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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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.

10.1126/science.1153288

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.

10.1126/science.1153360

PERSPECTIVE: Marine Calcifiers in a High-CO₂ Ocean
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10.1126/science.1157130

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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.

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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.

10.1126/science.1154520

PHYSICS
Quasi-Particle Properties from Tunneling in the ν = 1/8 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 1/8 of an electron charge.

10.1126/science.1157560

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CLIMATE CHANGE
Phytoplankton Calcification in a High-CO₂ 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

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MEDICINE
The Global Circulation of Seasonal Influenza A (H3N2) Viruses
C. A. Russell et al.
Recent seasonal flu strains constantly evolved in overlapping epidemics in Asia, then erupted to periodically sweep the world, ending in South America 6 to 18 months later.

>> News story p. 310

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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

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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.

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**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.

>> Perspective p. 324

**CHEMISTRY**

Atomlike, Hollow-Core–Bound Molecular Orbitals of C60

M. Feng, J. Zhao, H. Petek

Scanning tunneling microscopy and density functional theory reveal that C60 acts as a superatom in which its unoccupied orbitals are atomlike and delocalized in aggregates.

**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 Vetencourt 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.

**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.

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**NEUROSCIENCE**

A Model for Neuronal Competition During Development

C. D. Deppmann 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 pilus of a pathogenic bacteria is accelerated by a protein that catalyzes supramolecular assembly without input of cellular energy.

**NEUROSCIENCE**

Divergence of Quaternary Structures Among Bacterial Flagellar Filaments

V. E. Galkin et al.

Flagellar proteins from two bacterial species diverge in their coiled-coil regions; only one triggers an immune response, which may have driven their evolutionary divergence.

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**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.

**BIOCHEMISTRY**

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