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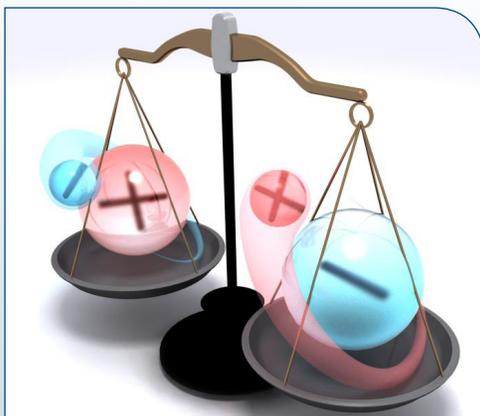
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FEATURE ARTICLES



Do atoms of antihydrogen weigh the same as atoms of ordinary hydrogen? Could they even have "negative" weight? Scientists from Berkeley Lab and UC Berkeley have used data from the ALPHA Experiment at CERN to measure antimatter gravity directly. (Credit: Illustration by Chukman So)

Does antimatter fall up or down? First direct evidence of how atoms of antimatter interact with gravity

Science Daily, 30APR2013

The atoms that make up ordinary matter fall down, so do antimatter atoms fall up? Do they experience gravity the same way as ordinary atoms, or is there such a thing as antigravity? If an antihydrogen atom falls downward, its gravitational mass is no more than 110 times greater than its inertial mass. If it falls upward, its gravitational mass is at most 65 times greater. What the results do show is that measuring antimatter gravity is possible, using an experimental method that points toward much greater precision in future. [TECHNICAL ARTICLE](#)

Tags: Science without borders, Particle physics, Featured Article

Japanese scientists build baseball-playing robot with 100,000-neuron 'brain'

Wired UK, 29APR2013

The robot is equipped with an artificial brain which mimics the function of about 100,000 neurons, and using a software platform developed by Nvidia, the scientists have programmed these neurons for the task at hand. [TECHNICAL ARTICLE](#)

Tags: Autonomous systems & robotics, S&T Japan, Featured Article

Physicists Build World's First "Magnetic Hose" For Transmitting Magnetic Fields

MIT Technology Review, 29APR2013

Researchers in Spain report that a "magnetic hose" consisting of concentric tubes of superconducting and ferromagnetic materials ought to transmit about 90 per cent of a magnetic field at one end to the other. Indeed, a tube of just 2 concentric rings should transmit about 75 per cent. They have tested this idea with a single superconducting tube 7 cm long (made of BiPbSrCaCuO) and filled with a ferromagnetic alloy of cobalt and iron.

[TECHNICAL ARTICLE](#)

Tags: Materials science, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

Novel strategy to fabricate large-area graphene films and patterns

Nanowerk Spotlight, 30APR2013

Researchers in Singapore report a facile, scalable, and solution-processable strategy to synchronously reduce and assemble graphene oxide sheets on metal surface into large scale chemically converted graphene films under ambient conditions. This novel processing is low-temperature with scalable and high-throughput capability. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

Scientists reach the ultimate goal—controlling chirality in carbon nanotubes

EurekaAlert, 29APR2013

An international team of researchers (Finland, Russia, Denmark) has managed to control chirality in carbon nanotubes during their chemical vapor deposition synthesis. Chirality defines the optical and electronic properties of carbon nanotubes, so controlling it is a key to exploiting their practical applications. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, CNT, Nanotechnology, S&T Finland, S&T Russia

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AUTONOMOUS SYSTEMS & ROBOTICS

Researchers Put Sense of Touch in Reach for Robots[New York Times, 28APR2013](#)

Researchers at the Georgia Institute of Technology created a robot arm able to reach into a cluttered environment and use “touch,” along with computer vision, to complete exacting tasks. This ability is vital if robots are to leave the world of factory automation and begin to undertake tasks in human environments, like patient and elder care or rescue missions during emergencies. [TECHNICAL ARTICLE](#).

Tags: Autonomous systems & robotics

Video Friday: Angry Romibos, Rockets in Flight, and Real Dogs Dropping Robot Snakes[IEEE Spectrum, 26APR2013](#)

Check out this robotic snake from the Carnegie Mellon University Biorobotics Lab exploring a collapsed building. It’s worth watching through to the end to see the canine deployment system, the most interesting aspect of which is a dog that seems to care absolutely not that it’s got a ROBOTIC SNAKE attached to it.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

Synthetic biology research community grows significantly[Science Daily, 30APR2013](#)

The number of private and public entities conducting research in synthetic biology worldwide grew significantly between 2009 and 2013, according to the latest version of an interactive map produced by the Synthetic Biology Project at the Woodrow Wilson International Center for Scholars. [MAP](#).

Tags: Biotechnology, Synthetic biology

COMMUNICATIONS TECHNOLOGY

Optical two-way time and frequency transfer over free space[Nature Photonics, 29APR2013](#)

Researchers at NSIT demonstrate optical time–frequency transfer over free space via two-way exchange between coherent frequency combs, each phase-locked to the local optical oscillator. They achieved 1 fs timing deviation, residual instability below 1×10^{-18} at 1,000 s and systematic offsets below 4×10^{-19} , despite frequent signal fading due to atmospheric turbulence or obstructions across the 2 km link.

Tags: Communications Technology, Government S&T, Optical communication

NASA mission to study what disrupts radio waves[Science Daily, 27APR2013](#)

Violent ionospheric storms can occur in the equatorial F-region a few hours after sunset and if we can better understand what causes these storms, we’ll be able to better mitigate their effects on communication and navigation systems.

Tags: Communications Technology, Environment

ENERGY

Japanese test coaxes fire from ice[Nature News, 29APR2013](#)

The test, run by oil companies in Japan took place in waters 1 kilometre deep, where the research drilling ship had bored through 270 metres of sediment to reach a 60-metre-thick methane hydrate reservoir. On 12 March, a pump reduced the pressure in the deposit, unlocking the gas from its icy cage. Gas started flowing up from the sea floor to a platform on the ship, where it produced a roaring flame.

Tags: Energy, S&T Japan

Measuring the swelling of single silicon particles in electrodes during charging[Nanowerk, 29APR2013](#)

Researchers in Japan succeeded in measuring the volumetric expansion of single particles of silicon, which is a negative electrode material for lithium ion batteries, accompanying the charging reaction, and demonstrated the importance of electrode design from the viewpoint of volumetric energy density based on this finding.

Tags: Energy, Battery

ENVIRONMENTAL SCIENCE

Cooling Properties of Atmospheric Molecule Discovered[Science Daily, 24APR2013](#)

An international team of researchers from the US and the UK has detected the second simplest Criegee intermediate molecule—acetaldehyde oxide—and measured its reactivity. They believe Criegee intermediates have the potential to cool the planet by converting these pollutants into sulphate and nitrate compounds that will lead to aerosol and cloud formation. [TECHNICAL ARTICLE](#).

Tags: Environmental science

“Engineering or Technology is the making of things that did not previously exist, whereas science is the discovering of things that have long existed.” DAVID BILLINGTON

FORECASTING

[The problem with predictions](#)

Harvard University, 28APR2013

The ability to predict trends is connected to our worldview of how we think about prediction. Today, predictive models are largely governed by these same classical ideals or aesthetics. New models are emerging from the life sciences that view the world as a living organism rather than a machine. These models are coupled with a new aesthetic, which finds beauty in the complexity of life rather than the elegance of symmetry.

Tags: Forecasting

IMAGING TECHNOLOGY

[Increased space-bandwidth product in pixel super-resolved lensfree on-chip microscopy](#)

Nature Scientific Reports, 24APR2013

Researchers at UCLA report that by using the two-dimensional pixel-function of an image sensor-array as an input to lensfree image reconstruction, pixel-super-resolution can improve the numerical aperture of the reconstructed image by ~3 fold compared to a raw lensfree image.

Tags: Imaging technology

INFORMATION TECHNOLOGY

[What Does 10 Petabytes of Data Look Like?](#)

Wired, 30APR2013

What you don't see is the massive amount of effort, data and storage necessary to capture and maintain those archives. Filmmaker Jonathan Minard's documentary Internet Archive takes a behind the scenes look at how (and why) the Internet Archive's efforts are preserving the web as we know it. [VIDEO](#).

Tags: Information Technology

[Wave hand, Turn any surface into a touchscreen](#)

Futurity.org, 29APR2013

The WorldKit system, developed by researchers at Carnegie Mellon University, enables one to rub the arm of a sofa to “paint” a remote control for the TV or swipe a hand across an office door to post a calendar from which subsequent users can “pull down” an extended version. These ad hoc interfaces can be moved, modified, or deleted with similar gestures, making them highly personalized.

Tags: Information Technology

MATERIALS SCIENCE

[Simple Trick Turns Commercial Polymer Into World's Toughest Fiber](#)

MIT Technology Review, 29APR2013

Researchers in Italy reveal a remarkably simple trick that dramatically increases the toughness of almost any kind of fibre. The new idea is deceptively simple—it involves no more than tying a slip knot in the fibre, creating a loop of extra fibre that passes through the knot as it comes under tension. The mechanism is straightforward. When the fibre is placed in tension, the slip knot begins to tighten and the extra material passes through the knot, dissipating energy through friction.

Tags: Materials science

[Terahertz waves: Cool generation](#)

Nature Photonics, 29APR2013

Researchers at MIT demonstrate highly efficient terahertz generation by optical rectification (OR) of near-optimum pump pulses centered at 1.03 μm in cryogenically cooled lithium niobate. Using a close to optimal pulse duration of 680 fs and a pump energy of 1.2 mJ, they report conversion efficiencies above $3.8 \pm 0.4\%$, which is more than an order of magnitude higher than previously reported.

Tags: Materials science, Terahertz technology

[Understanding the turbulence in plasmas](#)

MIT News, 29APR2013

Researchers at MIT have now taken a significant step in that direction by quantifying a previously unknown type of small-scale turbulence that can have big effects on cooling the plasma in a reactor. This prevents the plasma from reaching the temperatures needed to overcome the electrical repulsion between atomic nuclei—which, in turn, prevents fusion reaction. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Movement of pyrrole molecules defy 'classical' physics](#)

Science Daily, 27APR2013

Researchers at Cambridge University say they have evidence that, in the case of pyrrole, quantum laws affecting the internal motions of the molecule change the “very nature of the energy landscape”—making this ‘quantum motion’ essential to understanding the distribution of the whole molecule. [TECHNICAL ARTICLE](#)

Tags: Materials science

[A blueprint for reversible wrinkling in composite materials](#)

MIT News, 24APR2013

Researchers at MIT have identified the mechanics involved in the wrinkling of thin interfacial layers within soft composite materials, and developed a model based on material properties and geometry to predict how wrinkled an internal layer may become, given its stiffness and width. The wrinkling of materials can generate new functionalities that have never been achieved before. [TECHNICAL ARTICLE](#)

Tags: *Materials science*

FEATURED RESOURCE

[IOP Asia-Pacific](#)

Research highlights from Korea, India, Pakistan, Thailand, Taiwan, Japan, China, Vietnam, Australia and New Zealand. [RSS](#)

MEDICAL SCIENCES

[Threaded through a nanopore—single-molecule detection in DNA](#)

Nanowerk, 24APR2013

Changes in the bases that make up DNA act as markers, telling a cell which genes it should read and which it shouldn't. A British team has now introduced a new method that makes it possible to enrich the rare gene segments that contain the modified base hydroxymethylcytosine and to identify individual hydroxymethylcytosine molecules in DNA. [TECHNICAL ARTICLE](#)

Tags: *Medical Sciences, S&T UK*

MICROELECTRONICS

[Engineers generate world-record mm wave output power from nanoscale CMOS](#)

Nanowerk, 29APR2013

Researchers at Columbia University accomplished record power output level for CMOS-based power amplifiers by developing a chip design methodology that stacks several nanoscale CMOS devices on top of each other so that they can handle larger voltages without compromising their speed.

Tags: *Microelectronics*

[Nanowire Transistors Could Keep Moore's Law Alive](#)

IEEE Spectrum, 29APR2013

Researchers in France report the creation of a nanowire transistor that consists of an array of 225 doped-silicon

nanowires, each 30 nm wide and 200 nm tall, vertically linking the two platinum contact planes that form the source and drain of the transistor. Besides their narrowness, what's new is the gate: A single 14-nm-thick chromium layer surrounds each nanowire midway up its length. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics, S&T France*

[High performance semiconductor spray paint could be a game changer for organic electronics](#)

Science Daily, 27APR2013

Researchers at Wake Forest University have developed a high performance organic semiconductor 'spray paint' that can be applied to large surface areas without losing electric conductivity. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics*

[Microelectronics: Taking the heat off microfluidic chips](#)

Asia Research News, 24APR2013

Researchers in Singapore report that replacing a high-temperature processing technique with an infrared treatment allows the manufacture of tiny devices without damaging the polymer components. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics*

NEUROSCIENCE

[Decoding 'noisy' language in daily life](#)

MIT News, 29APR2013

A new study by MIT researchers indicates that when we process language, we often make mental edits. Moreover, it suggests that we seem to use specific strategies for making sense of confusing information—the "noise" interfering with the signal conveyed in language, as researchers think of it. [TECHNICAL ARTICLE](#)

Tags: *Neuroscience*

[Clenching right fist may give better grip on memory](#)

Science Daily, 24APR2013

Researchers at Montclair State University report that clenching your right hand may help form a stronger memory of an event or action, and clenching your left may help you recollect the memory later. The findings suggest that some simple body movements—by temporarily changing the way the brain functions—can improve memory. Future research will examine whether hand clenching can also improve other forms of cognition, for example verbal or spatial abilities. [TECHNICAL ARTICLE](#)

Tags: *Neuroscience*

PHOTONICS

Researchers design nanometer-scale material that can speed up, squeeze light*Science Daily, 29APR2013*

Researchers at Missouri University stacked 10 of the meta-atoms, then shot light through them at various frequencies. They found that when light encountered the material in a range between 540 terahertz and 590 terahertz, it “stretched” into a nearly straight line and achieved an “effective permittivity” known as epsilon-near-zero.

TECHNICAL ARTICLE

Tags: Photonics

QUANTUM SCIENCE

One step closer to a quantum computer*Science Daily, 30APR2013*

An international team of scientists (US, Sweden, Germany) has succeeded in both initializing and reading nuclear spins, relevant to qubits for quantum computers, at room temperature. With the help of the spin filter, they have succeeded in producing a flow of free electrons with a given spin in a material—in this case GaNAs. TECHNICAL ARTICLE

Tags: Quantum science, S&T Germany, S&T Sweden, S&T USA

SCIENCE WITHOUT BORDERS

Einstein’s gravity theory passes toughest test yet*Science Daily, 29APR2013*

A strange stellar pair nearly 7,000 light-years from Earth has provided physicists with a unique cosmic laboratory for studying the nature of gravity. The extremely strong gravity of a massive neutron star in orbit with a companion white dwarf star puts competing theories of gravity to a test more stringent than any available before.

*Tags: Science without borders***Research Headlines—Establishing the link between climate change and human security***EUROPA research, 29APR2013*

The UN Security Council has expressed concerns that the adverse effects of climate change could lead to certain threats to international peace and security. However, EU funded research suggests that scarcity can lead to cooperation rather than conflict.

*Tags: Science without borders***‘Urgent need’ to remove space debris***BBC News, 29APR2013*

So much man-made debris clogs Earth’s orbit that the space environment is close to a hazardous cascade of collisions, scientists warn. Scientists estimate there are nearly 30,000 items circling the Earth larger than 10cm in size.

Tags: Science without borders

SENSORS

New adverts ‘could track your eyes’*BBC News, 30APR2013*

Lancaster University Sideways project uses software to locate faces and eye movements of shoppers captured on camera. It could allow for video screens which change adverts depending on what you look at in a shop. The technology can also be used to allow people to use their eyes to control content on screens, such as scrolling through items on a list.

*Tags: Sensors***Tracking gunfire with a smartphone***Science Daily, 29APR2013*

Engineers at Vanderbilt University have developed a system which consists of an external sensor module about the size of a deck of cards that contains the microphones and the processing capability required to detect the acoustic signature of gunshots, log their time and send that information to the smartphone by a Bluetooth connection.

Tags: Sensors ■

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This publication is authored and distributed by:

Dr. Melissa Flagg

Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath

OTI Corporate Librarian