

News by category

XML

- ▶ Nano and Quantum Physics
- ▶ Technology
- ▶ Physics
- ▶ Space and Earth science
- ▶ Electronic Devices
- ▶ Striking research and developments
- ▶ Books directory
- ▶ Free Magazines

Most popular

- ▶ **Motorola Debuts First Ever Nano Emissive Flat Screen Display Prototype**
- ▶ Researchers make bendable concrete
- ▶ New 'Nuclear Battery' Runs 10 Years, 10 Times More Powerful
- ▶ Sapphire 'Blizzard' Liquid Metal Cooled Graphics Card
- ▶ Utah Dinosaur Bones Reveal Missing Link in Evolution of Diet

Last forum posts

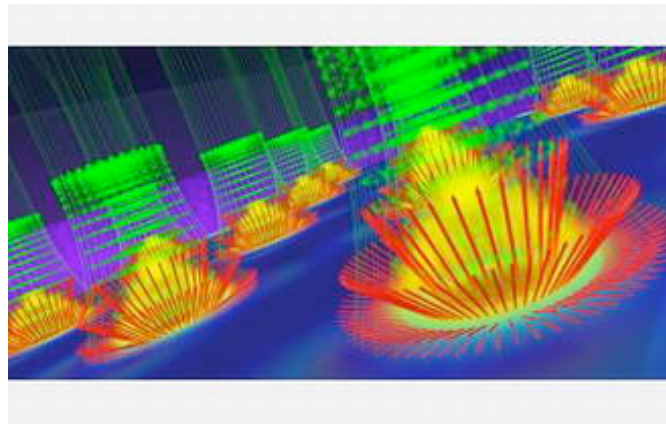
- ▶ **Are you a man or woman?**
last post by "THEY"
- ▶ **a hydrogen video**
last post by Guest
- ▶ **eBay in Space in August...Really!**
last post by .001
- ▶ **Science: hijacked by pseudo**
last post by yquantum

Nanotechnology combined with superconductivity could pave the way for 'spintronics'

May 05, 2005

Latest News By E-mail

Print this news



As the ever-increasing power of computer chips brings us closer and closer to the limits of silicon technology, many researchers are betting that the future will belong to "spintronics": a nanoscale technology in which information is carried not by the electron's charge, as it is in conventional microchips, but by the electron's intrinsic spin.

If a reliable way can be found to control and manipulate the spins, these researchers

argue, spintronic devices could offer higher data processing speeds, lower electric consumption, and many other advantages over conventional chips--including, perhaps, the ability to carry out radically new quantum computations.

Stunning Presentations

MathType for science and math presentations - free download!

Physics & Consciousness

Quantum physics and the human mind Podcast & mp3 by Dr. John Hagelin.

Ads by Goooooogle

Image: The idea is to create the device as a series of layers, each only a few dozen nanometers thick. At the bottom is a layer of diluted magnetic

Ads by Goooooogle

China magnet manufacturer

"Kaiven" ferrite magnet, NdFeB, SmCo, Alnico and plastic magnets
www.kaiven.com

Spintronics & MRAM Course

Online Courses on Magnetic Storage Drs. Stuart Parkin, Kamel Ounadjela
www.semizone.com

Nanotechnology articles

Search over 170+ publications, only on KeepMedia. Try us for free.
www.KeepMedia.com

semiconductor (DMS) material--for example, gallium arsenide doped with manganese atoms. Each manganese atom contributes an extra electron to the material, and thus an extra electron spin. Above that is a layer of insulator (grey) and then a layer of superconducting material (SC). Zooming in shows the magnetic field (green), which can thread

Today's news:

Electronic Devices

- **16 Gb Samsung's Flash Solid State Disk to Replace Hard Drives**
- **New AMD Geode Processor for Mobile Computing**
- **Sapphire 'Blizzard' Liquid Metal Cooled Graphics Card**
- **Vodafone Simply: the more the better?**

Nano and Quantum Physics

- **Quantum Dot Materials Can Reduce Heat, Boost Electrical Output**
- **Scientists coax gold particles to emit light strong enough to**

last post by **JavaTool**

▶ **TSUNAMI : Possible reasons**

last post by **Dr. Dolittle**

▶ **Proposed String Theory Test**

last post by **thezman**

▶ **Semiconductors question**

last post by **newPhis**

▶ **Evolution vs God**

last post by **Guest_Rengi**

▶ **Two groups of people?**

last post by **Kaeroll**

All today's posts

News archive

▶ News archive

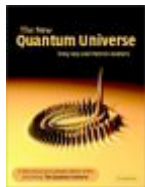
▶ Search

Important

Help us make our site better!

Take PhysOrg.com Survey

The survey takes less than two minutes, there's nothing to identify you personally, and you won't receive any email or other sales pitches by participating.



The New Quantum Universe

Tony Hey

Best Price \$19.98
or Buy New \$24.41



Privacy Information



The Biology Of Belief

Bruce H. Lipton

Best Price \$16.36
or Buy New \$16.50

through the superconducting layer only pinching itself down into an array of nanoscale flux tubes (green columns). The field in each flux tube is very intense, and extends right through the DMS layer. As it does, it forces a patch of electron spins to fall into line (red arrows). It also causes a certain amount of electric charge to accumulate (yellow).
Credit: Dr. Ovidiu Toader, University of Toronto

Now, University of Notre Dame physicist Boldizar Janko and his colleagues believe they have found such a control technique. Their work, funded by the National Science Foundation through a Nanoscale Interdisciplinary Research Team grant, was published in the March 5, 2005, edition of the journal *Nature*.

The idea is to create the device as a series of layers, each only a few dozen nanometers thick. At the base is a layer of diluted magnetic semiconductor, a type of material Janko and his group have been studying intensively. When gallium arsenide is doped with manganese atoms, for example, each manganese atom contributes an extra electron, and thus an extra electron spin; the result is a semiconductor material that can be magnetized in much the same way as iron. Then an insulator material is layered over the base, followed by a layer of superconducting material.

Next, a magnetic field is applied perpendicular to the top surface (see animation above). Thanks to the basic physics of superconductors, the field can make it through only by pinching itself down into an array of nanoscale flux tubes. That super concentrates the field inside each tube, so that it creates a spot of high-intensity magnetism on the semiconductor layer below, which, in turn, creates a patch of closely aligned electron spins. The resulting spin patches, one for each flux tube, are then available for encoding information.

The effect resembles what happens when you sprinkle iron filings on a piece of paper, and then hold a bar magnet underneath, says Janko: the presence of the magnet (the flux tube) makes the iron filings (the spins) stand at attention. Furthermore, he says, just as you can manipulate the filings by moving the magnet underneath the paper, you can manipulate the spins in this system by moving the flux tubes.

For example, an electric current flowing through the superconductor will cause a given flux tube to move to one side (with the patch of spins underneath moving along with it), while a current flowing in the reverse direction will move it back to the other side (see animation, this video requires the free RealPlayer plug-in).

Although Janko and his colleagues have tested their approach so far only through computer simulations, experiments are now underway to demonstrate the technique in the laboratory.

Source: NSF

[\[Comments\]](#)

Sponsored Result

Online Distance Learning

Directory of top Online Schools & Distance Learning programs.

Sponsored Listings

- Environmental Science
- Science Magazine
- Cisco CCNA Certification
- ISO 9000 Certification
- Science Education
- PHP Computer Training
- Cisco Certification
- Linux Certification
- IT Certification
- New Floating-Point devices from TI

■ **New technique may speed DNA analysis**

■ Evident announces first commercially available non heavy-metal quantum dots

Physics

■ **The Inverse Doppler effect: Researchers add to the bylaws of physics**

■ **New photocatalyst for hydrogen generation works by irradiation with visible light**

■ Archimedes manuscript yields secrets under X-ray gaze

■ **The electroluminescent Star Wars' light sabre**

Space and Earth science

■ Cassini Radio Signals Decipher Saturn Ring Structure

■ Data from Space: Adaptive Array Network Could Improve Access to NASA's Earth Observing Satellites

■ UK starts planning for Cosmic Vision

■ **Clues to planet formation revealed**

■ **Astronomers, Amateur Skywatchers Find New Planet 15,000 Light Years Away**

■ NASA's AcrimSat Solar Spacecraft Completes Five-Year Mission

Technology

■ Energy-Saving Paper Sensor Passes Major Milestone

■ Motorola's Commercial Broadband Over Powerline Solution Debuts at Telecom 2005

■ Freescale to demonstrate Ultra-Wideband at 20 meters for home, enterprise applications

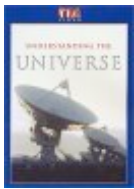
■ First Near UV Laser Diode Developed In China

■ **New Promising Phase Change Memory Technology**

■ New LED driver and sequencer launched to enable complete programmability of 18 LEDs

■ **New low power semiconductor solution for portable audio devices with hard drive**

Privacy Information



Understanding The Universe

Understanding the ...

Best Price \$9.81
or Buy New \$13.48

Privacy Information

Search The Web

Search

**Striking research and
developments**

- **Google's Thriving Advertising Model Has Math Roots**
- **Scientists unravel the secret world of elephant communication**
- **Students create underwater remotely operated vehicle for use in scientific research**
- **Too Much Knowledge Can Be Bad For Some Types Of Memory, Study Finds**

PhysOrgForum discussions:



**There is a discussion of this news at PhysOrgForum entitled:
`Creating micro-electric current with UV Photons and`**

There are **0** replies in that topic. The last post was on 13-May-2005

News archive

The first post is :

On 13-May-2005 by holoman

<http://www.physorg.com/news3998.html>

an electrostatic field will also yield a controllable molecular/atomic current according to Michael Thomas at Colossal Storage.

Since electromagnetic fields and electrostatic field are both contained in any EMF waveform. Electrostatics could also be used to control the spin of electrons.

Reply / Comment

You do not need to be registered to post your comments.

Other news discussion topics:

- [NEMS device detects](#)
- [On-chip optical modulation](#)
- [-509 F?](#)
- [applications](#)
- [Entangled particle data and](#)

[Home](#)

[Search](#)

[PhysOrgFAQ](#)

[Links](#)

[Contact us](#)

[Add headlines to your site](#)

©PhysOrg.com 2003-2004 [Privacy Policy](#)