Topic 2 Scalar Diffraction University Of Edinburgh | 85b9c83edcd494a6524c84dd1cad1aff

University PhysicsCoherent X-Ray OpticsImaging OpticsPhotonic CrystalsWave Dynamics, Mechanics and Physics of Microstructured MetamaterialsLocalized WavesCollege PhysicsIntroduction to ElectrodynamicsIntroduction to Modern OpticsOptical InterferometryOptical EngineeringModern Optics SimplifiedEnergy Research AbstractsLight Propagation in Linear Optical MediaQuantities, Units and Symbols in Physical ChemistryThe University of Virginia RecordUniversity PhysicsUnderstanding Surface Scatter PhenomenaElectromagnetic Theory of GratingsThe Fourier Transform and Its ApplicationsProceedings of the Cambridge Philosophical SocietySoliton-driven PhotonicsOpticsElectromagnetic Fields and WavesPrinciples of OpticsOpticsLarge Time-bandwidth Product Surface Acoustic Wave Delay LinesUniversity PhysicsPrinciples and Applications of Fourier OpticsPhysics for the IB Diploma Full ColourSelected Papers on Scalar Wave DiffractionAn Introduction to X-Ray Physics, Optics, and ApplicationsThe Principles of Quantum MechanicsDigital HolographyScattering, Two-Volume SetWaves in Focal RegionsOptical PhysicsHolographic Materials and Optical SystemsCornell University Courses of StudyPhysics of Light and Optics (Black & White)

University Physics Holographic Materials and Optical Systems covers recent research achievements in the areas of volume holographic optical elements and systems, development of functionalized holographic recording materials, and applications in holographic imaging and metrology. Designs of single and multiplexed volume holographic optical elements for laser beam shaping, combining, and redirection are covered, and their properties are studied theoretically and experimentally. The high impact of holography in imaging and metrology is demonstrated by applications spreading from thickness and surface measurements, through antenna metrology and analyzing high-density gradients in fluid mechanics to characterization of live objects in clinical diagnostics. Novel functionalized materials used in dynamic or permanent holographic recording cover photopolymers, photochromics, photo-thermo-refractive glasses, and hybrid organic-inorganic media.

Coherent X-Ray Optics "University Physics is a three-volume collection that meets the scope and sequence requirements for two- and three-semester calculus-based physics courses. Volume 1 covers mechanics, sound, oscillations, and waves. This textbook emphasizes connections between theory and application, making physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. Frequent, strong examples focus on how to approach a problem, how to work with the equations, and how to check and generalize the result."--Open Textbook Library.

Imaging Optics Optics has been part of scientific enquiry from its beginning and remains a key element of modern science. This book provides a concise treatment of physical optics starting with a brief summary of geometrical optics. Scalar diffraction theory is introduced to describe wave propagation and diffraction effects and provides the basis for Fourier methods for treating more complex diffraction problems. The rest of the book treats the physics underlying some important instruments for spectral analysis and optical metrology, reflection and transmission at dielectric surfaces and the polarization of light. This undergraduate-level text aims to aid understanding of optical applications in physical, engineering and life sciences or more advanced topics in modern optics.

Photonic Crystals "Understanding Surface Scatter Phenomena: A Linear Systems Formulation deals with surface scatter phenomena that continue to be an important issue in diverse areas of science and engineering in the 21st century. Scattering effects from microtopographic surface roughness are merely non paraxial diffraction phenomena. After reviewing the historical background of surface scatter theory, this book describes how integrating sound radiometric principles with scalar diffraction theory results in the development of a linear systems formulation of non paraxial scalar diffraction theory which then becomes the basis of the Generalized Harvey Shack (GHS) surface scatter theory characterized by a two parameter family of surface transfer functions. This GHS surface scatter theory produces accurate results for rougher surfaces than the classical Rayleigh Rice theory and (due to a more general obliquity factor) for larger incident and scattered angles than either the Beckmann-Kirchhoff or Rayleigh-Rice theories. The transfer function characterization of scattering surfaces can be readily incorporated into the traditional linear systems formulation of image formation, thus allowing a systems engineering analysis of image quality as degraded by diffraction effects, geometrical aberrations, surface scatter effects, and a variety of other miscellaneous error sources. This allows us to derive the optical fabrication tolerances necessary to satisfy a specific image quality requirement, which further enables the integration of optical fabrication and metrology into the optical design process."--

Wave Dynamics, Mechanics and Physics of Microstructured Metamaterials

Localized Waves In this book, Carolyn A. MacDonald provides a comprehensive introduction to the physics of a wide range of x-ray applications, optics, and analysis tools. Theory is applied to practical considerations of optics and applications ranging from astronomy to medical imaging and materials analysis. Emphasizing common physical concepts that underpin diverse phenomena and applications of x-ray physics, the book opens with a look at nuclear medicine, motivating further investigations into scattering, detection, and noise statistics. The second section explores topics in x-ray generation, including

characteristic emission, x-ray fluorescence analysis, bremsstrahlung emission, and synchrotron and laser sources. The third section details the main forms of interaction, including the physics of photoelectric absorption, coherent and Compton scattering, diffraction, and refractive, reflective, and diffractive optics. Applications in this section include x-ray spectroscopy, crystallography, and dose and contrast in radiography. A bibliography is included at the end of every chapter, and solutions to chapter problems are provided in the appendix. Based on a course for advanced undergraduates and graduate students in physics and related sciences and also intended for researchers, An Introduction to X-Ray Physics, Optics, and Applications offers a thorough survey of the physics of x-ray generation and of interaction with materials. Common aspects of diverse phenomena emphasized Theoretical development tied to practical applications Suitable for advanced undergraduate and graduate students in physics or related sciences, as well as researchers Examples and problems include applications drawn from medicine, astronomy, and materials analysis Detailed solutions are provided for all examples and problems

College Physics This textbook reduces the complexity of the coverage of optics to allow a student with only elementary calculus to learn the principles of optics and the modern Fourier theory of diffraction and imaging. Students majoring in sciences or engineering and taking a standard physics course on optics will find this text useful. Examples of a variety of applications dependent on optics allow the student to connect this course to their particular field of interest. Topics covered include aberrations with experimental examples, correction of chromatic aberration, explanation of coherence and the use of interference theory to design an antireflection coating. Fourier transform optics and its application to diffraction and imaging, use of Gaussian wave theory, and fiber optics make the text of interest to those in electrical and bioengineering as well as physics and medical science. The text includes hundreds of photos, figures and diagrams to provide readers with strong visual insights into optics. More difficult, optional topics are highlighted throughout, and the need for experience with differential equations and extensive use of vector theory are avoided by using a one dimensional theory where possible. Maxwell's equations are introduced only to determine the properties of a light wave, and the boundary conditions are introduced to characterize reflection and refraction. Most discussion is limited to reflection. The book also introduces Fourier transforms as they are needed in the discussion of diffraction and imaging.

Introduction to Electrodynamics The first book on Localized Waves—a subject of phenomenal worldwide research with important applications from secure communications to medicine Localized waves—also known as non-diffractive waves—are beams and pulses capable of resisting diffraction and dispersion over long distances even in non-guiding media. Predicted to exist in the early 1970s and obtained theoretically and experimentally as solutions to the wave equations starting in 1992, localized waves now garner intense worldwide research with applications in all fields where a role is played by a wave equation, from electromagnetism to acoustics and quantum physics. In the electromagnetics areas, they are paving the way, for instance, to ubiquitous secure communications in the range of millimeter waves, terahertz frequencies, and optics. At last, the localized waves with an envelope at rest are expected to have important applications especially in medicine. Localized Waves brings together the world's most productive researchers in the field to offer a well-balanced presentation of theory and experiments in this new and exciting subject. Composed of thirteen chapters, this dynamic volume: Presents a thorough review of the theoretical foundation and historical aspects of localized waves Explores the interconnections of the subject with other technologies and scientific areas Analyzes the effect of arbitrary anisotropies on both continuous-wave and pulsed non-diffracting fields Describes the physical nature and experimental implementation of localized waves Provides a general overview of wave localization, for example in photonic crystals, which have received increasing attention in recent years Localized Waves is the first book to cover this emerging topic, making it an indispensable resource in particular for researchers in electromagnetics, acoustics, fundamental physics, and free-space communications, while also serving as a requisite text for graduate students.

Introduction to Modern Optics Optical methods of measurements are the most sensitive techniques of noncontact investigations, and at the same time, they are fast as well as accurate which increases reproducibility of observed results. In recent years, the importance of optical interferometry methods for research has dramatically increased, and applications range from precise surface testing to finding extrasolar planets. This book covers various aspects of optical interferometry including descriptions of novel apparatuses and methods, application interferometry for studying biological objects, surface qualities, materials characterization, and optical testing. The book includes a series of chapters in which experts share recent progress in interferometry through original research and literature reviews.

Optical Interferometry The first IUPAC Manual of Symbols and Terminology for Physicochemical Quantities and Units (the Green Book) of which this is the direct successor, was published in 1969, with the object of 'securing clarity and precision, and wider agreement in the use of symbols, by chemists in different countries, among physicists, chemists and engineers, and by editors of scientific journals'. Subsequent revisions have taken account of many developments in the field, culminating in the major extension and revision represented by the 1988 edition under the simplified title Quantities, Units and Symbols in Physical Chemistry. This 2007, Third Edition, is a further revision of the material which reflects the experience of the contributors with the previous editions. The book has been systematically brought up to date and new sections have been added. It strives to improve the exchange of scientific information among the readers in different disciplines and across different nations. In a rapidly expanding volume of scientific literature where each discipline has a tendency to retreat into its own jargon this book attempts to provide a readable compilation of widely used terms and symbols from many

sources together with brief understandable definitions. This is the definitive guide for scientists and organizations working across a multitude of disciplines requiring internationally approved nomenclature.

Optical Engineering Optics clearly explains the principles of optics using excellent pedagogy to support student learning. Beginning with introductory ideas and equations, K.K. Sharma takes the reader through the world of optics by detailing problems encountered, advanced subjects, and actual applications. Elegantly written, this book rigorously examines optics with over 300 illustrations and several problems in each chapter. The book begins with light propagation in anisotropic media considered much later in most books. Nearly one third of the book deals with applications of optics. This simple idea of merging the sometimes overwhelming and dry subject of optics with real world applications will create better future engineers. It will make 'optics' jump off the page for readers and they will see it take shape in the world around them. In presenting optics practically, as well as theoretically, readers will come away not only with a complete knowledge base but a context in which to place it. This book is recommended for optical engineers, libraries, senior undergraduate students, graduate students, and professors. Strong emphasis on applications to demonstrate the relevance of the theory Includes chapter on problem solving of ray deviations, focusing errors, and distortion Problems are included at the end of each chapter for thorough understanding of this dense subject matter

Modern Optics Simplified This book addresses theoretical and experimental methods for exploring microstructured metamaterials, with a special focus on wave dynamics, mechanics, and related physical properties. The authors use various mathematical and physical approaches to examine the mechanical properties inherent to particular types of metamaterials. These include: • Boundary value problems in reduced strain gradient elasticity for composite fiber-reinforced metamaterials • Self-organization of molecules in ferroelectric thin films • Combined models for surface layers of nanostructures • Computer simulation at the micro- and nanoscale • Surface effects with anisotropic properties and imperfect temperature contacts • Inhomogeneous anisotropic metamaterials with uncoupled and coupled surfaces or interfaces • Special interface finite elements and other numerical and analytical methods for composite structures

Energy Research Abstracts Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light, Sixth Edition covers optical phenomenon that can be treated with Maxwell's phenomenological theory. The book is comprised of 14 chapters that discuss various topics about optics, such as geometrical theories, image forming instruments, and optics of metals and crystals. The text covers the elements of the theories of interference, interferometers, and diffraction. The book tackles several behaviors of light, including its diffraction when exposed to ultrasonic waves. The selection will be most useful to researchers whose work involves understanding the behavior of light.

Light Propagation in Linear Optical Media When I was a student, in the early fifties, the properties of gratings were generally explained according to the scalar theory of optics. The grating formula (which pre dicts the diffraction angles for a given angle of incidence) was established, exper imentally verified, and intensively used as a source for textbook problems. Indeed those grating properties, we can call optical properties, were taught'in a satisfac tory manner and the students were able to clearly understand the diffraction and dispersion of light by gratings. On the other hand, little was said about the "energy properties", i. e. , about the prediction of efficiencies. Of course, the existence of the blaze effect was pointed out, but very frequently nothing else was taught about the efficiency curves. At most a good student had to know that, for an eche lette grating, the efficiency in a given order can approach unity insofar as the diffracted wave vector can be deduced from the incident one by a specular reflexion on the large facet. Actually this rule of thumb was generally sufficient to make good use of the optical gratings available about thirty years ago. Thanks to the spectacular improvements in grating manufacture after the end of the second world war, it became possible to obtain very good gratings with more and more lines per mm. Nowadays, in gratings used in the visible region, a spacing small er than half a micron is common.

Quantities, Units and Symbols in Physical Chemistry

The University of Virginia Record Light Propagation in Linear Optical Media describes light propagation in linear media by expanding on diffraction theories beyond what is available in classic optics books. In one volume, this book combines the treatment of light propagation through various media, interfaces, and apertures using scalar and vector diffraction theories. After covering the fundamentals of light and physical optics, the authors discuss light traveling within an anisotropic crystal and present mathematical models for light propagation across planar boundaries between different media. They describe the propagation of Gaussian beams and discuss various diffraction models for the propagation of light. They also explore methods for spatially confining (trapping) cold atoms within localized light-intensity patterns. This book can be used as a technical reference by professional scientists and engineers interested in light propagation and as a supplemental text for upper-level undergraduate or graduate courses in optics.

University Physics

Understanding Surface Scatter Phenomena "The standard work in the fundamental principles of quantum mechanics, indispensable both to the advanced student

and to the mature research worker, who will always find it a fresh source of knowledge and stimulation." --Nature "This is the classic text on quantum mechanics. No graduate student of quantum theory should leave it unread"--W.C Schieve, University of Texas

Electromagnetic Theory of Gratings This fourth edition of a well-established textbook takes students from fundamental ideas to the most modern developments in optics. Illustrated with 400 figures, it contains numerous practical examples, many from student laboratory experiments and lecture demonstrations. Aimed at undergraduate and advanced courses on modern optics, it is ideal for scientists and engineers. The book covers the principles of geometrical and physical optics, leading into quantum optics, using mainly Fourier transforms and linear algebra. Chapters are supplemented with advanced topics and up-to-date applications, exposing readers to key research themes, including negative refractive index, surface plasmon resonance, phase retrieval in crystal diffraction and the Hubble telescope, photonic crystals, super-resolved imaging in biology, electromagnetically induced transparency, slow light and superluminal propagation, entangled photons and solar energy collectors. Solutions to the problems, simulation programs, key figures and further discussions of several topics are available at www.cambridge.org/lipson.

The Fourier Transform and Its Applications This book presents a substantial description of the principles and applications of digital holography. The first part of the book deals with mathematical basics and the linear filtering theory necessary to approach the topic. The next part describes the fundamentals of diffraction theory and exhaustively details the numerical computation of diffracted fields using FFT algorithms. A thorough presentation of the principles of holography and digital holography, including digital color holography, is proposed in the third part. A special section is devoted to the algorithms and methods for the numerical reconstruction of holograms. There is also a chapter devoted to digital holographic interferometry with applications in holographic microscopy, quantitative phase contrast imaging, multidimensional deformation investigations, surface shape measurements, fluid mechanics, refractive index investigations, synthetic aperture imaging and information encrypting. Keys so as to understand the differences between digital holography and speckle interferometry and examples of software for hologram reconstructions are also treated in brief. Contents 1. Mathematical Prerequisites. 2. The Scalar Theory of Diffraction. 3. Calculating Diffraction by Fast Fourier Transform. 4. Fundamentals of Holography. 5. Digital Off-Axis Fresnel Holography. 6. Reconstructing Wavefronts Propagated through an Optical System. 7. Digital Holographic Interferometry and Its Applications. Appendix. Examples of Digital Hologram Reconstruction Programs

Proceedings of the Cambridge Philosophical Society This comprehensive introduction to classical electromagnetic theory covers the major aspects, including scalar fields, vectors, laws of Ohm, Joule, Coulomb, Faraday, Maxwell's equation, and more. With numerous diagrams and illustrations.

Soliton-driven Photonics X-ray optics is undergoing a renaissance, which may be paralleled to that experienced by visible-light optics following the invention of the laser. The associated surge of activity in "coherent" x-ray optics has been documented in this monograph, the first of its type in the field.

Optics 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.

Electromagnetic Fields and Waves

Principles of Optics This well-known undergraduate electrodynamics textbook is now available in a more affordable printing from Cambridge University Press. The Fourth Edition provides a rigorous, yet clear and accessible treatment of the fundamentals of electromagnetic theory and offers a sound platform for explorations of related applications (AC circuits, antennas, transmission lines, plasmas, optics and more). Written keeping in mind the conceptual hurdles typically faced by undergraduate students, this textbook illustrates the theoretical steps with well-chosen examples and careful illustrations. It balances text and equations, allowing the physics to shine through without compromising the rigour of the math, and includes numerous problems, varying from straightforward to elaborate, so that students can be assigned some problems to build their confidence and others to stretch their minds.

Optics University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize

concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project. VOLUME III Unit 1: Optics Chapter 1: The Nature of Light Chapter 2: Geometric Optics and Image Formation Chapter 3: Interference Chapter 4: Diffraction Unit 2: Modern Physics Chapter 5: Relativity Chapter 6: Photons and Matter Waves Chapter 7: Quantum Mechanics Chapter 8: Atomic Structure Chapter 9: Condensed Matter Physics Chapter 10: Nuclear Physics Chapter 11: Particle Physics and Cosmology

Large Time-bandwidth Product Surface Acoustic Wave Delay Lines Fourier optics, being a staple of optical design and analysis for over 50 years, has produced many new applications in recent years. In this text, Bob Tyson presents the fundamentals of Fourier optics with sufficient detail to educate the reader, typically an advanced student or working scientist or engineer, to the level of applying the knowledge to a specific set of design or analysis problems. Well aware that many of the mathematical techniques used in the field can now be solved digitally, the book will point to those methods or applicable computer software available to the reader.

University Physics Since it was first published in 1995, Photonic Crystals has remained the definitive text for both undergraduates and researchers on photonic band-gap materials and their use in controlling the propagation of light. This newly expanded and revised edition covers the latest developments in the field, providing the most up-to-date, concise, and comprehensive book available on these novel materials and their applications. Starting from Maxwell's equations and Fourier analysis, the authors develop the theoretical tools of photonics using principles of linear algebra and symmetry, emphasizing analogies with traditional solid-state physics and quantum theory. They then investigate the unique phenomena that take place within photonic crystals at defect sites and surfaces, from one to three dimensions. This new edition includes entirely new chapters describing important hybrid structures that use band gaps or periodicity only in some directions: periodic waveguides, photonic-crystal slabs, and photonic-crystal fibers. The authors demonstrate how the capabilities of photonic crystals to localize light can be put to work in devices such as filters and splitters. A new appendix provides an overview of computational methods for electromagnetism. Existing chapters have been considerably updated and expanded to include many new three-dimensional photonic crystals, an extensive tutorial on device design using temporal coupled-mode theory, discussions of diffraction and refraction at crystal interfaces, and more. Richly illustrated and accessibly written, Photonic Crystals is an indispensable resource for students and researchers. Extensively revised and expanded Features improved graphics throughout Includes new chapters on photonic-crystal fibers and combined index-and band-gap-guiding Provides an introduction to coupled-mode theory as a powerful tool for device design Covers many new topics, including omnidirectional reflection, anomalous refraction and diffraction, computational photonics, and much more.

Principles and Applications of Fourier Optics

Physics for the IB Diploma Full Colour This comprehensive and self-contained text for researchers and professionals presents a detailed account of optical imaging from the viewpoint of both ray and wave optics.

Selected Papers on Scalar Wave Diffraction

An Introduction to X-Ray Physics, Optics, and Applications

The Principles of Quantum Mechanics Using numerous mathematical and numerical techniques of diffraction theory, Waves in Focal Regions: Propagation, Diffraction and Focusing of Light, Sound and Water Waves provides a full and richly illustrated description of waves in focal regions. Unlike most books, the author treats electromagnetic, acoustic, and water waves in one comprehensive volume. After an introductory section, the book describes approximate diffraction theories and efficient numerical methods to study the focusing of various kinds of waves. It then covers the physical interpretation of the theories, their accuracy, and the computational savings obtained, emphasizing uniform asymptotic results that remain valid in the vicinity of shadow boundaries and caustics. The next part deals with the focusing of scalar waves, including thorough theoretical analyses and detailed contour maps of diffraction patterns in focal regions for a variety of different system parameters, such as f-number, Frensel number, aperture shape, amplitude distribution, and wavefront aberration. The author proceeds to explore the diffraction and focusing of electromagnetic waves. First solutions are derived for fields radiated by sources, reflected and refracted at plane interfaces, or diffracted by apertures in plane screens, and then these solutions are applied to study the focusing in homogeneous media and through a plane dielectric interface. In both cases, the author includes many computed results of the electromagnetic field distribution near focus. Presenting both theoretical and experimental results, the following part examines the focusing of sound and water waves by means of zone-plate lenses. The book concludes with a detailed study of the diffraction and focusing of water waves and a comparison of the results of both linear and nonlinear theories with those of experiments.

Digital Holography University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the

scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project. VOLUME I Unit 1: Mechanics Chapter 1: Units and Measurement Chapter 2: Vectors Chapter 3: Motion Along a Straight Line Chapter 4: Motion in Two and Three Dimensions Chapter 5: Newton's Laws of Motion Chapter 6: Applications Of Newton's Laws Chapter 7: Work and Kinetic Energy Chapter 8: Potential Energy and Conservation of Energy Chapter 9: Linear Momentum and Collisions Chapter 10: Fixed-Axis Rotation Chapter 11: Angular Momentum Chapter 12: Static Equilibrium and Elasticity Chapter 13: Gravitation Chapter 14: Fluid Mechanics Unit 2: Waves and Acoustics Chapter 15: Oscillations Chapter 16: Waves Chapter 17: Sound

Scattering, Two-Volume Set This text blends traditional introductory physics topics with an emphasis on human applications and an expanded coverage of modern physics topics, such as the existence of atoms and the conversion of mass into energy. Topical coverage is combined with the author's lively, conversational writing style, innovative features, the direct and clear manner of presentation, and the emphasis on problem solving and practical applications.

Waves in Focal Regions Publishes papers reporting on research and development in optical science and engineering and the practical applications of known optical science, engineering, and technology.

Optical Physics

Holographic Materials and Optical Systems It is ironic that the ideas ofNewton, which described a beam of light as a stream ofparticles made it difficult for him to explain things like thin film interference. Yet these particles, called 'photons', have caused the adjective 'photonic' to gain common usage, when referring to optical phenomena. The purist might argue that only when we are confronted by the particle nature of light should we use the word photonics. Equally, the argument goes on, only when we are face-to face with an integrable system, i. e. one that possesses an infinite number of conserved quantities, should we say soliton rather than solitary wave. Scientists and engineers are pragmatic, however, and they are happy to use the word 'soliton' to describe what appears to be an excitation that is humped, multi humped, or localised long enough for some use to be made of it. The fact that such 'solitons' may stick to each other (fuse) upon collision is often something to celebrate for an application, rather than just evidence that, after all, these are not really solitons, in the classic sense. 'Soliton', therefore, is a widely used term with the qualification that we are constantly looking out for deviant behaviour that draws our attention to its solitary wave character. In the same spirit, 'photonics' is a useful generic cover-all noun, even when 'electromagnetic theory' or 'optics' would suffice.

Cornell University Courses of Study Part 1: SCATTERING OF WAVES BY MACROSCOPIC TARGET -- Interdisciplinary aspects of wave scattering -- Acoustic scattering -- Acoustic scattering: approximate methods -- Electromagnetic wave scattering: theory -- Electromagnetic wave scattering: approximate and numerical methods -- Electromagnetic wave scattering: applications -- Elastodynamic wave scattering: theory -- Elastodynamic wave scattering: Applications -- Scattering in Oceans -- Part 2: SCATTERING IN MICROSCOPIC PHYSICS AND CHEMICAL PHYSICS -- Introduction to direct potential scattering -- Introduction to Inverse Potential Scattering -- Visible and Near-visible Light Scattering -- Practical Aspects of Visible and Near-visible Light Scattering -- Nonlinear Light Scattering -- Atomic and Molecular Scattering: Introduction to Scattering in Chemical -- X-ray Scattering -- Neutron Scattering -- Electron Diffraction and Scattering -- Part 3: SCATTERING IN NUCLEAR PHYSICS -- Nuclear Physics -- Part 4: PARTICLE SCATTERING -- State of

Physics of Light and Optics (Black & White) A best-seller now available in full colour, covering the entire IB syllabus.