**Floquet Supersymmetry**
Author(s): Thomas Iadecola and Timothy H. Hsieh
We show that time-reflection symmetry in periodically driven (Floquet) quantum systems enables an inherently nonequilibrium phenomenon structurally similar to quantum-mechanical supersymmetry. In particular, we find Floquet analogs of the Witten index that place lower bounds on the degeneracies of states.

[Phys. Rev. Lett. 120, 210603] Published Thu May 24, 2018

**Observation and Uses of Position-Space Bloch Oscillations in an Ultracold Gas**
Author(s): Zachary A. Geiger, Kurt M. Fujiwara, Kevin Singh, Ruwan Senaratne, Shankari V. Rajagopal, Mikhail Lipatov, Toshihiko Shimasaki, Rodislav Driben, Vladimir V. Konotop, Torsten Meier, and David M. Weld
Bloch oscillations—first predicted to occur for electrons in a crystal—have been observed in an optical lattice containing ultracold atoms.

[Phys. Rev. Lett. 120, 213201] Published Thu May 24, 2018

**Breath Figures under Electrowetting: Electrically Controlled Evolution of Drop Condensation Patterns**
Author(s): Davood Baratian, Ranabir Dey, Harmen Hoek, Dirk van den Ende, and Frieder Mugele
We show that electrowetting (EW) with structured electrodes significantly modifies the distribution of drops condensing onto flat hydrophobic surfaces by aligning the drops and by enhancing coalescence. Numerical calculations demonstrate that drop alignment and coalescence are governed by the drop-surface interactions.

[Phys. Rev. Lett. 120, 214502] Published Thu May 24, 2018

**Better Than Counting: Density Profiles from Force Sampling**
Author(s): Daniel de las Heras and Matthias Schmidt
A new approach to calculate one-body density profiles of nonuniform systems uses local force density distributions rather than spatial distributions to achieve improved statistical accuracy.

[Phys. Rev. Lett. 120, 218001] Published Thu May 24, 2018

**Cloud Quantum Computing of an Atomic Nucleus**
Researchers perform a quantum computation of the binding energy of the deuteron using a web connection to remote quantum devices.

[Phys. Rev. Lett. 120, 210501] Published Wed May 23, 2018
**QCD Axion Dark Matter with a Small Decay Constant**
Author(s): Raymond T. Co, Lawrence J. Hall, and Keisuke Harigaya
A proposed new cosmological production mechanism for QCD axion dark matter that involves parametric resonance in field oscillation predicts larger axion masses than the conventional misalignment mechanism.

[Phys. Rev. Lett. 120, 211602] Published Wed May 23, 2018

**Asymptotically Free Natural Supersymmetric Twin Higgs Model**
Author(s): Marcin Badziak and Keisuke Harigaya
Twin Higgs (TH) models explain the absence of new colored particles responsible for natural electroweak symmetry breaking (EWSB). All known ultraviolet completions of TH models require some nonperturbative dynamics below the Planck scale. We propose a supersymmetric model in which the TH mechanism i...

[Phys. Rev. Lett. 120, 211803] Published Wed May 23, 2018

**Most Strange Dibaryon from Lattice QCD**
Author(s): Shinya Gongyo, Kenji Sasaki, Sinya Aoki, Takumi Doi, Tetsuo Hatsuda, Yoichi Ikeda, Takashi Inoue, Takumi Iritani, Noriyoshi Ishii, Takaya Miyamoto, and Hidekatsu Nemura (HAL QCD Collaboration)
The $\Omega \Omega$ system in the $^1S_0$ channel (the most strange dibaryon) is studied on the basis of the $(2+1)$-flavor lattice QCD simulations with a large volume $(8.1 \text{ fm})^3$ and nearly physical pion mass $m_\pi \approx 146 \text{ MeV}$ at a l...

[Phys. Rev. Lett. 120, 212001] Published Wed May 23, 2018

**Puzzling Two-Proton Decay of $^{67}\text{Kr}$**
Author(s): S. M. Wang and W. Nazarewicz
Ground-state two-proton ($2p$) radioactivity is a rare decay mode found in a few very proton-rich isotopes. The $2p$ decay lifetime and properties of emitted protons carry invaluable information on nuclear structure in the presence of a low-lying proton continuum. The recently measured $2p$ decay of...

[Phys. Rev. Lett. 120, 212502] Published Wed May 23, 2018

**Tomography and Purification of the Temporal-Mode Structure of Quantum Light**
Author(s): Vahid Ansari, John M. Donohue, Markus Allgaier, Linda Sansoni, Benjamin Brecht, Jonathan Roslund, Nicolas Treps, Georg Harder, and Christine Silberhorn
High-dimensional quantum information processing promises capabilities beyond the current state of the art, but addressing individual information-carrying modes presents a significant experimental...
challenge. Here we demonstrate effective high-dimensional operations in the time-frequency domain of non...

[Phys. Rev. Lett. 120, 213601] Published Wed May 23, 2018

**Graphitization of Glassy Carbon after Compression at Room Temperature**


Glassy carbon is a technologically important material with isotropic properties that is nongraphitizing up to $\sim 3000\text{°C}$ and displays complete or “superelastic” recovery from large compression. The pressure limit of these properties is not yet known. Here we use experiments and model...

[Phys. Rev. Lett. 120, 215701] Published Wed May 23, 2018

**Strong Interlayer Magnon-Magnon Coupling in Magnetic Metal-Insulator Hybrid Nanostructures**

Author(s): Jilei Chen, Chuanpu Liu, Tao Liu, Yang Xiao, Ke Xia, Gerrit E. W. Bauer, Mingzhong Wu, and Haiming Yu

We observe strong interlayer magnon-magnon coupling in an on-chip nanomagnonic device at room temperature. Ferromagnetic nanowire arrays are integrated on a 20-nm-thick yttrium iron garnet (YIG) thin film strip. Large anticrossing gaps up to 1.58 GHz are observed between the ferromagnetic resonance ...

[Phys. Rev. Lett. 120, 217202] Published Wed May 23, 2018

**Ultrafast Light Switching of Ferromagnetism in EuSe**

Author(s): A. B. Henriques, X. Gratens, P. A. Usachev, V. A. Chitta, and G. Springholz

We demonstrate that light resonant with the band gap forces the antiferromagnetic semiconductor EuSe to enter ferromagnetic alignment in the picosecond timescale. A photon generates an electron-hole pair, whose electron forms a supergiant spin polaron of magnetic moment of nearly 6000 Bohr magnetons...

[Phys. Rev. Lett. 120, 217203] Published Wed May 23, 2018

**Direct Observation of Zhang-Li Torque Expansion of Magnetic Droplet Solitons**

Author(s): Sunjae Chung, Q. Tuan Le, Martina Ahlberg, Ahmad A. Awad, Markus Weigand, Iuliia Bykova, Roman Khymyn, Mykola Dvornik, Hamid Mazraati, Afshin Houshang, Sheng Jiang, T. N. Anh Nguyen, Eberhard Goering, Gisela Schütz, Joachim Gräfe, and Johan Åkerman

Magnetic droplets are nontopological dynamical solitons that can be nucleated in nanocontact based spin torque nano-oscillators (STNOs) with perpendicular magnetic anisotropy free layers. While theory predicts that the droplet should be of the same size as the nanocontact, its inherent drift instabi...

[Phys. Rev. Lett. 120, 217204] Published Wed May 23, 2018
Simultaneous Control of Multispecies Particle Transport and Segregation in Driven Lattices
Author(s): Aritra K. Mukhopadhyay, Benno Liebchen, and Peter Schmelcher
We provide a generic scheme to separate the particles of a mixture by their physical properties like mass, friction, or size. The scheme employs a periodically shaken two-dimensional dissipative lattice and hinges on a simultaneous transport of particles in species-specific directions. This selectiv...

Signatures of Indistinguishability in Bosonic Many-Body Dynamics
Author(s): Tobias Brünner, Gabriel Dufour, Alberto Rodríguez, and Andreas Buchleitner
The dynamics of bosons in generic multimode systems, such as Bose-Hubbard models, are not only determined by interactions among the particles, but also by their mutual indistinguishability manifested in many-particle interference. We introduce a measure of indistinguishability for Fock states of bos...

Exact Fluctuations of Nonequilibrium Steady States from Approximate Auxiliary Dynamics
Author(s): Ushnish Ray, Garnet Kin-Lic Chan, and David T. Limmer
We describe a framework to reduce the computational effort to evaluate large deviation functions of time integrated observables within nonequilibrium steady states. We do this by incorporating an auxiliary dynamics into trajectory based Monte Carlo calculations, through a transformation of the syste...

Fast Preparation of Critical Ground States Using Superluminal Fronts
Author(s): Kartiek Agarwal, R. N. Bhatt, and S. L. Sondhi
We propose a spatiotemporal quench protocol that allows for the fast preparation of ground states of gapless models with Lorentz invariance. Assuming the system initially resides in the ground state of a corresponding massive model, we show that a superluminally moving “front” that locally quenches ...
Final Results of the OPERA Experiment on $\nu_{\mu} \rightarrow \nu_{\tau}$ Appearance in the CNGS Neutrino Beam
Author(s): N. Agafonova et al. (OPERA Collaboration)
The final analysis of data collected by the OPERA experiment improves the precision of measurements of neutrinos oscillating between muon and tau flavors.

[Phys. Rev. Lett. 120, 211801] Published Tue May 22, 2018