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011001 ***Colloquium*: Fracton matter**

Andrey Gromov
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Fractons are exotic excitations originally conceived as platforms for reliable quantum memories. They are characterized by highly restricted mobilities. In the continuum, they are described by tensor fields with higher gauge symmetries. In this Colloquium, the focus is on a class of duality mappings between fracton models and elasticity theory, building the reader's intuition and understanding in a more familiar setting.

011002 ***Colloquium*: Sliding and pinning in structurally lubric 2D material interfaces**

Jin Wang
Ali Khosravi
Andrea Vanossi
Erio Tosatti

Friction at highly lubric interfaces of two-dimensional materials is important yet incompletely characterized. This Colloquium discusses sliding and pinning between two-dimensional layers, using simulations of twisted graphene interfaces as a prototypical system. The resulting insights are of potential relevance for a larger category of bilayer and multilayer systems as well.

015001 **Comprehensive theory of the Lamb shift in light muonic atoms**

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This article reviews recent literature and presents new calculations of the Lamb shift in light muonic atoms. Point-nucleus QED and nuclear structure effects are treated consistently among all muonic and electronic atoms to allow for improved determination of nuclear charge radii and fundamental constants.

015002 **Controlling mass and energy diffusion with metamaterials**

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Metamaterials are artificially patterned structures designed to behave as artificial materials with novel properties. A popular application is controlling electromagnetic waves with subwavelength patterning, leading to properties like negative indices of refraction. Metamaterials can also control diffusion processes, which are different from wave propagation. This review describes metamaterials in diffusive systems in terms of their underlying physics, the theory used to describe them, and their potential applications in areas such as heat management, drug transport, and particle separation.

015003 **Time-resolved ARPES studies of quantum materials**

Fabio Boschini
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Time-resolved angle-resolved photoemission spectroscopy provides access to light-induced changes in the electronic band structure and interactions of solids, and to the out-of-equilibrium electron dynamics. This article reviews the history and future prospects for the development of the technique, and offers an overview of recent achievements in studying unoccupied and light-driven states, photoinduced phase transitions, electron-phonon scattering, and electron dynamics in quantum materials, including topological insulators, unconventional superconductors, traditional and novel semiconductors, excitonic insulators, and spin-textured systems.

015004 **Spontaneous scalarization**

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Recent observations of compact astrophysical objects have opened the possibility to probe the nature of gravity in its strong-field regime. Such observations could reveal deviations from general relativity or the standard model. Spontaneous scalarization, which is controlled by scalar-field couplings to gravity, leads to a behavior that resembles a phase transition: the scalar induces measurable effects in the strong-field regime while remaining undetectable in weak-field gravitational experiments. This review presents the spontaneous scalarization mechanism, several scalarization models considered in the literature, and their astrophysical implications for neutron stars and black holes. It also discusses the generalization of such models to other types of fields and instabilities.

015005 **Electrical control of magnetism by electric field and current-induced torques**

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Ramamoorthy Ramesh
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Fèlix Casanova
Manuel Bibes

Electronic devices that incorporate magnetism, called spintronic devices, can increase the functionality of electronic circuits and lead to increases in efficiency. Such devices are useful if the magnetization can be manipulated electrically rather than by magnetic fields. This review covers the materials, underlying physics, and applications involved in such manipulation, focusing on two control mechanisms. The first is control by manipulating the magnetization through its coupling to ferroelectric order and the second is control by spin-polarized currents manipulating the magnetization through the angular momentum flowing into it.

015006 **The standard model effective field theory at work**

Gino Isidori
Felix Wilsch
Daniel Wyler

The standard model is successful at describing most of the data at the electroweak scale, but there are indications that new physics should exist at a higher energy scale. To identify, quantify, and elucidate the new physics, one can use the framework of the standard model effective field theory. This article reviews the construction and theoretical tools provided by the effective field theory for analyzing the present and future experimental data, as well as theoretical ideas for new physics.

019901 **Erratum: Optical diagnostics of laser-produced plasmas [Rev. Mod. Phys. 94, 035002 (2022)]**

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