Cover
Optical or electrical pulses can rapidly locate and manipulate the spin of a single electron in a quantum dot or of a nitrogen vacancy in diamond. Such techniques represent progress toward solid-state quantum computing (see pages 349 and 352).
Image: Peter Allen and Jesse Berezovsky

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IPCC Tunes Up for Its Next Report Aiming for Better, Timely Results
Greenland Ice Slipping Away but Not All That Quickly
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Team Unveils Mideast Archaeology Peace Plan
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>> Research Article p. 340
The Mad Dash to Make Light Crystals
SCIENCE EXPRESS

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CLIMATE CHANGE
Seasonal Speedup Along the Western Flank of the Greenland Ice Sheet
I. Joughin et al.
Measurements of ice motion from Greenland show that summer melt water accelerates ice sheet flow by 50 to 100% overall but has less effect in the faster outlet glaciers.

>> News story p. 301; Science Express Report by S. B. Das et al.

CLIMATE CHANGE
Fracture Propagation to the Base of the Greenland Ice Sheet During Supraglacial Lake Drainage
S. B. Das et al.
A large lake on the surface of the Greenland Ice Sheet drained out through and along the base of the Ice Sheet within 2 hours, revealing an efficient basal hydrological system.

>> News story p. 301; Science Express Report by I. Joughin et al.

PERSPECTIVE: Marine Calcifiers in a High-CO_2 Ocean
V. J. Fabry
>> Research Article p. 336

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MEDICINE
Qinghaosu (Artemisinin): The Price of Success
N. J. White

ECOLOGY
The Movement of Aquatic Mercury Through Terrestrial Food Webs
D. A. Cristol et al.
Industrial mercury in a contaminated river can spread beyond the immediate area to nearby terrestrial ecosystems through food web connections.

CELL BIOLOGY
Reconstitution of Contractile FtsZ Rings in Liposomes
M. Osawa, D. E. Anderson, H. P. Erickson
A tubulin homolog from prokaryotes can, without other proteins, assemble into rings around liposomes and constrict, suggesting a primordial cell division mechanism.

PHYSICS
Quasi-Particle Properties from Tunneling in the ν = 5/2 Fractional Quantum Hall State
I. P. Radu, J. B. Miller, C. M. Marcus, M. A. Kastner, L. N. Pfeiffer, K. W. West
Tunneling measurements between the conduction channels in the fractional quantum Hall effect confirm that the charge is quantized in units of 1/4 of an electron charge.

RESEARCH ARTICLES

CLIMATE CHANGE
Phytoplankton Calcification in a High-CO_2 World
M. D. Iglesias-Rodriguez et al.
Experiments show that a coccolithophore grows better at elevated carbon dioxide levels, in contrast to predictions for most plankton, and is already increasing in abundance.

>> Science Express Perspective by V. J. Fabry

REPORTS

MATHEMATICS
Generalized Voice-Leading Spaces
C. Callender, I. Quinn, D. Tymoczko
A geometric representation of Western music theory, in which distance represents similarity of chord types, reveals relations among diverse musical concepts.

>> Perspective p. 328

PHYSICS
Picosecond Coherent Optical Manipulation of a Single Electron Spin in a Quantum Dot
J. Berezovsky et al.
A series of ultrafast optical pulses can be used to rotate the spin of a single electron in a quantum dot by a specified angle within a few picoseconds.
RESEARCH REPORTS CONTINUED...

PHYSICS
Coherent Dynamics of a Single Spin Interacting with an Adjustable Spin Bath
R. Hanson et al.
Simulations successfully show how the spin of a nitrogen vacancy in diamond is coupled to those of surrounding nitrogen impurities and how coherence between them is lost.

APPLIED PHYSICS
Chaotic Dirac Billiard in Graphene Quantum Dots
L. A. Ponomarenko et al.
Graphene quantum dots vary with their size: Large dots form molecular-scale transistors, intermediate ones show quantum chaos, and the smallest act as single-electron detectors.

CHEMISTRY
Atomlike, Hollow-Core–Bound Molecular Orbitals of C_{60}
M. Feng, J. Zhao, H. Petek
Scanning tunneling microscopy and density functional theory reveal that C_{60} acts as a superatom in which its unoccupied orbitals are atomlike and delocalized in aggregates.

GENETICS
The Chemical Genomic Portrait of Yeast: Uncovering a Phenotype for All Genes
M. E. Hillenmeyer et al.
Exposing yeast cultures to an extensive variety of small molecules and environmental stresses indicates that almost all genes have a demonstrable biological function.

CELL BIOLOGY
Wnt5a Control of Cell Polarity and Directional Movement by Polarized Redistribution of Adhesion Receptors
E. S. Witze et al.
A developmental signal causes clustering of membrane-associated proteins (including its receptor) at one end of the cell, marking the cell’s polarity for directional movement.

NEUROSCIENCE
A Model for Neuronal Competition During Development
C. D. Deppe et al.
Modeling and experiments show that neurons survive during development when neuronal sensitization to survival signals outweighs antagonistic signals for cell death.

MEDICINE
Recapitulation of IVIG Anti-Inflammatory Activity with a Recombinant IgG Fc
R. M. Anthony et al.
By identifying the sugar modifications responsible for the therapeutic, anti-inflammatory effect of immunoglobulin, an improved recombinant version can be formulated.

BIOCHEMISTRY
Reconstitution of Pilus Assembly Reveals a Bacterial Outer Membrane Catalyst
M. Nishiyama, T. Ishikawa, H. Rechsteiner, R. Glockshuber
The cell-free formation of the protruberant pili of a pathogenic bacteria is accelerated by a protein that catalyzes supramolecular assembly without input of cellular energy.

BIOCHEMISTRY
Structural Basis of Toll-Like Receptor 3 Signaling with Double-Stranded RNA
L. Liu et al.
Two horseshoe-shaped monomers of an innate immunity receptor bind to viral RNA through carboxyl-terminal dimerization, ultimately triggering inflammation.

NEUROSCIENCE
The Antidepressant Fluoxetine Restores Plasticity in the Adult Visual Cortex
J. F. Maya et al.
An antidepressant drug increases growth factors and reduces inhibitory activity in the visual cortex of adult rats, thereby restoring the plasticity seen only during development.
Financial trading can wreak havoc on physiology.

SCIENCE NOW

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Living in a World of Unfamiliar Voices
A woman with a lifelong inability to recognize voices is a medical mystery.

Bad Day for the Dow? Blame Hormones
Market activity is reflected in financial traders’ testosterone and cortisol levels.

Case Closed for Free Will?
The unconscious brain makes choices several seconds before the conscious mind knows about it.

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Case Closed for Free Will?
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A Matter of Policy
B. Vastag
Fellowships are available that let scientists contribute to local and national policies. >> Editorial p. 289

Tooling Up: On Headhunters
D. Jensen
Recruiters may seem to offer some advantages, but early-career scientists should still keep their heads.

Home Stretch to Graduation
E. Pain
Submitting your Ph.D. dissertation isn’t always a relief.

From the Archives: What’s Love Got to Do With It?
I. S. Levine
Our Mind Matters expert studies the pros and cons of scientists tying the knot.

Download the 18 April Science Podcast to hear about seasonal influenza, aquatic mercury in terrestrial food webs, making synthetic fuels, a geometric model of music, and more. www.sciencemag.org/about/podcast.dtl

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