

Fundamentals of Photonics (Wiley Series in Pure and Applied Optics)

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In recent years, photonics has found increasing applications in such areas as communications, signal processing, computing, sensing, display, printing, and energy transport. Now, Fundamentals of Photonics is the first self-contained introductory-level textbook to offer a thorough survey of this rapidly expanding area of engineering and applied physics. Featuring a logical blend of theory and applications, coverage includes detailed accounts of the primary theories of light, including ray optics, wave optics, electromagnetic optics, and photon optics, as well as the interaction of light with matter, and the theory of semiconductor materials and their optical properties. Presented at increasing levels of complexity, these sections serve as building blocks for the treatment of more advanced topics, such as Fourier optics and holography, guidedwave and fiber optics, photon sources and detectors, electro-optic and acousto-optic devices, nonlinear optical devices, fiber-optic communications, and photonic switching and computing. Included are such vital topics as:

- >> Generation of coherent light by lasers, and incoherent light by luminescence sources such as light-emitting diodes
- >> Transmission of light through optical components (lenses, apertures, and imaging systems), waveguides, and fibers
- >> Modulation, switching, and scanning of light through the use of electrically, acoustically, and optically controlled devices
- >> Amplification and frequency conversion of light by the use of wave interactions in nonlinear materials

Detection of light by means of semiconductor photodetectors
Each chapter contains summaries, highlighted equations, problem sets and exercises, and selected reading lists. Examples of real systems are included to emphasize the concepts governing applications of current interest, and appendices summarize the properties of one- and two-dimensional Fourier transforms, linear-systems theory, and modes of linear systems.

An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Covers the interaction of optics and electronics and their important applications in lasers, optical fibers and semiconductor optical devices. Examines the four theories of light--ray, wave, electromagnetic and photon optics as well as the theory of interaction of light with matter. Numerous applications and examples of actual systems are also provided. About the authors BAHAA E. A. SALEH is Professor and Chairman of the Department of Electrical and Computer Engineering at the University of Wisconsin, Madison. He is the Editor of the Journal of the Optical Society of America and the author of Photoelectron Statistics. He is a Fellow of the IEEE, the Optical Society of America, and the John Simon Guggenheim Foundation. Dr. Saleh is currently involved in research in the areas of image processing, optical signal processing, statistical optics, optical communications, and vision. MALVIN CARL TEICH is Professor and past Chairman of the Department of Electrical Engineering at Columbia University. He is also a member of the Department of Applied Physics, the Columbia Radiation Laboratory, and the Center for Telecommunications Research. He is the Deputy Editor of the journal Quantum Optics. Dr. Teich is a Fellow of the IEEE, the AAAS, the Optical Society of America, the American Physical Society, and the John Simon

Guggenheim Foundation. He was awarded the IEEE Browder J. Thompson Memorial Prize. He is currently involved in research in quantum optics, lightwave communications, and sensory perception.

Other Books

Applied Photonics, Photonic circuitry is the first-choice technological advancement recognized by the telecommunications industry. Due to the speed, strength, and clarity of signal, photonic circuits are rapidly replacing electronic circuits in a range of applications. Applied Photonics is a state-of-the-art reference book that describes the fundamental physical concept of photonics and examines the most current information available in the photonics field. Cutting-edge developments in semiconductors, optical switches, and solitons are presented in a readable and easily understandable style, making this volume accessible, if not essential, reading for practicing engineers and scientists. Introduces the concept of nonlinear interaction of photons with matters, photons, and phonons Covers recent developments of semiconductor lasers and detectors in the communications field Discusses the development of nonlinear devices, including optical amplifiers, solitons, and phase conjugators, as well as the development of photonic components, switches, interconnects, and image processing devices

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