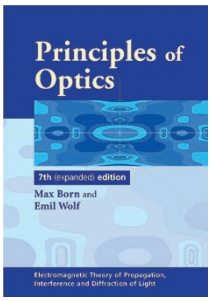
All-time favourites

Principles of Optics

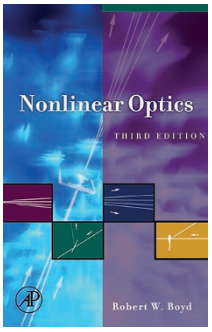
By Max Born and Emil Wolf
CAMBRIDGE UNIV. PRESS 985PP. £54.99



The seventh edition of this classic optics text is the most thoroughly revised and expanded version since it was first published in 1959. The first chapters lay the foundations of the field of optics, covering basic properties of the electromagnetic field, polarization, dispersion and geometric optics. The chapter dedicated to optical imaging features new material about computerized axial tomography, while a whole new chapter covers scattering from inhomogeneous media including diffraction tomography. The text concludes with the optics of crystals, which introduces the reader to nonlinear optical phenomena.

Nonlinear Optics

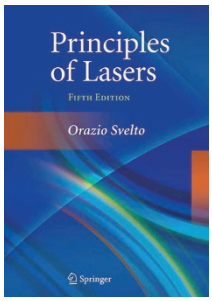
By Robert W. Boyd
ACADEMIC PRESS 640PP. £75.99



The interaction of intense laser light with matter is the subject of nonlinear optics. Interestingly, the third edition of this classic title switched from Gaussian units to the SI system. Starting with the nonlinear susceptibility and its properties, the author introduces the wave-equation description of nonlinear optical interactions to cover crucial concepts such as phase matching, second-harmonic and difference-frequency generation as well as parametric amplification. Other topics featured in this comprehensive text include the intensity-dependent refractive index and self-focusing, stimulated scattering processes, electro-optic effects and photorefractive materials. The concluding chapter describes high-harmonic generation and relativistic nonlinear optics.

Principles of Lasers

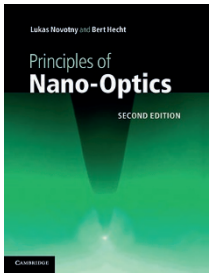
By Orazio Svelto
SPRINGER 620PP. £72.00



In the words of its author, the aim of this text is "to provide a broad and unified description of laser behaviour at the simplest level which is compatible with a correct physical understanding." A valuable feature is the rich collection of illustrations and diagrams. Following a structure that mirrors the basic scheme of a laser source (composed of an active medium, an optical resonator and a pumping system), the first chapters describe spontaneous and stimulated emission, absorption as well as radiative and non-radiative processes to introduce concepts such as gain, line broadening and saturation. Further, the author discusses stable and unstable resonators before considering optical and electrical pumping systems. Two chapters focus on continuous-wave and pulsed laser behaviour, and the text concludes with a presentation of specific laser sources.

Principles of Nano-Optics

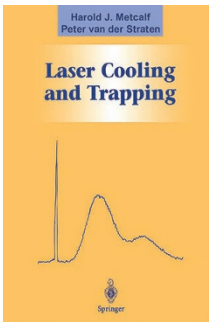
By Lukas Novotny and Bert Hecht
CAMBRIDGE UNIV. PRESS 578PP. £62.00



This text responds to the growing importance of nanoscience, and presents a rare collection of topics across optics and microscopy at the nanoscale. A major goal of nano-optics is to extend the use of optical techniques to length scales beyond the diffraction limit. Notably, the book features a valuable discussion of resolution, localization and position accuracy in microscopy. A non-exhaustive list of subjects covered in later chapters includes near- and far-field microscopy techniques, quantum emitters and surface plasmons in nanostructures.

Laser Cooling and Trapping

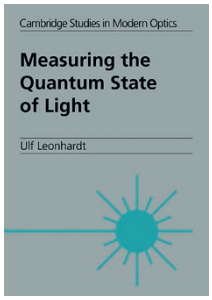
By Harold J. Metcalf and Peter van der Straten
SPRINGER 324PP. £46.99



Nobel Prize winner W. D. Phillips wrote that "when someone asks me how to start learning about laser cooling, I'll tell them to read Metcalf and Van der Straten." Over the past four decades, the physics and technology of laser cooling and trapping have led to crucial advances in research areas ranging from the study of Bose–Einstein condensates to atomic clocks. The text is divided into three parts: the first reviews the basics of quantum mechanics and describes two- and multi-level atoms; the second covers optical molasses, magnetic and optical trapping of neutral atoms, as well as evaporative cooling; and the final part illustrates some applications of laser cooling and trapping techniques.

Measuring the Quantum State of Light

By Ulf Leonhardt
CAMBRIDGE UNIV. PRESS 208PP. £40.99



Quantum mechanics prescribes that there is a fundamental limit on the amount of information that can be extracted from a single set of measurements performed on a quantum object. As such, this book appears less restricted in its scope than it might first look, and in fact constitutes a self-contained source of knowledge for anyone interested or already working in quantum optics. The author focuses on two paradigms of state measurement, namely quantum tomography and the simultaneous measurement of position and momentum. The book also contains a valuable presentation of quasi-probability distributions and a description of fundamental optical elements such as the beam splitter and the homodyne detector.