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2022-03-31

JANIAH STEPHENSON

Introduction to Optics I John Wiley & Sons

This book explains the Lorentz mathematical group in a language familiar to physicists. While the three-dimensional rotation group is one of the standard mathematical tools in physics, the Lorentz group of the four-dimensional Minkowski space is still very strange to most present-day physicists. It plays an essential role in understanding particles moving at close to light speed and is becoming the essential language for quantum optics, classical optics, and information science. The book is based on papers and books published by the authors on the representations of the Lorentz group based on harmonic oscillators and their applications to high-energy physics and to Wigner functions applicable to quantum optics. It also covers the two-by-two representations of the Lorentz group applicable to ray optics, including cavity, multilayer and lens optics, as well as representations of the Lorentz group applicable to Stokes parameters and the Poincaré sphere on polarization optics.

Photonics Cambridge University Press

This book discusses statistical methods that are useful for treating problems in modern optics, and the application of these methods to solving a variety of such problems This book covers a variety of statistical problems in optics, including both theory and applications. The text covers the necessary background in statistics, statistical properties of light waves of various types, the theory of partial coherence and its applications, imaging with partially coherent light, atmospheric degradations of images, and noise limitations in the detection of light. New topics have been introduced in the second edition, including: Analysis of the Vander Pol oscillator model of laser light Coverage on coherence tomography and coherence multiplexing of fiber sensors An expansion of the chapter on imaging with partially coherent light, including several new examples An expanded section on speckle and its properties New sections on the cross-spectrum and bispectrum techniques for obtaining images free from atmospheric distortions A new section on imaging through atmospheric turbulence using coherent light The addition of the effects of "read noise" to the discussions of limitations encountered in detecting very weak optical signals A number of new problems and many new references have been added Statistical Optics, Second Edition is written for researchers and engineering students interested in optics, physicists and chemists, as well as graduate level courses in a University Engineering or Physics Department.

Fundamentals of Photonics Cambridge University Press

For one-semester, undergraduate-level courses in Optoelectronics and Photonics, in the departments of electrical engineering, engineering physics, and materials science and engineering. This text takes a fresh look at the enormous developments in electo-optic devices and associated materials.

Physical Properties of Semiconductors Springer

Introduction to Optics is now available in a re-issued edition from Cambridge University Press. Designed to offer a comprehensive and engaging introduction to intermediate and upper level undergraduate physics and engineering students, this text also allows instructors to select specialized content to suit individual curricular needs and goals. Specific features of the text, in terms of coverage beyond traditional areas, include extensive use of matrices in dealing with ray tracing, polarization, and multiple thin-film interference; three chapters devoted to lasers; a separate chapter on the optics of the eye; and individual chapters on holography, coherence, fiber optics, interferometry, Fourier optics, nonlinear optics, and Fresnel equations.

Physics of the Lorentz Group Wiley

This book presents current theories of diffraction, imaging, and related topics based on Fourier analysis and synthesis techniques, which are essential for understanding, analyzing, and synthesizing modern imaging, optical communications and networking, as well as micro/nano systems. Applications covered include tomography; magnetic resonance imaging; synthetic aperture radar (SAR) and interferometric SAR; optical communications and networking devices; computer-generated holograms and analog holograms; and wireless systems using EM waves.

Light Science Springer

Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanys: 9780471839651 .

Stability, Instability and Chaos Morgan & Claypool Publishers

The authors explore the ways to improve the classical resolution limits of an imaging system, and provide novel approaches for achieving better results than would otherwise be possible with current imaging technology. The book begins by presenting the theoretical foundations, background information, and terminology of super resolution, and then discusses methods and systems used to achieve the super resolution effect. Various approaches to dealing with and exceeding the limitations of the lens aperture, the pixel size of the camera, and the noise generated at the detector are presented and analyzed. The last chapter illustrates several industry-related examples and potential applications to real industrial electro-optical systems. This book is intended for graduate students or researchers in academia or industry, and anyone else looking to improve the performance of their electro-optical system design.

Fractal-Based Point Processes Information Gatekeepers Inc

Research Methods is an introduction to the importance of scientific research in everyday life and uses familiar examples to keep students engaged. The text analyzes controversies in psychology to stimulate student interest while explaining crucial methodological concepts. It presents ethical issues related to

research, as well as social and cultural factors that might affect it, and provides a comprehensive introduction to a wide variety of methodologies. Through this book, students will learn how to generate research questions and select appropriate methodology, as well as to write a successful research report.

Modern Optics John Wiley & Sons

This book provides a comprehensive introduction into photonics, from the electrodynamic and quantum mechanic fundamentals to the level of photonic components and building blocks such as lasers, amplifiers, modulators, waveguides, and detectors. The book will serve both as textbook and as a reference work for the advanced student or scientist. Theoretical results are derived from basic principles with convenient, yet state-of-the-art mathematical tools, providing not only deeper understanding but also familiarization with formalisms used in the relevant technical literature and research articles. Among the subject matters treated are polarization optics, pulse and beam propagation, waveguides, light-matter interaction, stationary and transient behavior of lasers, semiconductor optics and lasers (including low-dimensional systems such as quantum wells), detector technology, photometry, and colorimetry. Nonlinear optics are elaborated comprehensively. The book is intended for both students of physics and electronics and scientists and engineers in fields such as laser technology, optical communications, laser materials processing, and medical laser applications who wish to gain an in-depth understanding of photonics.

Guided Wave Optics and Photonic Devices Fundamentals of Photonics

With the recent great expansion in optics and laser applications, several new areas of research have emerged, among which are: the theory of coherence, photon statistics, speckle phenomenon, statistical optics, atmospheric propagation, optical communications, and light-beating and photon-correlation spectroscopy. A factor common to these overlapping subjects is their basic dependence on the treatment of light as a randomly fluctuating excitation. Moreover, they all necessitate a thorough understanding of the phenomenon of light detection and the additional randomness it introduces. My objective in writing this book is to provide a unified and general presentation of a basic theoretical background central to these areas. This book has a threefold purpose: to present a systematic treatment of the statistical properties of optical fields, to develop methods for determining the statistics of the photoelectron events that are generated when such fields are intercepted by photodetectors, and to examine methods of estimating unknown field parameters from measurements of the photoelectron events. Emphasis is placed on the photoelectron measurements that yield information pertinent to spectroscopy and optical communication. Although some books that treat the theory of coherence and the statistical properties of light are available, the vast body of information central to problems of photoelectron statistics and its applications is scattered in various professional journals and conference proceedings.

Nanophotonic Materials Morgan & Claypool Publishers

A complete basic undergraduate course in modern optics for students in physics, technology, and engineering. The first half deals with classical physical optics; the second, quantum nature of light. Solutions.

Fundamentals of Photonics Cambridge University Press

An introduction to photonics and lasers that does not rely on complex mathematics. This book evolved from a series of courses developed by the author and taught in the areas of lasers and photonics. This thoroughly classroom-tested work fills a unique need for students, instructors, and industry professionals in search of an introductory-level book that covers a wide range of

topics in these areas. Comparable books tend to be aimed either too high or too low, or they cover only a portion of the topics that are needed for a comprehensive treatment. Photonics and Lasers is divided into four parts: * Propagation of Light * Generation and Detection of Light * Laser Light * Light-Based Communication. The author has ensured that complex mathematics does not become an obstacle to understanding key physical concepts. Physical arguments and explanations are clearly set forth while, at the same time, sufficient mathematical detail is provided for a quantitative understanding. As an additional aid to readers who are learning to think symbolically, some equations are expressed in words as well as symbols. Problem sets are provided throughout the book for readers to test their knowledge and grasp of key concepts. A solutions manual is also available for instructors. Finally, the detailed bibliography leads readers to in-depth explorations of particular topics. The book's topics, lasers and photonics, are often treated separately in other texts; however, the author skillfully demonstrates their natural synergy. Because of the combined coverage, this text can be used for a two-semester course or a one-semester course emphasizing either lasers or photonics. This is a perfect introductory textbook for both undergraduate and graduate students, additionally serving as a practical reference for engineers in telecommunications, optics, and laser electronics.

Optics in Our Time Cambridge University Press

A comprehensive resource to designing and constructing analog photonic links capable of high RF performance. Fundamentals of Microwave Photonics provides a comprehensive description of analog optical links from basic principles to applications. The book is organized into four parts. The first begins with a historical perspective of microwave photonics, listing the advantages of fiber optic links and delineating analog vs. digital links. The second section covers basic principles associated with microwave photonics in both the RF and optical domains. The third focuses on analog modulation formats—starting with a concept, deriving the RF performance metrics from basic physical models, and then analyzing issues specific to each format. The final part examines applications of microwave photonics, including analog receive-mode systems, high-power photodiodes applications, radio astronomy, and arbitrary waveform generation. Covers fundamental concepts including basic treatments of noise, sources of distortion and propagation effects. Provides design equations in easy-to-use forms as quick reference. Examines analog photonic link architectures along with their application to RF systems. A thorough treatment of microwave photonics, Fundamentals of Microwave Photonics will be an essential resource in the laboratory, field, or during design meetings. The authors have more than 55 years of combined professional experience in microwave photonics and have published more than 250 associated works.

Introduction to Subsurface Imaging Lulu.com

Light and light based technologies have played an important role in transforming our lives via scientific contributions spanned over thousands of years. In this book we present a vast collection of articles on various aspects of light and its applications in the contemporary world at a popular or semi-popular level. These articles are written by the world authorities in their respective fields. This is therefore a rare volume where the world experts have come together to present the developments in this most important field of science in an almost pedagogical manner. This volume covers five aspects related to light. The first presents two articles, one on the history of the nature of light, and the other on the scientific achievements of Ibn-Haitham (Alhazen), who is broadly considered the father of modern optics. These are then followed by an article on ultrafast phenomena and the invisible

world. The third part includes papers on specific sources of light, the discoveries of which have revolutionized optical technologies in our lifetime. They discuss the nature and the characteristics of lasers, Solid-state lighting based on the Light Emitting Diode (LED) technology, and finally modern electron optics and its relationship to the Muslim golden age in science. The book's fourth part discusses various applications of optics and light in today's world, including biophotonics, art, optical communication, nanotechnology, the eye as an optical instrument, remote sensing, and optics in medicine. In turn, the last part focuses on quantum optics, a modern field that grew out of the interaction of light and matter. Topics addressed include atom optics, slow, stored and stationary light, optical tests of the foundation of physics, quantum mechanical properties of light fields carrying orbital angular momentum, quantum communication, and Wave-Particle dualism in action.

A Tool for Life John Wiley & Sons

In this age of the photon, information optics and photonics represent the key technologies to sustain our knowledge-based society. New concepts in classical and quantum-entangled light and coherent matter and novel materials and processes have led to remarkable advances in today's information science and technology. This volume contains a collection of 32 chapters from internationally leading scientists and research groups on a variety of topics in information optics and photonics, including the 2003-2006 ICO Prize winners. The chapters are divided into 7 sections: Beam Optics; Laser Photonics and Components; Electromagnetic Coherence; Imaging, Microscopy, Holography, and Materials; Photonics Processing; Quantum Information and Matter; and, Communications and Networks.

Interaction of Light with Matter John Wiley & Sons

An integrated approach to fractals and point processes This publication provides a complete and integrated presentation of the fields of fractals and point processes, from definitions and measures to analysis and estimation. The authors skillfully demonstrate how fractal-based point processes, established as the intersection of these two fields, are tremendously useful for representing and describing a wide variety of diverse phenomena in the physical and biological sciences. Topics range from information-packet arrivals on a computer network to action-potential occurrences in a neural preparation. The authors begin with concrete and key examples of fractals and point processes, followed by an introduction to fractals and chaos. Point processes are defined, and a collection of characterizing measures are presented. With the concepts of fractals and point processes thoroughly explored, the authors move on to integrate the two fields of study. Mathematical formulations for several important fractal-based point-process families are provided, as well as an explanation of how various operations modify such processes. The authors also examine analysis and estimation techniques suitable for these processes. Finally, computer network traffic, an important application used to illustrate the various approaches and models set forth in earlier chapters, is discussed. Throughout the presentation, readers are exposed to a number of important applications that are examined with the aid of a set of point processes drawn from biological signals and computer network traffic. Problems are provided at the end of each chapter allowing readers to put their newfound knowledge into practice, and all solutions are provided in an appendix. An accompanying Web site features links to supplementary materials and tools to assist with data analysis and simulation. With its focus on applications and numerous solved problem sets, this is an excellent graduate-level text for courses in such diverse fields as statistics, physics, engineering, computer science, psychology, and neuroscience.

Introducing Photonics Springer

A concise, accessible guide explaining the essential ideas underlying photonics and how they relate to photonic devices and systems.

Statistical Optics Frontiers Media SA

This book describes the fascinating recent advances made concerning the chaos, stability and instability of semiconductor lasers, and discusses their applications and future prospects in detail. It emphasizes the dynamics in semiconductor lasers by optical and electronic feedback, optical injection, and injection current modulation. Applications of semiconductor laser chaos, control and noise, and semiconductor lasers are also demonstrated. Semiconductor lasers with new structures, such as vertical-cavity surface-emitting lasers and broad-area semiconductor lasers, are intriguing and promising devices. Current topics include fast physical number generation using chaotic semiconductor lasers for secure communication, development of chaos, quantum-dot semiconductor lasers and quantum-cascade semiconductor lasers, and vertical-cavity surface-emitting lasers. This fourth edition has been significantly expanded to reflect the latest developments. The fundamental theory of laser chaos and the chaotic dynamics in semiconductor lasers are discussed, but also for example the method of self-mixing interferometry in quantum-cascade lasers, which is indispensable in practical applications. Further, this edition covers chaos synchronization between two lasers and the application to secure optical communications. Another new topic is the consistency and synchronization property of many coupled semiconductor lasers in connection with the analogy of the dynamics between synaptic neurons and chaotic semiconductor lasers, which are compatible nonlinear dynamic elements. In particular, zero-lag synchronization between distant neurons plays a crucial role for information processing in the brain. Lastly, the book presents an application of the consistency and synchronization property in chaotic semiconductor lasers, namely a type of neuro-inspired information processing referred to as reservoir computing.

John Wiley & Sons

A comprehensive treatment of ultrafast optics This book fills the need for a thorough and detailed account of ultrafast optics. Written by one of the most preeminent researchers in the field, it sheds new light on technology that has already had a revolutionary impact on precision frequency metrology, high-speed electrical testing, biomedical imaging, and in revealing the initial steps in chemical reactions. Ultrafast Optics begins with a summary of ultrashort laser pulses and their practical applications in a range of real-world settings. Next, it reviews important background material, including an introduction to Fourier series and Fourier transforms, and goes on to cover: Principles of mode-locking Ultrafast pulse measurement methods Dispersion and dispersion compensation Ultrafast nonlinear optics: second order Ultrafast nonlinear optics: third order Mode-locking: selected advanced topics Manipulation of ultrashort pulses Ultrafast time-resolved spectroscopy Terahertz time-domain electromagnetics Professor Weiner's expertise and cutting-edge research result in a book that is destined to become a seminal text for engineers, researchers, and graduate students alike.

Optics Experiments and Demonstrations for Student Laboratories Wiley-Interscience

Describing and evaluating the basic principles and methods of subsurface sensing and imaging, Introduction to Subsurface Imaging is a clear and comprehensive treatment that links theory to a wide range of real-world applications in medicine, biology, security and geophysical/environmental exploration. It integrates

the different sensing techniques (acoustic, electric, electromagnetic, optical, x-ray or particle beams) by unifying the underlying physical and mathematical similarities, and computational and algorithmic methods. Time-domain, spectral and multisensor methods are also covered, whilst all the necessary mathematical, statistical and linear systems tools are

given in useful appendices to make the book self-contained. Featuring a logical blend of theory and applications, a wealth of color illustrations, homework problems and numerous case studies, this is suitable for use as both a course text and as a professional reference.