launch prototype

PhysOrg.com, 29NOV2013

A Canadian team has a prototype idea that could lead to self-healing structures in space. It is constructed out of carbon fiber (to reinforce it) and an epoxy resin (for its matrix). After the structure is damaged, it would "transport a healing agent" to that area using microcapsules that are inside various spots on the resin. The structure then chemically repairs itself. TECHNICAL DETAILS

Tags: Materials science, S&T Canada

Vanadium dioxide 'smart glass' can be activated to block infrared light while remaining transparent to visible light

RIKEN Research, 29NOV2013

Vanadium dioxide is a thermochromic material that is transparent below about 30 °C and reflects infrared light above 60 °C. This transition is related to a change in crystal structure that also results in a shift from electrically insulating properties at lower temperatures to conductive properties at higher temperatures. For the first time, researchers in Japan have been able to trigger this change using a static voltage rather than heat.

Tags: Materials science, S&T Japan

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New Effect Couples Electricity and Magnetism in Materials

Science Daily, 27NOV2013

Researchers in Austria have shown that in "multiferroics," in which electric and magnetic excitations are closely linked, magnetic properties and excitations can be influenced by an electric voltage. This opens up completely new possibilities for electronics at high frequencies. TECHNICAL ARTICLE

Tags: Materials science

Featured Resource

OSTI

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Teaching Matter Waves New Tricks: Making Magnets With Ultra Cold Atoms

Science Daily, 27NOV2013

In a joint experimental and theoretical effort, an international team of researchers (Germany, Austria, Spain) controlled quantum matter waves made of Rubidium atoms in such a way that they mimicked magnets. Under these well-defined conditions, these artificially created magnets can be studied with clarity, and can give a fresh perspective on long-standing riddles. TECHNICAL ARTICLE

Tags: Materials science, S&T Germany

Carbon Capture and Storage: An Inside Look at a Metal-Organic Framework (MOF) in Action

Science Daily, 22NOV2013

Researchers at the Lawrence Berkeley National Laboratory have recorded the first *in situ* electronic structure observations of the adsorption of carbon dioxide inside Mg-MOF-74, an open metal site MOF that has emerged as one of the most promising strategies for capturing and storing greenhouse gases. TECHNICAL ARTICLE

Tags: Materials science

Solar-Powered Battery Woven Into Fabric Overcomes Hurdle for 'Wearable Electronics'

Science Daily, 20NOV2013

Researchers from South Korea have looked at a way to unlink smart technology from the wall socket, by looking at what materials are best suited for use in a flexible, rechargeable battery that's also inexpensive. They also integrated lightweight solar cells to recharge the battery without disassembling it from clothing or requiring the wearer to plug in. TECHNICAL ARTICLE

Tags: Materials science, Energy

MICROELECTRONICS

50 Meters of Optical Fiber Shrunk to the Size of Microchips

DARPA News, 26NOV2013

DARPA's integrated Photonic Delay (iPhoD) program created a new class of photonic waveguides with losses approaching that of optical fiber. The new waveguides are built onto microchips and include up to 50 meters of coiled material that is used to delay light. These waveguides also employ modern silicon processing to achieve submicron precision and more efficient manufacturing. The result is a new component that is smaller and more precise than anything before in its class.

Tags: Microelectronics, DARPA, Government S&T

NEUROSCIENCE

DARPA Wants to Fix Broken Brains, Restore Lost Memories

Science Now, 28NOV2013

Deputy director of the Defense Sciences Office at DARPA, discusses the agency's plans for the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative. Another project, RAM (Restoring Active Memory), calls for a separate wireless device that repairs brain damage and restores memory loss. This article is an extended version of a Q&A that appears in the 29 November issue of Science.

Tags: Neuroscience, DARPA

Memories 'Geotagged' With Spatial Information

Science Daily, 28NOV2013

Researchers from the University of Pennsylvania and Germany have discovered how brain cells that encode spatial information form "geotags" for specific memories and are activated immediately before those memories are recalled. These findings provide evidence that the human memory system tags memories with information about where and when they were formed and that the act of recall involves the reinstatement of these tags. TECHNICAL ARTICLE

Tags: Neuroscience

S&T POLICY

Over 70 new centres to train tomorrow's engineers and scientists

Alphagalileo, 27NOV2013

UK's largest investment in postgraduate training in engineering and physical sciences will fund over seventy new Centres for Doctoral Training (CDTs), spread across 24 UK universities. A £350 million fund will be used to train over 3,500 postgraduate students in engineering and physical sciences.

Tags: S&T policy

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SCIENCE WITHOUT BORDERS

To create a super-intelligent machine, start with an equation

The Conversation, 28NOV2013

Researchers in Australia argue that mathematically defining intelligence is not only possible, but crucial to understanding and developing super-intelligent machines. PRESENTATION

Tags: Science without borders

Trove of data from Russian 'dash-cam' meteorite (w/video)

PhysOrg.com, 27NOV2013

This week, three papers, two in Nature and one in Science, describe new aspects of the meteorite's airburst, building the most-detailed forensic picture of the events of that morning. The new papers exploit an even wider array of data. Much of the information is a superb example of crowd-sourced science which provided an unprecedented set of measurements of the event. TECHNICAL ARTICLE

Tags: Science without borders

SENSORS

Amplifying Our Vision of the Infinitely Small

Science Daily, 02DEC2013

Researchers in Canada discovered that Raman scattering of dye-nanotube particles is so large that a single particle of this type can be located and identified. All one needs is an optical scanner capable of detecting this particle, much like a fingerprint. This discovery has applications in medicine and biology. TECHNICAL ARTICLE

Tags: Sensors, S&T Canada

Defending Against Electromagnetic Attacks

Science Daily, 02DEC2013

Researchers in Germany have developed a measurement instrument that is capable of determining the strength, frequency, and direction of electromagnetic attacks. Four specialized antennas make up the INT demonstration instrument that sample the environment around the subject device to be protected. Each of these covers a quadrant of 90 degrees and detects all types of electromagnetic sources. A high-frequency module preconditions the signals for measurement and determines when the electromagnetic pulse started and stopped.

Tags: Sensors, Military technology, S&T Germany ■

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