

Read Book Single Photon Imaging Springer Series In Optical Sciences Pdf For Free

Handbook of Nonlinear Optical Crystals Sep 29 2021 This Handbook of Nonlinear Optical Crystals provides a complete description of the properties and applications of nonlinear crystals. In addition, it presents the most important equations for calculating the main parameters of nonlinear frequency converters. This comprehensive reference work will be of great value to all scientists and engineers working in nonlinear optics,

quantum electronics and laser physics. *Fourier Series and Optical Transform Techniques in Contemporary Optics* Feb 15 2023 This book covers the applications of Fourier methods and linear systems theory to optical diffraction and imaging, and it will be of use to anyone seeking an understanding of Fourier series and Fourier transforms of one-and two-dimensional structures. *Atom Optics* Feb 03 2022 Quantum

mechanics does away with the distinction between particles and waves, and one of the more interesting implications of the wave/particle duality - the discovery that atoms may be manipulated in ways analogous to the manipulation of light with lenses and mirrors - has formed the basis for the relatively new field of atom optics. Pierre Meystre's *Atom Optics* is the first book entirely devoted to this exciting area of

research. Reference links to the leading journals in the field, links to research sites, graphics, and updates can be found online.

Optical Properties of Metal Clusters

Jun 14 2020 Optical Properties of Metal Clusters deals with the electronic structure of metal clusters determined optically. Clusters - as state intermediate between molecules and the extended solid - are important in many areas, e.g. in air pollution, interstellar matter, clay minerals, photography, heterogeneous catalysis, quantum dots, and virus crystals. This book extends the approaches of optical molecular

and solid-state methods to clusters, revealing how their optical properties evolve as a function of size. Cluster matter, i.e. extended systems of many clusters - the most frequently occurring form - is also treated. The combination of reviews of experimental techniques, lists of results and detailed descriptions of selected experiments will appeal to experts, newcomers and graduate students in this expanding field.

Optical Nonlinearities in Chalcogenide Glasses and Their Applications Jun 07 2022 This book reviews techniques used to characterize non-

linear optical constants of chalcogenide glasses in bulk or thin films, and presents the properties of many chalcogenide systems. A range of applications of these glasses are surveyed, including ultra-fast switching, optical limiting, second harmonic generation and electro-optic effects. Also addressed are suitability of chalcogenide films in all-optical integrated circuits, fabrication of rib as well as ridge waveguides and of fiber gratings. *Aberrations of Optical Systems* Oct 31 2021 Although the subject of optical design as a branch of applied physics is over one

hundred years old, the use of aberration theory has changed considerably. *Aberrations of Optical Systems* covers elementary optics and aberration theory of various optical systems, including the use of nonaxially symmetric systems and diffractive optical elements in complex designs, such as head-up displays and the increasing use of scanning systems with laser illumination. The book provides the complete range of mathematical tools, formulae, and derivations needed for understanding the process of optical design and for planning optical design programs.

While the treatment is mainly based on geometrical optics, some excursions into physical optics are made, particularly in connection with the problems of optical tolerances.

Optical Microresonators
Nov 12 2022
Optical Micro-Resonators are an exciting new field of research that has gained prominence in the past few years due to the emergence of new fabrication technologies. This book is the first detailed text on the theory, fabrication, and applications of optical micro-resonators, and will be found useful by both graduate students and researchers in the field.

THz Communications
Mar 24 2021 This book describes the fundamentals of THz communications, spanning the whole range of applications, propagation and channel models, RF transceiver technology, antennas, baseband techniques, and networking interfaces. The requested data rate in wireless communications will soon reach from 100 Gbit/s up to 1 Tbps necessitating systems with ultra-high bandwidths of several 10s of GHz which are available only above 200 GHz. In the last decade, research at these frequency bands has made

significant progress, enabling mature experimental demonstrations of so-called THz communications, which are thus expected to play a vital role in future wireless networks. In addition to chapters by leading experts on the theory, modeling, and implementation of THz communication technology, the book also features the latest experimental results and addresses standardization and regulatory aspects. This book will be of interest to both academic researchers and engineers in the telecommunications industry.

Optical Thin Films

and Coatings Aug 17 2020 *Optical Thin Films and Coatings: From Materials to Applications*, Second Edition, provides an overview of thin film materials and their properties, design and manufacture across a wide variety of application areas. Sections explore their design and manufacture and their unconventional features, including the scattering properties of random structures in thin films, optical properties at short wavelengths, thermal properties and color effects. Other chapters focus on novel materials, including organic optical coatings, surface

multiplasmonics, optical thin films containing quantum dots, and optical coatings, including laser components, solar cells, displays and lighting, and architectural and automotive glass. The book presents a technical resource for researchers and engineers working with optical thin films and coatings. It is also ideal for professionals in the security, automotive, space and other industries who need an understanding of the topic. Provides thorough review of applications of optical coatings including laser components, solar cells, glazing, displays and lighting One-stop reference that addresses

deposition techniques, properties, and applications of optical thin films and coatings Novel methods, suggestions for analysis, and applications makes this a valuable resource for experts in the field as well

Optical Properties of Solids Apr 05 2022 For final year undergraduates and graduate students in physics, this book offers an up-to-date treatment of the optical properties of solid state materials.

Mathematical Methods of Quantum Optics

Mar 16 2023 Starting from first principles, this reference treats the theoretical aspects of quantum optics.

It develops a unified approach for determining the dynamics of a two-level and three-level atom in combinations of quantized field under certain conditions.

Nano-Optics Feb 20 2021 A

presentation of the most advanced application of optical near-field microscopy to studies of fine metallic structures and related surface plasmons.

Optical Properties of Photonic Crystals

Jul 16 2020 Deals not only with the properties of the radiation modes inside the crystals but also with their peculiar optical response to external fields. A general theory of linear and nonlinear

optical response is presented in a clear and detailed fashion using the Green's function method. Important recent developments such as the enhancement of stimulated emission, second harmonic generation, quadrature-phase squeezing, and low-threshold lasing are likewise treated in detail and made understandable. Numerical methods are also emphasised. This book provides both introductory knowledge for graduate and undergraduate students and important ideas for researchers.

Optical Network Design and Planning Apr 12

2020 This book takes a pragmatic

approach to deploying state-of-the-art optical networking equipment in metro-core and backbone networks. The book is oriented towards practical implementation of optical network design. Algorithms and methodologies related to routing, regeneration, wavelength assignment, sub rate-traffic grooming and protection are presented, with an emphasis on optical-bypass-enabled (or all-optical) networks. The author has emphasized the economics of optical networking, with a full chapter of economic studies that offer guidelines as to

when and how optical-bypass technology should be deployed. This new edition contains: new chapter on dynamic optical networking and a new chapter on flexible/elastic optical networks. Expanded coverage of new physical-layer technology (e.g., coherent detection) and its impact on network design and enhanced coverage of ROADM architectures and properties, including colorless, directionless, contentionless and gridless. Covers 'hot' topics, such as Software Defined Networking and energy efficiency, algorithmic advancements and techniques, especially in the

area of impairment-aware routing and wavelength assignment. Provides more illustrative examples of concepts are provided, using three reference networks (the topology files for the networks are provided on a web site, for further studies by the reader). Also exercises have been added at the end of the chapters to enhance the book's utility as a course textbook.

Computer Design of Diffractive Optics Dec 01 2021
Diffractive optics involves the manipulation of light using diffractive optical elements (DOEs). DOEs are being widely applied in

such areas as telecommunications, electronics, laser technologies and biomedical engineering. Computer design of diffractive optics provides an authoritative guide to the principles and applications of computer-designed diffractive optics. The theoretical aspects underpinning diffractive optics are initially explored, including the main equations in diffraction theory and diffractive optical transformations. Application of electromagnetic field theory for calculating diffractive gratings and related methods in micro-optics are discussed, as is

analysis of transverse modes of laser radiation and the formation of self-replicating multimode laser beams. Key applications of DOEs reviewed include geometrical optics approximation, scalar approximation and optical manipulation of micro objects, with additional consideration of multi-order DOEs and synthesis of DOEs on polycrystalline diamond films. With its distinguished editor and respected team of expert contributors, Computer design of diffractive optics is a comprehensive reference tool for professionals and academics working

in the field of optical engineering and photonics. Explores the theoretical aspects underpinning diffractive optics Discusses key applications of diffractive optical elements A comprehensive reference for professionals and academics in optical engineering and photonics *Plasmonics* Mar 04 2022 This book deals with all aspects of plasmonics, basics, applications and advanced developments. Plasmonics is an emerging field of research dedicated to the resonant interaction of light with metals. The light/matter interaction is strongly enhanced

at a nanometer scale which sparks a keen interest of a wide scientific community and offers promising applications in pharmacology, solar energy, nanocircuitry or also light sources. The major breakthroughs of this field of research originate from the recent advances in nanotechnology, imaging and numerical modelling. The book is divided into three main parts: extended surface plasmons polaritons propagating on metallic surfaces, surface plasmons localized on metallic particles, imaging and nanofabrication techniques. The reader will find in

the book: Principles and recent advances of plasmonics, a complete description of the physics of surface plasmons, a historical survey with emphasize on the emblematic topic of Wood's anomaly, an overview of modern applications of molecular plasmonics and an extensive description of imaging and fabrications techniques.

Single-Mode

Fibers Sep 10 2022 Single-mode fibers are the most advanced means of transmitting information, since they provide extremely low attenuation and very high bandwidths. At

present, long distance communication by single-mode fibers is cheaper than by conventional copper cables, and in the future single-mode fibers will also be used in the subscriber loop. Since single-mode fibers have many applications, a variety of people need to understand this modern transmission medium. However, waveguiding in single-mode fibers is much more difficult to understand than waveguiding in copper lines. A single-mode fiber is a dielectric waveguide operated at optical wave lengths. Since 1961, I have been involved in experimental and

theoretical research on dielectric rod waveguides in the microwave region. From the experiments, I learned much about the properties of a wave guided by a dielectric rod or a glass fiber, especially about its behavior at waveguide discontinuities like bends, gaps, or the waveguide end. Since 1972, my co-workers and I have also been investigating dielectric waveguides at optical frequencies, and since 1973 I have lectured on "Optical Communications". These activities have shown that there is a need for a tutorial introduction to the new technical field

of single mode fibers. In this book the physical fundamentals are emphasized and the mathematics is limited to the absolutely necessary subjects. Besides presenting a physical explanation of waveguiding in single-mode fibers, it is also the aim of this book to give an overview of the knowledge accumulated in this field.

Advances in Atomic, Molecular, and Optical Physics

Jan 02 2022 This volume continues the tradition of the Advances series. It contains contributions from experts in the field of atomic, molecular, and optical (AMO)

physics. The articles contain some review material, but are intended to provide a comprehensive picture of recent important developments in AMO physics. Both theoretical and experimental articles are included in the volume. • International experts • Comprehensive articles • New developments
Optical Interconnects Aug 09 2022 *Optical Interconnects* provides a fascinating picture of the state of the art in optical interconnects and a perspective on what can be expected in the near future. It is composed of selected reviews

authored by world leaders in the field, and these reviews are written from either an academic or industrial viewpoint. An in-depth discussion of the path towards fully-integrated optical interconnects in microelectronics is presented. This book will be useful not only to physicists, chemists, materials scientists, and engineers but also to graduate students who are interested in the fields of microelectronics and optoelectronics. *Laser-Induced Damage of Optical Materials* Jul 28 2021 The laser power handling capacities of optical systems are

determined by the physical properties of their component materials. At low intensity levels these factors are not important, but an understanding of damage mechanisms is fundamental to good design of laser products operating at high power. *Laser Induced Damage of Optical Materials presents A Course in Lens Design* Dec 21 2020 *A Course in Lens Design* is an instruction in the design of image-forming optical systems. It teaches how a satisfactory design can be obtained in a straightforward way. Theory is limited to a minimum, and used to support the practical design

work. The book introduces geometrical optics, optical instruments and aberrations. It gives a description of the process of lens design and of the strategies used in this process. Half of its content is devoted to the design of sixteen types of lenses, described in detail from beginning to end. This book is different from most other books on lens design because it stresses the importance of the initial phases of the design process: (paraxial) lay-out and (thin-lens) pre-design. The argument for this change of accent is that in these phases much information can be obtained about the properties of the

lens to be designed. This information can be used in later phases of the design. This makes A Course in Lens Design a useful self-study book and a suitable basis for an introductory course in lens design. The mathematics mainly used is college algebra, in a few sections calculus is applied. The book could be used by students of engineering and technical physics and by engineers and scientists.

Kramers-Kronig Relations in Optical Materials Research

Nov 19 2020 The Kramers-Kronig relations constitute the mathematical formulation of the fundamental connection between the in-phase to the out-of-phase

response of a system to a sinusoidal time-varying external perturbation. Such connection exists in both classical and quantum physical systems and derives directly from the principle of causality. Apart from being of great importance in high energy physics, statistical physics, and acoustics, at present the Kramers-Kronig relations are basic and widely-accepted tools for the investigation of the linear optical properties of materials, since they allow performing the so-called inversion of optical data, i.e. acquiring knowledge on dispersive phenomena by

measurements of absorptive phenomena over the whole energy spectrum or vice versa. Since the late '80s, a growing body of theoretical results as well as of experimental evidences has shown that the Kramers-Kronig relations can be adopted for efficiently acquiring knowledge on nonlinear optical phenomena. These results suggest that the Kramers-Kronig relations may become in a near future standard techniques in the context of nonlinear spectroscopy. This book is the first comprehensive treatise devoted to providing a picture of the physical backgrounds, of the rigorous

mathematical theory, and of the applications of the Kramers-Kronig relations in both fields of linear and nonlinear optical spectroscopy. Some basic programs written for the MATLAB environment are also included. This book is organized as an argumentative discourse, progressing from the linear to the nonlinear phenomena, from the general to the specific systems, and from the theoretical to the experimental results.

Optics Jul 08 2022
Optics, Parts 1 and 2 covers electromagnetic optics and quantum optics. The first part of the book examines the

various of the important properties common to all electromagnetic radiation. This part also studies electromagnetic waves; electromagnetic optics of transparent isotropic and anisotropic media; diffraction; and two-wave and multi-wave interference. The polarization states of light, the velocity of light, and the special theory of relativity are also examined in this part. The second part is devoted to quantum optics, specifically discussing the classical molecular theory of optical phenomena and the quantization of radiant energy and of energy in atoms.

This part also looks into topics such as wave mechanics, atomic and molecular spectra, and spectrometry. This book will be beneficial to those interested in studying optics, including students of physics.

Optical Properties of Materials and Their Applications

Aug 29 2021

Provides a semi-quantitative approach to recent developments in the study of optical properties of condensed matter systems Featuring contributions by noted experts in the field of electronic and optoelectronic materials and photonics, this book looks at the optical properties of materials as well as their physical

processes and various classes. Taking a semi-quantitative approach to the subject, it presents a summary of the basic concepts, reviews recent developments in the study of optical properties of materials and offers many examples and applications. *Optical Properties of Materials and Their Applications*, 2nd Edition starts by identifying the processes that should be described in detail and follows with the relevant classes of materials. In addition to featuring four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescenc

e, perovskites, and ellipsometry, the book covers: optical properties of disordered condensed matter and glasses; concept of excitons; photoluminescence, photoinduced changes, and electroluminescenc e in noncrystalline semiconductors; and photoinduced bond breaking and volume change in chalcogenide glasses. Also included are chapters on: nonlinear optical properties of photonic glasses; kinetics of the persistent photoconductivity in crystalline III-V semiconductors; and transparent white OLEDs. In addition, readers will learn about excitonic processes

in quantum wells; optoelectronic properties and applications of quantum dots; and more. Covers all of the fundamentals and applications of optical properties of materials Includes theory, experimental techniques, and current and developing applications Includes four new chapters on optoelectronic properties of organic semiconductors, recent advances in electroluminescenc e, perovskites, and ellipsometry Appropriate for materials scientists, chemists, physicists and electrical engineers involved in development of electronic materials Written by

internationally respected professionals working in physics and electrical engineering departments and government laboratories. *Optical Properties of Materials and Their Applications*, 2nd Edition is an ideal book for senior undergraduate and postgraduate students, and teaching and research professionals in the fields of physics, chemistry, chemical engineering, materials science, and materials engineering.

Wiley-OSA Series on Optical Communication

Jun 26 2021

[Solid-State Laser Engineering](#)

May 14 2020

Written from an industrial

perspective, *Solid-State Laser Engineering* discusses in detail the characteristics, design, construction, and performance of solid-state lasers. Emphasis is placed on engineering and practical considerations; phenomenological aspects using models are preferred to abstract mathematical derivations. Since its first edition almost 30 years ago this book has become the standard in the field of solid-state lasers for scientists, engineers and graduate students. This new edition has been extensively revised and updated to account for recent

developments in the areas of diode-laser pumping, laser materials and nonlinear crystals. Completely new sections have been added dealing with frequency control, the theory of mode-locking, femto second lasers, high efficiency harmonic generation, passive and acousto-optic Q-switching, semiconductor saturable absorber mirrors (SESAM) and periodically poled nonlinear crystals.

Optics and Lasers

Oct 19 2020 In this newest edition of *Optics and Lasers*, I have added a substantial number of problems and moved most of the older ones to the end of the book. There are now about one hundred

problems, which, I hope, will make the book more useful in the classroom. As before, some of the problems derive an especially important or useful result; these I have left integrated within the body of the book. In such cases, I state the result and, often, give it an equation number and a citation in the index. Teachers who adopt the book may obtain solutions to the problems by asking me for them on letterhead stationery. In addition, I have rewritten over a dozen paragraphs to improve their clarity or precision and, further, corrected minor errors of punctuation and

taken care of other such small details. The field of optics has been changing greatly for almost two dozen years. Partly because of the applied or engineering nature of much of modern optics, there has been a need for a practical text that surveys the entire field. Such a book should not be a classical-optics text, but, rather, it should be strong on principles, applications and instrumentation, on lasers, holography and coherent light, and on optical-fiber waveguides. On the other hand, it should concern itself relatively little with such admittedly interesting phenomena as the formation of the

rainbow or the precise determination of the speed of light.
Detection of Optical and Infrared Radiation Dec 13 2022 This text treats the fundamentals of optical and infrared detection in terms of the behavior of the radiation field, the physical properties of the detector, and the statistical behavior of the detector output. Both incoherent and coherent detection are treated in a unified manner, after which selected applications are analyzed, following an analysis of atmospheric effects and signal statistics. The material was developed during a

one-semester course at M.I.T. in 1975, revised and presented again in 1976 at Lincoln Laboratory, and rewritten for publication in 1977. Chapter 1 reviews the derivation of Planck's thermal radiation law and also presents several fundamental concepts used throughout the text. These include the three thermal distribution laws (Boltzmann, Fermi-Dirac, Bose Einstein), spontaneous and stimulated emission, and the definition and counting of electromagnetic modes of space. Chapter 2 defines and analyzes the perfect photon detector and

calculates the ultimate sensitivity in the presence of thermal radiation. In Chapter 3, we turn from incoherent or power detection to coherent or heterodyne detection and use the concept of orthogonal spatial modes to explain the antenna theorem and the mixing theorem. Chapters 4 through 6 then present a detailed analysis of the sensitivity of vacuum and semiconductor detectors, including the effects of amplifier noise. [Advanced Optical Imaging Theory](#) Apr 17 2023 Optical microscopy and associated technologies have advanced rapidly along with laser

technology. These techniques have stimulated further development of the optical imaging theory, including 3-dimensional microscopy imaging theory, the theory of imaging with ultrashort pulsed beam illumination and the aberration theory for high numerical-aperture objectives. This book introduces these new theories in modern optical microscopy, providing comparisons with classical imaging as appropriate. **High-Order Modulation for Optical Fiber Transmission** Aug 21 2023 Catering to the current interest in increasing the spectral efficiency of optical fiber networks by the

deployment of high-order modulation formats, this monograph describes transmitters, receivers and performance of optical systems with high-order phase and quadrature amplitude modulation. In the first part of the book, the author discusses various transmitter implementation options as well as several receiver concepts based on direct and coherent detection, including designs of new structures. Hereby, both optical and electrical parts are considered, allowing the assessment of practicability and complexity. In the second part, a

detailed characterization of optical fiber transmission systems is presented, regarding a wide range of modulation formats. It provides insight in the fundamental behavior of different formats with respect to relevant performance degradation effects and identifies the major trends in system performance.

Optical Interference Coatings Oct 11 2022 Designed to give a concise but complete overview of the field, this book features contributions written by leading experts in the various areas. Topics include

design, materials, film growth, deposition including large area, characterization and monitoring, and mechanical stress. [The Physics of Thin Film Optical Spectra](#) Jan 14 2023 The present monograph represents itself as a tutorial to the field of optical properties of thin solid films. It is neither a handbook for the thin film practitioner, nor an introduction to interference coatings design, nor a review on the latest developments in the field. Instead, it is a textbook which shall bridge the gap between ground level knowledge on optics, electro-dynamics,

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Who can bene?t
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Polarization Optics

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In the chapters that
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leformalismthrough out,Ihopeto create a “base level” upon which future research and development can grow. Polarization optics in telecommunications is an ever-evolving field. Each year significant advancements are made, prompted by important discoveries. The references upon which this book is based are only a snapshot in time. Areas that remain unresolved at the time of publication may very well be clarified in the years to come. Moreover, the focus of the field changes in time: for instance, there have been few passive nonreciprocal component advancements reported in the last

few years, but PMD and PDL advancement continues with only modest abatement.

The Optical Constants of Bulk Materials and

Films, May 18

2023 Since

publication of the first edition of this book in 1988, interest in the optical properties of materials has continued to grow and there have been a number of important developments in the field. The aim of this second edition is to present an up-to-date and broad picture of the field of optical constants covering the theoretical background, experimental techniques and results for a wide range of materials

(bulk and thin film) over a wide spectral range from soft x-rays to microwaves. For the second edition Dr Ward has updated the book throughout. In particular, sections have been added on the optical properties of the sulphides, selenides and tellurides of cadmium, zinc and lead. Two other new sections deal with low dimensional structures, an important and relatively recent development area, and the sensitivities of different methods for measuring n , k and d . A new Appendix giving tabulated values of optical constants for a large number of elements, insulators and

semiconductors at two common laser wavelengths completes the second edition. The author Leslie Ward has worked in the field of optical materials for about thirty years. He is the author of some 40 research publications and co-author of a book on the theory and practice of high-vacuum technology. From 1967 to 1982 he was Head of the Department of Applied Physics, and is currently an Honorary Research Fellow, at Coventry University.

Optical Materials

May 06 2022

Optical Fiber

Fusion Splicing Jun

19 2023 This book is an up-to-date treatment of optical fiber fusion splicing incorporating all

the recent innovations in the field. It provides a toolbox of general strategies and specific techniques that the reader can apply when optimizing fusion splices between novel fibers. It specifically addresses considerations important for fusion splicing of contemporary specialty fibers including dispersion compensating fiber, erbium-doped gain fiber, polarization maintaining fiber, and microstructured fiber. Finally, it discusses the future of optical fiber fusion splicing including silica and non-silica based optical fibers as well as the trend

toward increasing automation. Whilst serving as a self-contained reference work, abundant citations from the technical literature will enable readers to readily locate primary sources. Fundamentals of Fiber Lasers and Fiber Amplifiers May 26 2021 This book covers the fundamental aspects of fiber lasers and fiber amplifiers, and includes a wide range of material from laser physics fundamentals to state-of-the-art topics in this rapidly growing field of quantum electronics. This expanded and updated new edition includes substantial new material on nonlinear frequency

conversion and Raman fiber lasers and amplifiers, as well as an expanded list of references inclusive of the recent literature in the field. Emphasis is placed on the nonlinear processes taking place in fiber lasers and amplifiers, their similarities, differences to, and their advantages over other solid-state lasers. The reader will learn the basic principles of solid-state physics and optical spectroscopy of laser active centers in fibers, the main operational laser regimes, and will receive practical recommendations and suggestions on fiber laser research, laser applications, and laser product development. The

book will be useful for students, researchers, and professional physicists and engineers who work with lasers in the optical and telecommunications field, as well as those in the chemical and biological industries.

Nonimaging

Fresnel Lenses Jan 22 2021 A detailed and comprehensive account of the engineering of the world's first nonimaging Fresnel lens solar concentrator. The book closes a gap in solar concentrator design, and describes nonimaging refractive optics and its numerical mathematics. The book shows the reader how to find

his or her own optical solution using the rules and methodologies covering the design and the assessment of the nonimaging lens.

Progress in Optics

Sep 17 2020 A

volume in the Progress in Optics series, the papers in this book cover a range of topics,

including: anamorphic beam shaping for laser and diffuse light; ultra-fast all-optical switching in optical networks; generation of dark hollow beams and their application; and two-photon lasers.

Cavity-Enhanced Spectroscopy and Sensing

Apr 24

2021 The book reviews the dramatic recent advances in the use

of optical resonators for high sensitivity and high resolution molecular spectroscopy as well as for chemical, mechanical and physical sensing. It encompasses a variety of cavities including those made of two or more mirrors, optical fiber loops, fiber gratings and spherical cavities. The book focuses on novel techniques

and their applications. Each chapter is written by an expert and/or pioneer in the field. These experts also provide the theoretical background in optics and molecular physics where needed. Examples of recent breakthroughs include the use of frequency combs (Nobel prize 2005) for cavity enhanced sensing and spectroscopy, the use of novel cavity

materials and geometries, the development of optical heterodyne detection techniques combined to active frequency-locking schemes. These methods allow the use and interrogation of optical resonators with a variety of coherent light sources for trace gas detection and sensing of strain, temperature and pressure.