Volume 3, Issue 41 ■ 11OCT2013

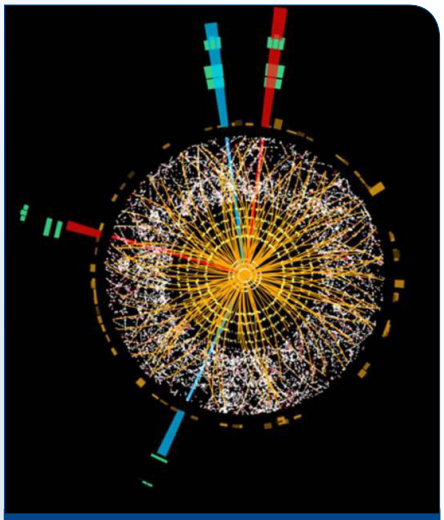
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

2013 Nobel Prize in Physics: Higgs Particle and the Origin of Mass

Science Daily, 08OCT2013



A Higgs boson decays to 4 leptons in this collision recorded by the ATLAS detector on 18 May 2012. (Credit: ATLAS)

The Royal Swedish Academy of Sciences has decided to award the Nobel Prize in Physics for 2013 to François Englert of Université Libre de Bruxelles, Brussels, Belgium, and Peter W. Higgs of the University of Edinburgh, UK, "for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider." NOBEL FOUNDATION

Tags: Science without borders, Featured Article

Physicists find that entanglement concentration is irreversible, in contrast with previous research

PhysOrg.com, 07OCT2013

Entangled states used in quantum information processes can be converted into one another using a variety of conversion processes. Researchers in Japan have shown that entanglement concentration is irreversible due to a trade-off relation between performance and reversibility. The finding could have implications for future developments in quantum information applications. TECHNICAL ARTICLE

Tags: Quantum science, S&T Japan, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Printed Electronics: A Multi-Touch Sensor Customizable With Scissors

Science Daily, 08OCT2013

Researchers in the USA (MIT) and Germany have developed a printable multi-touch sensor whose shape and size everybody can alter. A new circuit layout makes it robust against cuts, damage, and removed areas. TECHNICAL ARTICLE, VIDEO

Tags: Advanced manufacturing, Information technology

Software to construct everything with LEGO pieces

KurzweilAI, 07OCT2013

Researchers in Switzerland have developed software that automatically transforms a three-dimensional image into bricks and simplifies the challenge of construction by proposing a comprehensive plan of the parts to be used at each level.

Tags: Advanced manufacturing, S&T Switzerland

'4D printing' adaptive materials

KurzweilAI, 04OCT2013

Researchers from Harvard, the University of Pittsburg and the University of Illinois plan to manipulate materials via 3D printing at nano and micro levels to produce materials that can modify their structures over time at the macro level.

Tags: Advanced manufacturing

ADVANCED MATERIALS

First Computer-Designed Superconductor Created

Science Daily, 08OCT2013

The material synthesized by a team of researchers from Binghamton University and their international collaborators is made out of two common elements, has a brand-new crystal structure and exhibits an unexpected type of superconductivity for a material that contains iron, just as predicted in the original computational study. TECHNICAL ARTICLE

Tags: Advanced materials, Advanced manufacturing

continued...

BACK TO TOP

Fuel cells from gelatin

Nanowerk, 07OCT2013

A British-Japanese-Chinese research team has developed a really simple route to carbon materials that performs almost as well as a commercial platinum/carbon in a key fuel cell reaction. To make these materials, they use gelatin—the same gelatin you'd use to make jelly/jello. TECHNICAL ARTICLE

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

Shape-shifting metal has a long memory

Physics World, 07OCT2013

The latest shape shifting material developed by researchers at the University of Minnesota can go through 16,000 shape-shifting cycles without significant degradation. The metal was created using a theoretical model that predicts which types of materials should have superior shape-memory properties. The team believes its model will lead to the creation of new types of materials that could have a range of technological applications. TECHNICAL ARTICLE

Tags: Advanced materials

Graphene With Aroma: New Production Method Broadens Prospects for 'Magic' Material

Science Daily, 01OCT2013

A new and very flexible variant of graphene has been developed by a team of researchers in Germany. Their measurements confirm that graphene of excellent crystalline and electronic quality had actually been manufactured from the aromatic molecule. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science, S&T Germany

AUTONOMOUS SYSTEMS & ROBOTICS

Better robot vision

MIT News, 07OCT2013

Researchers at MIT have developed a new robot-vision algorithm, based on the Bingham distribution, that is 15 percent better than its best competitor at identifying familiar objects in cluttered scenes. Because the Bingham distribution is a tool for reasoning probabilistically, it promises even greater advantages in contexts where information is patchy or unreliable. TECHNICAL ARTICLE

Tags: Autonomous systems & robotics

Surprisingly Simple Scheme for Self-Assembling Robots

Science Daily, 04OCT2013

Researchers at MIT have developed robots (called M-Blocks) which are cubes with no external moving parts. Inside each M-Block is a flywheel that can reach speeds of 20,000 revolutions per minute; when the flywheel is braked, it imparts its angular momentum to the cube. On each edge of an M-Block, and on every face, are cleverly arranged permanent magnets that allow any two cubes to attach to each other.

Tags: Autonomous systems & robotics

Video Friday: Boston Dynamics Updates, DASH Can Turn, and Inflatable Beer Bot

IEEE Spectrum, 04OCT2013

To explore caves spotted on the Moon and Mars, Astrobotic is developing a trolley that can travel over a cave skylight on cables, and then lower a sensor package.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

Stem Cells Engineered to Become Targeted Drug Factories

Harvard University, 30SEP2013

A team of researchers from Harvard, MIT and Mass General Hospital inserted modified strands of messenger RNA into connective tissue stem cells which stimulated the cells to produce adhesive surface proteins and secrete interleukin-10, an anti-inflammatory molecule. When injected into the bloodstream of a mouse, the modified human stem cells were able to target and stick to sites of inflammation and release biological agents that successfully reduced the swelling.

Tags: Biotechnology

COMMUNICATIONS TECHNOLOGY

Solving the internet capacity crunch: First demonstration of a multicore fiber network

PhysOrg.com, 08OCT2013

Research by scientists in the UK relies on Space Division Multiplexed (SDM) provided by the multicore fibres and on Software Defined Network (SDN) control, which are considered promising solutions to fulfil and control the ever-increasing demand for data consumption in communication networks.

Tags: Communications Technology, S&T UK

ENERGY

Paper generators: Harvesting energy from touching, rubbing and sliding (w/video)

Nanowerk, 07OCT2013

The process developed by researchers at Disney Research, Pittsburgh and Carnegie Mellon University uses electrets, materials with special electrical properties which are currently used in microphones and in tiny MEMS devices. TECHNICAL ARTICLE

Tags: Energy, Materials science

Genetically Modified Bacteria Produce 50 Percent More Fuel

MIT Technology Review, 03OCT2013

Researchers in UCLA cobbled together genes from a variety of organisms to create an alternate way to process sugar that doesn't emit any carbon dioxide, and uses all of the carbon in sugar to make biofuel. They created

continued...

"And the only way to do great work is to love what you do. If you haven't found it yet, keep looking." STEVE JOBS

genetically modified E. coli bacteria to demonstrate the process, but they say the same genetic pathway could be incorporated into other organisms, including yeast.
Tags: Energy

ENVIRONMENTAL SCIENCE

Terrestrial ecosystems at risk of major shifts as temperatures increase

Science Daily, 08OCT2013

Researchers in Germany studied over 150 climate scenarios, looking at ecosystem changes in nearly 20 different climate models for various degrees of global warming. According to the study, over 80% of the world's ice-free land is at risk of profound ecosystem transformation by 2100. TECHNICAL ARTICLE
Tags: Environmental science, Climatology

Scientists Use Climate Model to Better Understand Electricity in the Air

Science Daily, 30SEP2013

Scientists have not had a good understanding of how conductivity varies throughout the atmosphere and how that may affect the path of the electrical currents. Now, reserchers at the University of Colorado, Boulder, have developed a global electric circuit model by adding an additional layer to a climate model created by colleagues at the National Center for Atmospheric Research (NCAR) in Boulder. TECHNICAL ARTICLE
Tags: Environmental science, Climatology

MATERIALS SCIENCE

Silicon and Graphene: Two Great Materials That Stay Great Together

IEEE Spectrum, 08OCT2013

Researchers in Germany have shown that graphene does not lose its impressive conductivity characteristics even when mated with silicon. They determined that the carrier mobility of the graphene layer was roughly 30 times greater than that of conventional zinc oxide-based contact layers. TECHNICAL ARTICLE
Tags: Materials science

'White Graphene' Halts Rust in High Temps: Nano-Thin Films of Hexagonal Boron Nitride Protect Materials from Oxidizing

Science Daily, 07OCT2013

Researchers at Rice University have discovered that atomically thin sheets of hexagonal boron nitride (h-BN) have the handy benefit of protecting what's underneath from oxidizing even at very high temperatures. The researchers see potential for making very large sheets of h-BN only a few atoms thick by scalable vapor deposition methods. TECHNICAL ARTICLE
Tags: Materials science

3-D Dynamic Imaging of Soft Materials

Science Daily, 03OCT2013

Through a combination of transmission electron microscopy (TEM) and their own unique graphene liquid cell, researchers at Lawrence Berkeley National lab have recorded the three-dimensional motion of DNA connected to gold nanocrystals. This is the first time TEM has been used for 3D dynamic imaging of so-called soft materials. TECHNICAL ARTICLE
Tags: Materials science, Nanotechnology

Direct printing of liquid metal 3D microstructures

Nanowerk, 02OCT2013

The key concept of the method developed by researchers at North Carolina State University is that the liquid metal spontaneously forms a thin oxide layer on its surface. This oxide layer is solid and allows the metal to be printed into 3D shapes despite being a liquid. When two droplets of water come together, they form a larger droplet. However, this does not happen with the liquid metal due to the oxide 'skin.' TECHNICAL ARTICLE
Tags: Materials science

New biomimetic material to develop nanosensors

Nanowerk, 02OCT2013

Researchers in Spain have developed a biomimetic material which will allow researchers to develop multiple nanometer-sized chemical sensors over the same substrate by electron beam lithography. In addition, the material behaves as a molecularly imprinted polymer (MIP) that is able to recognize a molecule or a specific compound.
Tags: Materials science

MEDICAL SCIENCES

Cracked metal, heal thyself (w/video)

Nanowerk, 09OCT2013

Researchers at MIT found that under certain conditions, putting a cracked piece of metal under tension—that is, exerting a force that would be expected to pull it apart—has the reverse effect, causing the crack to close and its edges to fuse together. The surprising finding could lead to self-healing materials that repair incipient damage before it has a chance to spread. TECHNICAL ARTICLE
Tags: Medical Sciences

continued...

MICROELECTRONICS

Major silicon photonics breakthrough could allow for continued exponential growth in microprocessors

KurzweilAI, 08OCT2013

The technique developed by the University of Colorado, Boulder, MIT and Micron Technologies, Inc. allows microprocessors to use light instead of electrical wires to communicate with transistors on a single chip, a system that could also lead to energy-efficient computing.

Tags: Microelectronics

FEATURED RESOURCE

Chinese Academy of Sciences

Provides links to many English language journals and contents; Chinese articles provide English abstracts. RSS

NEUROSCIENCE

'Brain Training' May Boost Working Memory, but Not Intelligence

Science Daily, 08OCT2013

Researchers at Georgia Institute of Technology showed that despite the potential boost for multitasking, the benefits of training didn't transfer to fluid intelligence. They point out that just because WMC (Working Memory Capacity) and fluid intelligence are highly correlated doesn't mean that they are the same. TECHNICAL ARTICLE

Tags: Neuroscience

Human brains are bigger, but not so special

Futurity.org, 08OCT2013

Scientists in Australia and Brazil use computer modeling to demonstrate that the substantial enlargement of some areas of the human brain, vital to advanced cognition, reflect a consistent pattern that is seen across primate species of all sizes. TECHNICAL ARTICLE

Tags: Neuroscience

Well-Connected Hemispheres of Einstein's Brain May Have Sparked His Brilliance

Science Daily, 04OCT2013

Using a technique that measures and color-codes the varying thicknesses of subdivisions of the corpus callosum along its length, where nerves cross from one side of the brain to the other, researchers at the Florida State University determined that the left and right hemispheres of Albert Einstein's brain were unusually well connected to each other and may have contributed to his brilliance. TECHNICAL ARTICLE

Tags: Neuroscience

QUANTUM SCIENCE

Quantum optics: Light's improbable connection mapped

Nanowerk, 09OCT2013

By mapping the connections between photons, researchers in Singapore and Russia have shown that the properties of each photon in a pair, which were created in the same time and place, are governed by statistics. The maps could aid future quantum optics engineering efforts. TECHNICAL ARTICLE

Tags: Quantum science, S&T Russia

S&T POLICY

Russian Air Force to Field a Stealth Bomber By 2020

Defense Update, 06OCT2013

The new bomber will carry both conventional and nuclear weapons, including a new long-range cruise missile that has already been adapted for the new bomber. Experts say the combination of subsonic stealth and hypersonic flight overcoming access denial and counter-air weapons would enable the future bomber superior capabilities over existing platforms.

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

SCIENCE WITHOUT BORDERS

First Ever Evidence of a Comet Striking Earth

Science Daily, 08OCT2013

The discovery by a team of South African scientists and international collaborators has not only provided the first definitive proof of a comet striking Earth, millions of years ago, but it could also help us to unlock, in the future, the secrets of the formation of our solar system. TECHNICAL ARTICLE

Tags: Science without borders

SENSORS

A Cure for Urban GPS: a 3-D Antenna

MIT Technology Review, 09OCT2013

A new antenna design developed by the U.S. Air Force Institute of Technology could make GPS significantly more reliable and able to function in dense urban areas where GPS accuracy is weak. It might even allow the technology to work indoors in some cases.

Tags: Sensors, Government S&T

Carnegie Mellon motion tracking technology is extremely precise, inexpensive with minimal lag

EurekAlert, 07OCT2013

Lumitrack, a technology developed by researchers at Carnegie Mellon University and Disney Research Pittsburgh has two components—projectors and sensors. A structured

continued...

pattern, which looks something like a very large barcode, is projected over the area to be tracked. Sensor units, either near the projector or on the person or object being tracked, can then quickly and precisely locate movements anywhere in that area. PROJECT WEBSITE

Tags: Sensors, Imaging Technology

Disney Research develops algorithm for rendering 3-D tactile features on touch surfaces

EurekAlert, 07OCT2013

A person sliding a finger across a topographic map displayed on a touch screen can feel the bumps and curves of hills and valleys, despite the screen's smooth surface, with the aid of a novel algorithm created by the Pittsburgh Interaction Group at Disney Research. PROJECT WEBSITE

Tags: Sensors, Information technology

UltraHaptics: It's Magic in the Air

Science Daily, 07OCT2013

A team of researchers from the UK has developed UltraHaptics, a system designed to provide multipoint, mid-air haptic feedback above a touch surface, to allow people to feel what is on a screen and receive invisible information before they touch it. The researchers have established the necessary properties of a display surface that is transparent to 40kHz ultrasound.

Tags: Sensors, Information technology, S&T UK

New Device to Revolutionize Gaming in Virtual Realities

Science Daily, 24SEP2013

Researchers in Austria built a "Virtualizer," which allows for an almost natural walk through virtual spaces. The user is fixated with a belt in a support frame, the feet glide across a low friction surface. Sensors pick up these movements and feed the data into the computer.

Tags: Sensors ■

About This Publication

To subscribe (or unsubscribe), visit https://tin-ly.sainc.com/ASDRE. To provide feedback or ask questions, contact us at asdre-st-bulletin-reply@sainc.com.

This publication is authored and distributed by:

Dr. Brian Beachkofski
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian