Cover

In the first decade of the millennium, rapid progress has transformed whole areas of research (see the Insights of the Decade section on page 1612). Meanwhile, the Breakthrough of the Year goes to the first mechanical devices to reach the quantum ground state, a feat achieved by physicists at the University of California, Santa Barbara (see the Breakthrough section on page 1604). Also see related online content at www.sciencemag.org/special/insights2010.

Credit: Yael Fitzpatrick and Matthew Twombly/Science
1639 Being Glassy Without Being Hard to Solve
F. Ricci-Tersenghi

1641 Retrospective: Britton Chance (1913–2010)
P. L. Dutton

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1642 A Giant Planet Around a Metal-Poor Star of Extragalactic Origin
J. Setiawan et al.
A planet is observed to orbit a star whose properties are different from those of all other known planet-hosting stars.

1645 Experimental Spin Ratchet
M. V. Costache and S. O. Valenzuela
A superconducting-based single-electron device is used to control the flow of electronic spin currents.

1648 Spin Transfer Torques in MnSi at Ultralow Current Densities
F. Jonietz et al.
A complicated spin texture lattice in a bulk material rotates under the influence of a tiny electrical current.

1652 Electronic Spin Storage in an Electrically Readable Nuclear Spin Memory with a Lifetime >100 Seconds
D. R. McCamey et al.
An electrically readable spin memory in silicon has been developed with storage times exceeding 100 seconds.

1656 Oxygen Doping Modifies Near-Infrared Band Gaps in Fluorescent Single-Walled Carbon Nanotubes
S. Ghosh et al.
Contrast can be improved in bioimaging applications by separating the emission and absorption wavelengths.

1660 Entropically Stabilized Local Dipole Formation in Lead Chalcogenides
E. S. Božin et al.
Upon heating, lead telluride and lead sulfide show the formation of a less symmetric, dipolar structure.

1663 Large Variations in Southern Hemisphere Biomass Burning During the Last 650 Years
Z. Wang et al.
Large variations in the degree of biomass burning in the Southern Hemisphere occurred during the past 650 years.

1670 Greatwall Phosphorylates an Inhibitor of Protein Phosphatase 2A That Is Essential for Mitosis
S. Mochida et al.
An inhibitor of protein phosphatase 2A is identified as a component of the machinery controlling cell division.

1673 The Substrate of Greatwall Kinase, Arpp19, Controls Mitosis by Inhibiting Protein Phosphatase 2A
A. Gharbi-Ayachi et al.
The protein kinase Greatwall controls cell division by phosphorylating and activating an inhibitor of protein phosphatase 2A.

1677 Cholinergic Interneurons Control Local Circuit Activity and Cocaine Conditioning
I. B. Witten et al.
Silencing giant interneurons and thereby exciting medium spiny neurons during cocaine-induced activity disrupts cocaine reward.

1682 New Genes in Drosophila Quickly Become Essential
S. Chen et al.
One-third of evolutionary young genes is essential to fruit flies.

1685 Cytoplasmic Partitioning of P Granule Components Is Not Required to Specify the Germline in C. elegans
C. M. Gallo et al.
Germ granules do not need to be segregated asymmetrically during cell division to specify germ cell fate.

1689 Glucose and Weight Control in Mice with a Designed Ghrelin O-Acyltransferase Inhibitor
B. P. Barnett et al.
A drug inhibiting the activation of ghrelin, a hormone that promotes weight gain, has beneficial metabolic effects in mice.

1693 The Cellular and Physiological Mechanism of Wing-Body Scaling in Manduca sexta
H. F. Nijhout and L. W. Grunert
The central nervous system and the hormone ecdysone govern wing-size scaling in the tobacco hornworm.

1695 Fetal and Adult Hematopoietic Stem Cells Give Rise to Distinct T Cell Lineages in Humans
J. E. Mold et al.
Distinct fetal T cell lineages help explain the tolerogenic properties of the fetus and immune responsiveness at birth.

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Researchers grow insulin-producing cells

Data may provide evidence of a ‘multiverse.’

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The Genetic Landscape of the Childhood Cancer Medulloblastoma

Passive Origins of Stomatal Control in Vascular Plants

Time-Resolved Holography with Photoelectrons

Structure of DNMT1-DNA Complex Reveals a Role for Autoinhibition in Maintenance DNA Methylation

The eukaryote maintenance DNA methyltransferase discriminates against de novo CpG methylation sites.

Full text at www.sciencemag.org/cgi/content/full/330/6011/1627-b

Full text at www.sciencemag.org/cgi/content/full/330/6011/1627-c

Comment on “The Incidence of Fire in Amazonian Forests with Implications for REDD”

Time-Resolved Holography with Photoelectrons

Y. Huismans et al.

The interference pattern produced by photoelectrons provides holographic snapshots of the photoionization process.

Full text at www.sciencemag.org/cgi/content/full/330/6011/1627-b

Response to Comment on “The Incidence of Fire in Amazonian Forests with Implications for REDD”

L. E. O. C. Aragão and Y. E. Shimabukuro

Full text at www.sciencemag.org/cgi/content/full/330/6011/1627-c

Comment on “The Incidence of Fire in Amazonian Forests with Implications for REDD”

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Comment on “The Incidence of Fire in Amazonian Forests with Implications for REDD”

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Breakthrough of the Year: Bridging the Quantum and the Classical Worlds

E. Pain

Ph.D. student Aaron O’Connell was able to induce and measure quantum effects in the motion of a micrometer-sized mechanical oscillator.

>> Breakthrough of the Year section p. 1604 and www.sciencemag.org/special/insights2010/

SCIENCE INSIDER

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J. Weiss et al.

PERSPECTIVE: A Therapeutic Target for Smoking-Associated Lung Cancer

N. C. Turner and M. J. Seckl

A new oncogenic aberration in smoking-associated lung cancer may be the disease’s first relatively high-frequency therapeutic target.