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## FEATURE ARTICLES

### [Remote creation of hybrid entanglement between particle-like and wave-like optical qubits](#)

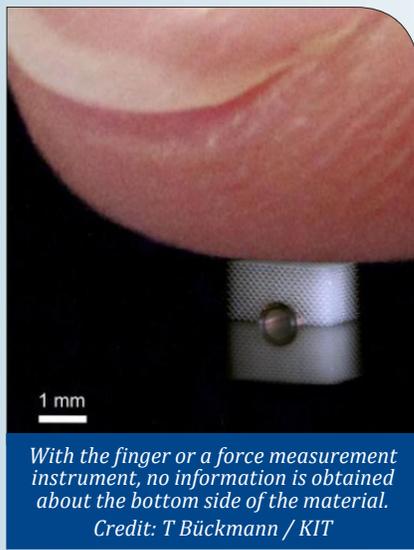
[Nature, 22JUN2014](#)

An international team of researchers (China, France) demonstrates the generation of entanglement between optical qubits of different types, located at distant places and connected by a lossy channel. Such hybrid entanglement enables information to be converted from one Hilbert space to the other via teleportation and therefore the connection of remote quantum processors based upon different encodings.

*Tags: Quantum science, Featured Article*

### [Princess and the Pea? Invisibility cloak prevents an object from being felt](#)

[Science Daily, 20JUN2014](#)



*With the finger or a force measurement instrument, no information is obtained about the bottom side of the material.*

*Credit: T Bückmann / KIT*

Researchers in Germany have succeeded in creating a volume in which an object can be hidden from touching. The mechanical invisibility cloak represents pure physical fundamental research, but might open up the door to interesting applications

in the future. [TECHNICAL ARTICLE](#)

*Tags: Sensors, S&T Germany, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MANUFACTURING

#### [From foundry to factory: building synthetic plants](#)

[Technology Org, 23JUN2014](#)

Can we build new plants that make better materials, act as miniature 'factories' for food and fuel, and minimize the human impact on the environment? With this in mind, synthetic biologists are beginning to build new organisms—or at least reprogram existing organisms—by turning the biology lab into an engineering foundry.

*Tags: Advanced manufacturing*

### ADVANCED MATERIALS

#### [Morphable surfaces cut air resistance: Golf ball-like dimples on cars may improve fuel efficiency](#)

[Science Daily, 24JUN2014](#)

Detailed studies of aerodynamics have shown that while a ball with a dimpled surface has half the drag of a smooth one at lower speeds, at higher speeds that advantage reverses. So the ideal would be a surface whose smoothness can be altered, literally, on the fly—and that's what MIT researchers have developed.

[TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

#### [These new smart curtains respond to light and don't need batteries](#)

[Science Alert \(Australia\), 24JUN2014](#)

Researchers at UC Berkeley layered carbon nanotubes onto a plastic carbonate membrane to develop a new type of material that moves in response to light. The carbon nanotubes absorb light, convert it into heat and transfer it to the plastic membrane, causing the membrane to expand and the composite material to bend. The material could be used in energy-efficient buildings. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

**Scientists shoot carbon nanotubes out of high-speed gun (w/ video)**

PhysOrg.com, 23JUN2014

An international team of researchers (USA, Brazil, India) shot multiwalled carbon nanotubes out of a gun onto an aluminum target at a velocity of more than 15,000 mph. They found that if a nanotube reaches the target at a 90° angle (head-on), it will break and deform quite drastically. However, if it is parallel to the target upon impact, the nanotube will unzip, resulting in a 2D graphene nanoribbon.

**TECHNICAL ARTICLE**

*Tags: Advanced materials, Materials science*

**Longer battery life, more memory in electronics? Rare materials perform at near-room temperature**

Science Daily, 19JUN2014

An international team of researchers (China, USA, Spain) found that a specific class of multiferroics, when periodically alternating along a specific direction to make a superlattice, should exhibit both controllable magnetic and electrical polarization properties at near-room temperature. They used computer modeling to perform extremely accurate calculations on a specific class of materials to find combinations that would display these properties.

**TECHNICAL ARTICLE**

*Tags: Advanced materials, Materials science*

**New ultrastiff, ultralight material developed**

MIT News, 19JUN2014

Researchers at MIT and Lawrence Livermore National Laboratory (LLNL) have devised a way to translate airy, yet remarkably strong lattice structure down to the microscale—designing a system that could be fabricated from a variety of materials, such as metals or polymers, and that may set new records for stiffness for a given weight.

*Tags: Advanced materials*

**AUTONOMOUS SYSTEMS & ROBOTICS****Video: Robot can be programmed by casually talking to it**

EurekAlert, 23JUN2014

Researchers at Cornell University equipped a robot with a 3-D camera that scans its environment and identifies the objects in it by using computer vision software. The robot has been trained to associate objects with their capabilities. They are teaching robots to understand instructions in natural language from various speakers, account for missing information, and adapt to the environment at hand.

*Tags: Autonomous systems & robotics*

**BIOTECHNOLOGY****New particle-sorting method breaks speed records (w/video)**

MIT News, 24JUN2014

The discovery by researchers at MIT could lead to new ways of detecting cancer cells or purifying contaminated water. They found that by adding a minuscule amount of hyaluronic acid—a biopolymer—to the fluid, flow rates could be increased to a Reynolds number of 10,000 without introducing turbulence. The technique could allow cells to be sorted at least 100 times faster than any existing system.

*Tags: Biotechnology, Sensors*

**CYBER SECURITY****Cracks emerge in the cloud: Security weakness of cloud storage services**

Science Daily, 19JUN2014

New findings by researchers in Singapore promise to improve the security of popular online services and better protect users by revealing hidden flaws associated with an important cloud storage feature—the ability to share files.

**TECHNICAL ARTICLE**

*Tags: Cyber security*

**Statistical Tricks Extract Sensitive Data from Encrypted Communications**

MIT Technology Review, 19JUN2014

Researchers at UC Berkeley and Intel developed an effective traffic analysis against HTTPS. The technique involves having software visit the websites of interest and using machine-learning algorithms to learn the traffic patterns associated with different pages. Those patterns are then looked for in a victim's traffic trace.

**TECHNICAL ARTICLE**

*Tags: Cyber security, Communications Technology*

**ENERGY****Sharp Demonstrates Ultra-Efficient Solar Cells**

MIT Technology Review, 20JUN2014

When sunlight strikes a solar cell, it produces some very high-energy electrons, but within a few trillionths of a second, those electrons shed most of their energy as waste heat. Researchers at Sharp found a way to extract these electrons before they give up that energy, thereby increase the voltage output of their prototype solar cell by as much as 60 percent.

*Tags: Energy, Solar energy*

“Every great advance in science has issued from a new audacity of imagination”

JOHN DEWEY

### **Collecting light with artificial moth eyes: Producing hydrogen with sunlight**

Science Daily, 18JUN2014

Researchers in Switzerland have developed a photoelectrochemical cell, recreating a moth's eye to drastically increase its light collecting efficiency. The cell is made of cheap raw materials—iron and tungsten oxide. A special tungsten oxide microstructure on the photoelectrode surface literally gathers sunlight and does not let it out again. [TECHNICAL ARTICLE](#)

Tags: Energy, S&T Switzerland, Solar energy

### IMAGING TECHNOLOGY

#### **How to see around a corner without a mirror**

KurzweilAI, 19JUN2014

An international team of researchers (Germany, Canada) has developed a camera system that can detect objects hidden by obstructions without using a mirror. It uses diffusely reflected, time-coded light to reconstruct the shape of objects outside of the field of view. The research will be presented at the Conference for Computer Vision and Pattern Recognition (CVPR) June 24–27 in Columbus, Ohio.

Tags: Imaging technology

#### **New technique could make sub-wavelength images at radio frequencies**

PhysOrg.com, 17JUN2014

Researchers at NIST and the University of Michigan suggest using laser light at optical wavelengths to measure and image RF fields. The new technique uses a pair of highly stable lasers and rubidium atoms as tunable resonators to map and image electric fields at resolutions far below their RF wavelengths. This advance could be useful in measuring and explaining the behavior of metamaterials and metasurfaces-structures. [TECHNICAL ARTICLE](#)

Tags: Imaging technology, Government S&T, Materials science

### INFORMATION TECHNOLOGY

#### **Future technologies may revolutionize the usage of mobile services**

PhysOrg.com, 23JUN2014

Researchers in Finland aim to understand the technical architecture of the technologies and identify factors affecting the deployment of multipath protocols. They examine the economic feasibility of multipath protocols in mobile services from the perspective of various market players. The benefits and market impact essentially depend on the launch of devices with multihoming capability, such as multi-SIM phones. [TECHNICAL ARTICLE](#)

Tags: Information Technology, S&T Finland

### **Graphene quantum dot flash memories look promising for data storage**

PhysOrg.com, 18JUN2014

Researchers in South Korea have used graphene quantum dots instead of nanocrystals as the discrete charge trap material. As flash memory devices in their early stages of development, the graphene quantum dot memories demonstrate a promising performance, with an electron density comparable to that of memory devices based on semiconductor and metal nanocrystals. [TECHNICAL ARTICLE](#)

Tags: Information Technology

### MICROELECTRONICS

#### **Sound waves harnessed to enable precision micro- and nano-manufacturing**

Science Daily, 24JUN2014

Researchers in Australia have demonstrated how high-frequency sound waves can be used to precisely control the spread of thin film fluid along a specially-designed chip. [TECHNICAL ARTICLE](#). [VIDEO](#)

Tags: Microelectronics, Advanced manufacturing, S&T Australia

#### **Researchers unveil experimental 36-core chip**

PhysOrg.com, 23JUN2014

Researchers at MIT unveiled a 36-core chip that features a “network-on-chip.” It also solves one of the problems that has bedeviled previous attempts to design networks-on-chip: maintaining cache coherence, or ensuring that cores' locally stored copies of globally accessible data remain up to date.

Tags: Microelectronics

### NEUROSCIENCE

#### **Wearable computing gloves can teach Braille, even if you're not paying attention**

Science Daily, 23JUN2014

Researchers at Georgia Institute of Technology created wearable computing technology to help people learn how to read and write Braille. People wearing the glove don't have to pay attention. They learn while doing something else. The process is based on passive haptic learning (PHL). People can acquire motor skills through vibrations without devoting active attention to their hands.

Tags: Neuroscience, Biotechnology

*continued...*

## PHOTONICS

**[Strange physics turns off laser](#)**[Bright Surf](#), 17JUN2014

Inspired by anomalies that arise in certain mathematical equations, researchers in Austria and the USA have demonstrated a laser system that paradoxically turns off when more power is added rather than becoming continuously brighter. The finding could lead to new ways to manipulate the interaction of electronics and light, an important tool in communications networks and high-speed information processing. [TECHNICAL ARTICLE](#)

*Tags: Photonics*

## FEATURED RESOURCE

**[SciTech Daily](#)**

Selected analysis, opinion, features, background and book reviews from international news sources. [RSS](#)

## QUANTUM SCIENCE

**[Physicists find way to boot up quantum computers 72 times faster than previously possible](#)**[PhysOrg.com](#), 23JUN2014

Quantum computers require numerous adjustments and calibration to start up. Using an algorithm from engineering mathematics, researchers in Germany were able to reduce the calibration error rate to below the required 0.1 percent threshold, while at the same time speeding up the calibration process from six hours to five minutes. [TECHNICAL ARTICLE](#)

*Tags: Quantum science, S&T Germany*

**[Physics: Bell's theorem still reverberates](#)**[Nature News](#), 19JUN2014

In 1964, Northern Irish physicist John Bell proved mathematically that certain quantum correlations, unlike all other correlations in the universe, cannot arise from any local cause. This theorem has become central to both metaphysics and quantum information science. But 50 years on, the experimental verifications of these quantum correlations still have 'loopholes', and scientists and philosophers still dispute exactly what the theorem states.

*Tags: Quantum science*

**[New quantum mechanism to trigger the emission of tunable light at terahertz frequencies](#)**[Science Daily](#), 18JUN2014

Researchers in the UK found that quantum wells, 2D nanostructures formed of several layers of semi-conductor alloys, placed on top of each other like a sandwich can enhance light emission in a technologically challenging spectral range. It is hoped that the findings will have an impact on photonic and optoelectronic devices.

[TECHNICAL ARTICLE](#)

*Tags: Quantum science, S&T UK*

## S&amp;T POLICY

**[Graphene Flagship initiative doubles in size](#)**[Nanowerk](#), 23JUN2014

The Graphene Flagship, one of the largest-ever European research initiatives now includes more than 140 organisations from 23 countries. While most partners are universities and research institutes, the share of companies, mainly SMEs, involved is increasing. It is fully set to take graphene and related layered materials from academic laboratories to everyday use.

*Tags: S&T policy, Advanced materials, S&T EU*

## SCIENCE WITHOUT BORDERS

**[Evidence found for the Higgs boson direct decay into fermions](#)**[Science Daily](#), 22JUN2014

For the first time, an international team of researchers (Armenia, Austria, Belarus, Belgium, Brazil) have succeeded in finding evidence for the direct decay of the Higgs boson into fermions. Previously, the Higgs particle could only be detected through its decay into bosons. As a group of elementary particles, fermions form the matter while bosons act as force carriers between fermions. [TECHNICAL ARTICLE](#)

*Tags: Science without borders, Particle physics*

## SENSORS

**['Sensing skin' quickly detects cracks, damage in concrete structures](#)**[EurekAlert](#), 23JUN2014

Researchers from the North Carolina State University and Finland have developed "sensing skin" which is an electrically conductive coat of paint that can be applied to new or existing structures. Electrodes applied around the perimeter of a structure and the electronic skin identify the location of the damage.

*Tags: Sensors*

## Can magnetic fields accurately measure positions of ferromagnetic objects?

EurekAlert, 22JUN2014

Researchers at the University of Minnesota have shown that the inherent magnetic fields of ferromagnetic objects can be exploited for accurate position measurements. Such position measurement is enabled by the spatial variation of magnetic field around an object which can be modeled using just the geometry of the object. Using this model, the position of the ferromagnetic object is calculated.

*Tags: Sensors*

## Stanford breakthrough provides picture of underground water

EurekAlert, 17JUN2014

Researchers at Stanford University have proved that satellite-collected data can accurately measure aquifer levels, a finding with potentially huge implications for management of precious global water sources.

*Tags: Sensors*

## Swell new sensors

Nanowerk, 17JUN2014

Using microscopic polymer light resonators that expand in the presence of specific gases, researchers at MIT have developed new optical sensors with predicted detection levels in the parts-per-billion range. Optical sensors are ideal for detecting trace gas concentrations due to their high signal-to-noise ratio. [TECHNICAL ARTICLE](#)

*Tags: Sensors* ■

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