Volume 97, Issue 3 (partial)

July - September 2025

Browse Issues: Prev

Nobel Lecture: Physics is a point of view

John J. Hopfield

Rev. Mod. Phys. **97**, 030501 (2025) - Published 25 August, 2025

The 2024 Nobel Prize for Physics was shared by John Hopfield and Geoffrey Hinton. This paper is the text of the address given in conjunction with the award.

Nobel Lecture: Boltzmann machines

Geoffrey Hinton

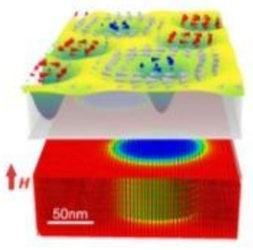
Rev. Mod. Phys. **97**, 030502 (2025) - Published 25 August, 2025

The 2024 Nobel Prize for Physics was shared by John Hopfield and Geoffrey Hinton. This paper is the text of the address given in conjunction with the award.

Colloquium: Quantum properties and functionalities of magnetic skyrmions

Alexander P. Petrović, Christina Psaroudaki, Peter Fischer, Markus Garst, and Christos Panagopoulos

Rev. Mod. Phys. **97**, 031001 (2025) - Published 8 July, 2025



Skyrmions are topological field configurations that were first discussed in the context of high-energy theory. In recent years, skyrmionic spin patterns in solid-state systems have received much attention, in part for their promising application potential. This Colloquium discusses quantum-mechanical aspects of such magnetic skyrmions, both for the interactions that underlie skyrmion formation and for quantum features of the skyrmions themselves.

Photoinduced nonequilibrium states in Mott insulators

Yuta Murakami, Denis Golež, Martin Eckstein, and Philipp Werner

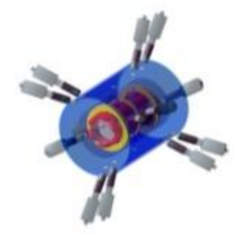
Rev. Mod. Phys. **97**, 035001 (2025) - Published 31 July, 2025

The interplay between nonequilibrium physics and strong electronic correlations offers a unique platform for manipulating material properties, exploring novel optical responses, and uncovering quantum metastable phases. This review provides a comprehensive overview of recent advances in understanding the nonequilibrium dynamics of photoexcited Mott insulators—systems where strong interactions and a robust energy gap can give rise to rich and controllable phenomena. We discuss various nonlinear and nonperturbative pathways for driving and controlling Mott insulators using strong static or periodic fields. Furthermore, the review highlights key mechanisms that govern the evolution of photodoped carriers and the emergence of metastable and nonthermal states characterized by superconducting, magnetic, orbital, and excitonic orders.

Solar fusion III: New data and theory for hydrogen-burning stars

B. Acharya *et al.*

Rev. Mod. Phys. **97**, 035002 (2025) - Published 4 September, 2025

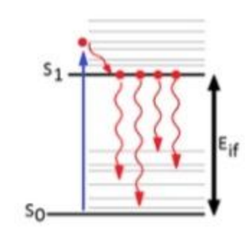


Approximately 90% of the stars in the Milky Way are on the main sequence, fusing hydrogen into helium through a network of nuclear reactions. This includes the nearest star, our Sun. A precise understanding of hydrogen burning is crucial to predicting its luminosity, neutrino production, and helioseismology. This review describes the theoretical and experimental work of the last decade that has advanced our understanding of the nuclear physics of hydrogen burning. It describes the plasma and atomic physics that influences the solar environment in which the nuclear reactions take place, as well as the diagnostics probes—including solar neutrinos and helioseismology—that allow us to test our resulting model of the solar interior.

The ups and downs of internal conversion

Anjay Manian, Zifei Chen, Hugh T. Sullivan, and Salvy P. Russo

Rev. Mod. Phys. **97**, 035003 (2025) - Published 16 September, 2025



This review examines the theoretical methods used to describe the photophysical process of internal conversion in quantum systems. These models explore all facets of the nonradiative mechanism, and the review presents an outlook on how they can be incorporated in studies relevant to applications, for example, in photonics and energy harvesting.

ISSN 1539-0756 (online), 0034-6861 (print).

©2025 American Physical Society. All rights reserved.
Reviews of Modern Physics™ is a trademark of the American Physical Society, registered in the United States, Canada, European Union, and Japan. The *APS Physics logo* and *Physics logo* are trademarks of the American Physical Society. Information about registration may be found here. Use of the American Physical Society websites and journals implies that the user has read and agrees to our Terms and Conditions and any applicable Subscription Agreement.