Like a cauliflower, the quantum critical regime has the same appearance irrespective of viewing distance. Fluctuations prevent a stable phase from developing; instead a patchwork of mixed phases arises. See the special section on quantum matter beginning on page 1201.

Image: Getty Images

SPECIAL SECTION

Quantum Matter

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A 500,000-year record shows that more dust, which provides iron and other nutrients, was blown into the equatorial Pacific during glacial periods than during warm periods.
10.1126/science.1150595

GEOCHEMISTRY
Graphite Whiskers in CV3 Meteorites
M. Fries and A. Steele
Graphite whiskers, a naturally occurring allotrope of carbon, have been found in primitive grains in several meteorites and may explain spectral features of supernovae.
10.1126/science.1153578

MEDICINE
TDP-43 Mutations in Familial and Sporadic Amyotrophic Lateral Sclerosis
J. Sreedharan et al.
Mutations in a gene that encodes a protein that aggregates in several neurodegenerative disorders are linked to amyotrophic lateral sclerosis (Lou Gehrig’s disease).
10.1126/science.1154584

NEUROSCIENCE
Protein Synthesis and Neurotrophin-Dependent Structural Plasticity of Single Dendritic Spines
J. Tanaka et al.
Pairing of stimuli in hippocampal cells induces secretion of the growth factor BDNF, causing enlargement of individual spines and strengthening of synapses.
10.1126/science.1152864

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UBIQUITY OF BIOLOGICAL ICE NUCLEATORS IN SNOWFALL
B. C. Christner et al.
Biogenic aerosols are ubiquitous in nuclei of ice particles that grow and form snowflakes, and thus may influence the precipitation cycle.

RESEARCH ARTICLE
GENETICS
Complete Chemical Synthesis, Assembly, and Cloning of a Mycoplasma genitalium Genome
D. G. Gibson et al.
A complete bacterial genome is synthesized, assembled, and cloned, providing a method that will be useful for generating large DNA molecules de novo.
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Asphericity in Supernova Explosions from Late-Time Spectroscopy
K. Maeda et al.
Spectroscopic signatures show that supernova explosions of stars that have lost their hydrogen envelopes are strongly aspherical and may be jetlike.
Sensory leads to misexpression of root.

K. Trajkovic

Ceramide Triggers Budding of Exosome Vesicles

S. Aigner

Nanoribbon Semiconductors

X. Li, X. Wang, L. Zhang, S. Lee, H. Dai

Unlike nanotubes, 10-nanometer-wide graphene nanoribbons have smooth edges and can act as semiconductors.

CHEMISTRY

Deeply Inverted Electron-Hole Recombination in a Luminescent Antibody-Stilbene Complex

E. W. Debler et al.

The bright blue emission from a stilbene-antibody complex, a versatile biosensor, is not fluorescence, but arises from charge recombination between a stilbene anion and a cationic side chain.

CLIMATE CHANGE

Land Clearing and the Biofuel Carbon Debt

J. Fargione, J. Hill, D. Tilman, S. Polasky, P. Hawthorne

Use of U. S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change

T. Searchinger et al.

Converting forests and grasslands to biofuels crop production results in a net carbon flux to the atmosphere for decades despite any displacement of fossil fuel use.

CELL BIOLOGY

Local Positive Feedback Regulation Determines Cell Shape in Root Hair Cells

S. Takeda, C. Gapper, H. Kaya, E. Bell, K. Kuchitsu, L. Dolan

Accumulation of an oxidase enzyme at one end of Arabidopsis root hair cells generates reactive oxygen species, which in turn trigger calcium entry and directional growth.

CELL BIOLOGY

Ceramide Triggers Budding of Exosome Vesicles into Multivesicular Endosomes

K. Trajkovic et al.

Endosomes, membrane-bound vesicles later released from cells, are filled by a lipid-controlled budding of certain membrane regions into the lumen.

NEUROSCIENCE

BOLD Responses Reflecting Dopaminergic Signals in the Human Ventral Tegmental Area

K. D’Ardenne, S. M. McClure, L. E. Nystrom, J. D. Cohen

In humans, activity measurements in a small midbrain region show dopamine transmission changes that resident dopamine-containing neurons accurately predict rewards in a learning task.

NEUROSCIENCE

Transgenic Inhibition of Synaptic Transmission Reveals Role of CA3 Output in Hippocampal Learning

T. Nakashiba et al.

Blockade of neural activity in the CA3 region of the hippocampus with a reversible, inducible transgenic method inhibits rapid learning but spares certain spatial tasks.

PHYSIOLOGY

Leading-Edge Vortex Improves Lift in Slow-Flying Bats

F. T. Muijres et al.

Flying bats generate high lift forces similar to those used by insects, creating a vortex of air that stays attached to the wing on the downward stroke.

NEUROSCIENCE

Synaptic Protein Degradation Underlies Destabilization of Retrieved Fear Memory

S.-H. Lee et al.

Upon recollection, mouse memories of fearful situations become labile, as postsynaptic proteins are degraded by proteosomes and are then reconsolidated via protein synthesis.

NEUROSCIENCE

Hybrid Neurons in a MicroRNA Mutant Are Putative Evolutionary Intermediates in Insect CO2 Sensory Systems

P. Cayirlioglu et al.

Loss of a microRNA in Drosophila leads to misexpression of CO2-sensing neurons in the mouthparts, creating a possible evolutionary hybrid between the fruit fly and mosquito.

PSYCHOLOGY

BOLD Responses Reflecting Dopaminergic Signals

in the Human Ventral Tegmental Area

K. D’Ardenne, S. M. McClure, L. E. Nystrom, J. D. Cohen

In humans, activity measurements in a small midbrain region show that resident dopamine-containing neurons accurately predict rewards in a learning task.
Bigger amygdalas in aggressive teens.

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MEETING REPORT: cGMP Matters
B. Kemp-Harper and R. Feil
Emerging therapies for treating cardiovascular disorders target the cGMP signaling system.

TEACHING RESOURCE: Using Web-Based Discussion Forums as a Model of the Peer-Review Process and a Tool for Assessment
Asynchronous discussion forums have several advantages over in-class journal club discussions.

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M. P. DeWhyse
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K. Arney
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