Cover
X-rays emerge with varying intensity (red/green wave) as an electron is pulled out of and then pushed back into a vibrating N₂O₄ molecule by an intense laser field. The pattern reveals real-time dynamic changes in electronic spatial configurations, or orbitals, at the compressed (left blue orbital) and stretched (right blue orbital) limits of the vibration cycle. See page 1207.
Image: Greg Kuebler, JILA/University of Colorado

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The Spreading of Disorder
K. Keizer, S. Lindenberg, L. Steg
Upon observing signs of social disorder (such as littering or graffiti), individuals are more likely to disobey a variety of social rules, including prohibitions against theft.

CELL BIOLOGY
Dynamic Proteomics of Individual Cancer Cells in Response to a Drug
A. A. Cohen et al.
Cells that escape death from a chemotherapy drug express a different array of proteins from genetically identical ones that died, which may help to inform cancer therapeutics.

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The Psychology of Transcending the Here and Now
N. Liberman and Y. Trope

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Fossil Pollen as a Guide to Conservation in the Galápagos
J. F. N. van Leeuwen et al.
Fossil pollen shows that six plant species in the Galápagos, presumed to be invasive, had actually been native to the islands for thousands of years before human colonization.

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Time-Resolved Dynamics in N₂O₄ Probed Using High Harmonic Generation
W. Li et al.
Electrons can be ejected from multiple orbitals of N₂O₄ by exploiting different stages in its excited vibrations, yielding an attosecond light probe of molecular dynamics.

PHYSICS
Broadband Invisibility by Non-Euclidean Cloaking
U. Leonhardt and T. Tyc
In theory, materials with a negative refractive index deployed in a curved, non-Euclidean space can provide a route to cloaking and invisibility across a range of wavelengths.

CHEMISTRY
Real-Time DNA Sequencing from Single Polymerase Molecules
J. Eid et al.
Arrays of narrow waveguides can record the action of a DNA polymerase stepping along a primer template, potentially providing a way to sequence DNA molecules.
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4D Imaging of Transient Structures and Morphologies in Ultrafast Electron Microscopy B. Barwick et al.
Imaging with single electrons can track structural dynamics of gold and graphite in real space with femtosecond temporal resolution and angstrom spatial resolution.

CHEMISTRY
High Harmonic Generation from Multiple Orbitals in N₂ B. K. McFarland et al.
Electron ejection from multiple N₂ orbitals, controlled by the molecule’s orientation relative to a laser, produces attosecond light spectra that can reveal molecular dynamics. >> Perspective p. 1194

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Radar Sounding Evidence for Buried Glaciers in the Southern Mid-Latitudes of Mars J. W. Holt et al.
Radar data from the Mars Reconnaissance Orbiter show that a series of lobate landforms at low latitudes are composed primarily of massive ice covered by debris.

EVOLUTION
Variation in Evolutionary Patterns Across the Geographic Range of a Fossil Bivalve M. Grey, J. W. Haggart, P. L. Smith
Within a fossil bivalve genus, evolution tended to occur as a random walk at the highest latitudes and to be in stasis mode in deep marine environments.

EVOLUTION
Genes that confer a deleterious sex ratio in Drosophila also decrease male fertility and promote competitive mating in females, providing a possible explanation of polyandry.

CELL BIOLOGY
Regulation of Microtubule Dynamics by Reaction Cascades Around Chromosomes C. A. Athale et al.
A reaction-diffusion model involving regulatory molecules and a microtubule-stabilizing phosphoprotein predicts the spatial distribution of microtubules during cell division.

DEVELOPMENTAL BIOLOGY
Canonical Wnt Signaling Regulates Organ-Specific Assembly and Differentiation of CNS Vasculature J. M. Stenman et al.
In mice, two specialized ligands for a key developmental signaling pathway are produced by neuroepithelial cells and direct endothelial cells to form the blood-brain barrier. >> Perspective p. 1195

MEDICINE
Regulation of Pancreatic β Cell Mass by Neuronal Signals from the Liver J. Imai et al.
In obese mice, fat tissue stimulates proliferation of insulin-producing pancreatic cells via a neural relay through the liver, contributing to symptoms of metabolic syndrome.

ECOLOGY
Control of Toxic Marine Dinoflagellate Blooms by Serial Parasitic Killers A. Chambouvet, P. Morin, D. Marie, L. Guillou
As successive populations of protists have caused summer red tides in France, each has been killed off by a distinct, persistent parasite, establishing a self-regulating ecosystem.

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Antimicrobial Defense and Persistent Infection in Insects E. R. Haine, Y. Moret, M. T. Siva-Jothy, J. Rolff
Flies fight some infections by quickly engulfing bacteria in phagocytic cells then deploying antimicrobial peptides, a system that avoids bacterial resistance. >> Perspective p. 1199

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Multi-University Research Teams: Shifting Impact, Geography, and Stratification in Science B. F. Jones, S. Wuchty, B. Uzzi
Over the past 30 years, scientific papers have become increasingly likely to be written by teams of authors from more than one of a small number of elite universities.

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Scientists as Financial Analysts
Finance’s Quant(um) Mechanics
Analyzing Scientific Investments
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With new modes of regulation and new functions for members of the pathway, TGF-β breaks the canonical barrier.

PERSPECTIVE: Holding Their Own—The Noncanonical Roles of Smad Proteins
L. L. Hoover and S. W. Kubalak
There are TGF-β–independent regulatory mechanisms and functions of Smads.

PERSPECTIVE: PCTA—A New Player in TGF-β Signaling
F. Liu
The distribution of promyelocytic leukemia protein between the nucleus and cytoplasm controls Smad activation.

FORUM: Highlights from a TGF-β Workshop
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In addition to talks emphasizing the role of TGF-β in cancer, many speakers shared memories of Anita Roberts, scientist mentor, colleague, and friend.

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A. Kotok
Despite today’s headlines, it might be a good time to plan for a career as a financial analyst.

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Financial systems executive Lee Maclin explains why scientists often succeed as quantitative analysts.

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