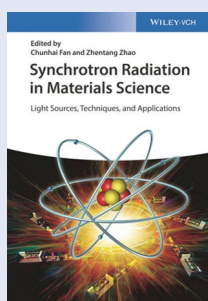


Principles of Free Electron Lasers

By *H. P. Freund and T. M. Antonsen, Jr*

SPRINGER: 2018. 716PP. £139.99.

The fundamental physical mechanisms of free-electron lasers are introduced before detailed derivation of the relevant particle dynamics for both spontaneous and stimulated emissions are presented. Linear theory on coherent emission, and nonlinear theories on guide-mode analysis and optical-mode analysis are provided. Also included in the 15 chapters are the nonlinear simulations of a variety of important concepts in use today, such as amplification, oscillations, self-amplified spontaneous emission, optical klystrons and high-gain harmonic generation. The last chapter is dedicated to chaos in free-electron lasers.

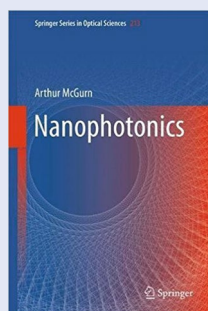


Synchrotron Radiation in Materials Science

Edited by *Chunhai Fan and Zhentang Zhao*

WILEY: 2018. 856PP. £275.00.

Connecting specialists in synchrotron research and materials scientists, this volume is divided into three main parts: the introduction of a synchrotron and synchrotron facilities; the description of synchrotron-based techniques; and synchrotron radiation for materials science research. Various techniques based on a synchrotron are detailed, including X-ray absorption, diffraction, scattering, imaging and lithography. The development of methods for materials research is subsequently discussed, followed by the applications of synchrotron radiation for research in energy materials, nanomaterials, biomaterials, interfacial materials and environmental materials.

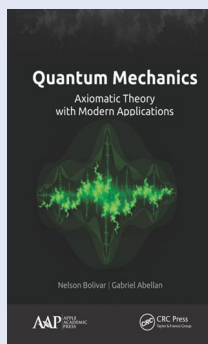


Nanophotonics

By *Arthur McGurn*

SPRINGER: 2018. 558PP. £119.99.

Composed of ten chapters, this book gives an overview of the basic elements of the field of nanophotonics. The topics that are discussed include the basic mathematical techniques needed for studying the materials used in nanophotonic technology, nonlinear optics in nanophotonics, photonic crystals and their nanophotonics applications, forces at the nanometre scale, and nanophotonics for lasers. New types of engineered material known as metamaterials and the emerging field of plasmonics are also described, as are the basic principles of near-field optical microscopy and the application of nanophotonics in quantum computers.



Quantum Mechanics

By *Nelson Bolivar and Gabriel Abellán*

CRC PRESS: 2018. 340PP. £99.20.

This book covers the basics of quantum mechanics and addresses new themes that have developed in the field recently, encompassing quantum mechanics in relation to electronics, quantum dots, spintronics, magnetic resonance and cryptography. Also covered are topics related to the theoretical aspects of quantum mechanics, such as superposition principle waves, the wavefunction, the well-known Schrödinger equation, the theory of scattering, quantum axiomatics, quantum measurements, path integral formulation of quantum mechanics, super-symmetry in quantum mechanics, quantum persistent currents, non-equilibrium quantum mechanics and the quantum Hall effect. The applications of quantum mechanics to information theory and encryption, medicine, modern communications systems and solid-state devices are also discussed.

Published online: 28 June 2018

<https://doi.org/10.1038/s41566-018-0207-3>