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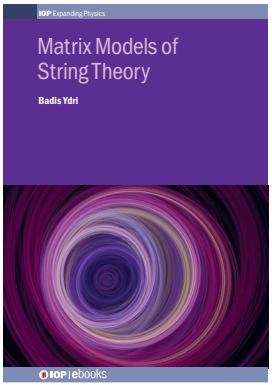

Extent 424pp

Collection
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Astronomy and astrophysics

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Matrix Models of String Theory

Badis Ydri
Annaba University, Algeria

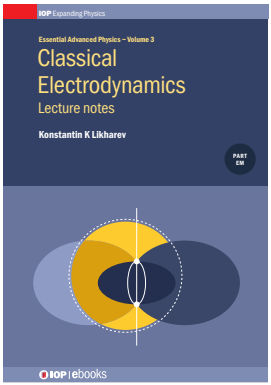
iopscience.org/book/978-0-7503-1726-9

About the book

Beginning with a systematic review of the standard exposition of string theory, which is required for a proper understanding of matrix models of string theory, this book proceeds to provide a comprehensive presentation of matrix models of string theory and their areas of applications. Supplemented with exercises and an appendix on Monte Carlo algorithms and methods used for matrix models of string theory, this work provides both a valuable self-study guide for postgraduate students and a comprehensive review and reference guide for researchers.

About the author

Badis Ydri is currently a professor of theoretical particle physics at the Institute of Physics, Annaba University, Algeria. He is also a research associate at the Dublin Institute for Advanced Studies, Ireland, and a regular ICTP associate at the Abdus Salam Center for Theoretical Physics, Trieste, Italy.



Classical Electrodynamics, Volume 3

Lecture notes

Konstantin K Likharev
Stony Brook University, USA

iopscience.org/book/978-0-7503-1404-6

About the book

Essential Advanced Physics is a series comprising four parts: *Classical Mechanics*, *Classical Electrodynamics*, *Quantum Mechanics* and *Statistical Mechanics*. Each part consists of two volumes, *Lecture notes* and *Problems with solutions*, further supplemented by an additional collection of test problems and solutions available to qualifying university instructors. This volume, *Classical Electrodynamics: Lecture notes* is intended to be the basis for a two-semester graduate-level course on electricity and magnetism, including not only the interaction and dynamics of charged point particles, but also properties of dielectric, conducting and magnetic media. The course also covers special relativity, including its kinematics and particle-dynamics aspects, and electromagnetic radiation by relativistic particles.

About the author

Konstantin K Likharev received his PhD from the Lomonosov Moscow State University, USSR, in 1969, and a habilitation degree of Doctor of Sciences from USSR's High Attestation Committee in 1979. From 1969 to 1990 Likharev was a staff scientist of Moscow State University. In 1991 he assumed a professorship at Stony Brook University (distinguished professor since 2002, John S Toll professor since 2017). During his research career, Likharev worked in the fields of nonlinear classical and dissipative quantum dynamics, and solid-state physics and electronics, notably including superconductor electronics and nanoelectronics – most recently, with applications to neuromorphic networks. He has authored more than 250 original publications, more than 80 review papers and book chapters, two monographs and several patents. Likharev is a Fellow of the APS and IEEE.

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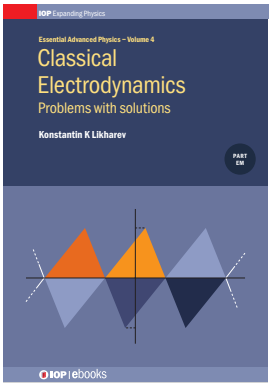

Classical Electrodynamics, Volume 4

Problems with solutions

Konstantin K Likharev
Stony Brook University, USA

iopscience.org/book/978-0-7503-1407-7

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About the book

Essential Advanced Physics is a series comprising four parts: *Classical Mechanics*, *Classical Electrodynamics*, *Quantum Mechanics* and *Statistical Mechanics.* Each part consists of two volumes, *Lecture notes* and *Problems with solutions*, further supplemented by an additional collection of test problems and solutions available to qualifying university instructors. This volume, *Classical Electrodynamics: Problems with solutions* contains detailed model solutions to the exercise problems formulated in the companion *Lecture notes* volume. In many cases, the solutions include result discussions that enhance the lecture material. For the reader's convenience, the problem assignments are reproduced in this volume.

About the author

Konstantin K Likharev received his PhD from the Lomonosov Moscow State University, USSR, in 1969, and a habilitation degree of Doctor of Sciences from USSR's High Attestation Committee in 1979. From 1969 to 1990 Likharev was a staff scientist of Moscow State University. In 1991 he assumed a professorship at Stony Brook University (distinguished professor since 2002, John S Toll professor since 2017). During his research career, Likharev worked in the fields of nonlinear classical and dissipative quantum dynamics, and solid-state physics and electronics, notably including superconductor electronics and nanoelectronics – most recently, with applications to neuromorphic networks. He has authored more than 250 original publications, more than 80 review papers and book chapters, two monographs and several patents. Likharev is a Fellow of the APS and IEEE.

Extent 368pp

Collection
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Subject
Classical physics

ISBN 9780750315906 (electronic)

ISBN 9780750315883 (print)

Entropy Beyond the Second Law

Thermodynamics and statistical mechanics for equilibrium, non-equilibrium, classical, and quantum systems

Phil Attard
University of Sydney, Australia

iopscience.org/book/978-0-7503-1590-6

About the book

Entropy Beyond the Second Law presents a coherent formulation of all aspects of thermodynamics and statistical mechanics with entropy as the unifying theme. This includes formulating equilibrium theory and explaining the role of the Second Law in establishing the equilibrium state. It also establishes the foundations of non-equilibrium theory by generalizing the concept of entropy in an appropriate way. Finally, it addresses the relationship between classical and quantum statistical mechanics by invoking the collapse of the wave function into entropy states. A secondary purpose is to increase the understanding of entropy and the Second Law, and to correct misapprehensions and errors that have arisen over the years.

About the author

Phil Attard is a research scientist working broadly in the areas of statistical mechanics, thermodynamics, and colloid and surface science. He has held academic positions at various universities in Australia, Europe and North America, and he was a Professorial Research Fellow of the Australian Research Council. He has authored some 120 papers, 10 review articles and three books, with more than 5000 citations.

The Wigner Function in Science and Technology

[1]David K Ferry
[2]Mihail Nedjalkov
[1]Arizona State University, USA
[2]Bulgarian Academy of Sciences, Bulgaria

iopscience.org/book/978-0-7503-1671-2

Extent 300pp

Collection
Expanding Physics

Subject
Condensed matter

ISBN 9780750316712 (electronic)

ISBN 9780750316699 (print)

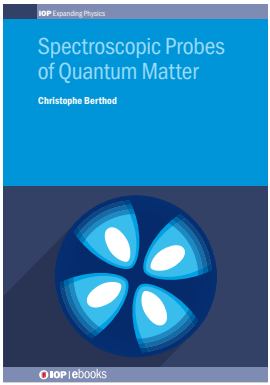
About the book

This book is designed to give a background on the origins and development of Wigner functions, as well as its mathematical underpinnings. Along the way the authors emphasise the connections, and differences, from the more popular non-equilibrium Green's function approaches. But, the importance of the text lies in the discussions of the applications of the Wigner function in various fields of science, including quantum information, coherent optics and superconducting qubits. These disciplines approach it differently, and the goal here is to give a unified background and highlight how it is utilized in the different disciplines.

About the authors

David K Ferry is Regents' Professor at Arizona State University, USA.

Mihail Nedjalkov is Associate Professor with the Institute of Information and Communication Technologies at the Bulgarian Academy of Sciences and holds a visiting research position at TU Wien, Austria.



Spectroscopic Probes of Quantum Matter

Christophe Berthod
University of Geneva, Switzerland

iopscience.org/book/978-0-7503-1741-2

About the book

The contemporary understanding of matter is based on the quantum theory, which envisions large collections of particles interacting with each other and with their environment. Spectroscopic probes, based for instance on light, change the environment and trigger a collective response of the particles. This book, based on a graduate-level course, explains the underpinnings of many-body quantum theory and exposes the main methodologies for calculations, before describing, with the support of practical examples and short computer codes, how the spectroscopic techniques are represented within the theory and how their outcome is interpreted as a probe of the correlations between quantum particles.

About the author

Christophe Berthod is a senior lecturer at the Department of Quantum Matter Physics at the University of Geneva, Switzerland. He obtained his PhD in physics in 1998 and specializes in research in condensed-matter physics and computational physics.

Extent 277pp

Collection
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Subject
Condensed matter

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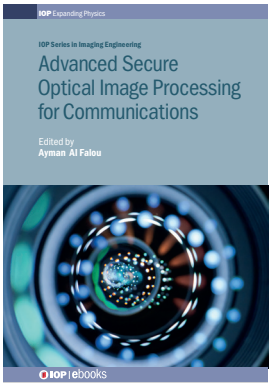


Advanced Secure Optical Image Processing for Communications

Edited by Ayman Al Falou
ISEN Brest, France

iopscience.org/book/978-0-7503-1457-2

Extent 280pp

Collection
Expanding Physics

Series
IOP Series in Imaging Engineering

Subject
Optics and photonics

ISBN 9780750314572 (electronic)

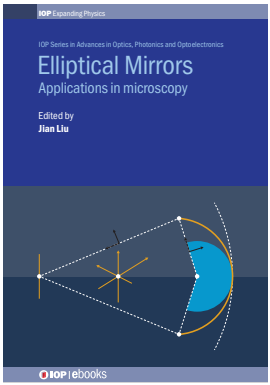
ISBN 9780750314558 (print)

About the book

New image-processing tools and data-processing network systems have considerably increased the volume of transmitted information such as 2D and 3D images with high resolution. Thus, more complex networks and long processing times become necessary, and high image quality and transmission speeds are requested for an increasing number of applications. To satisfy these two requests, several, either numerical or optical solutions, were offered separately. *Advanced Secure Optical Image Processing for Communications* explores both alternatives and describes research works that are converging towards optical/numerical hybrid solutions for high-volume signal and image processing and transmission. Without being limited to hybrid approaches, the latter are particularly investigated in this book in the purpose of combining the advantages of both techniques. Additionally, pure numerical or optical solutions are also considered since they emphasize the advantages of one of the two approaches separately.

About the editor

Ayman Al Falou received his PhD in telecommunications and signal processing from the French National Telecommunication Graduate Engineering School of Brittany (ENSTB France) and of the University of Rennes. Since 2000, he has been a professor of telecommunications and signal processing at ISEN Brest.



Elliptical Mirrors

Applications in microscopy

Edited by Jian Liu
Harbin Institute of Technology, China

iopscience.org/book/978-0-7503-1629-3

About the book

Composed by a specialist in the field, Jian Liu, with contributions from a number of scientists and optical specialists, *Elliptical Mirrors: Applications in microscopy* discusses the importance of the elliptical mirror; the third solution in far-field optical imaging after parabolic reflectors and lenses for which apodization factors were established in 1921 and 1959 respectively. Elliptical mirrors are a new and novel technique within the world of optics and can be applied to industrial imaging, bioimaging X-ray photography and much more, and they will inevitably retain a significant role in the trend of microscopic development. This detailed and highly insightful book will be an important reference in a growing subject area that will benefit PhD students, optical physicists, metrologists and researchers who have an interest in the ever-growing science of optics. The original content in this book will give a unique insight into mirror system design and applications in industrial metrology and bioimaging. It discusses the original theory of elliptical mirrors and gives a fundamental and comprehensive theory behind them and their functions.

About the editor

Jian Liu is a professor and the vice dean at the Harbin Institute of Technology, China. He is also an honorary professor at The University of Nottingham, UK. His academic interests lie in the theories and implementations of optical microscopes, and he has a particular interest in the development of optical microscopes, applied optics and optical metrology.

Extent 182pp

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Subject
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ISBN 9780750316293 (electronic)

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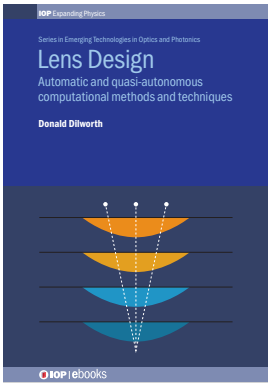

Lens Design

Automatic and quasi-autonomous computational methods and techniques

Donald Dilworth
Optical Systems Design Inc, USA

iopscience.org/book/978-0-7503-1611-8

About the book

Lens Design: Automatic and quasi-autonomous computational methods and techniques is the first book that interactively describes the newest lens design tools. Detailing design methods for a variety of lens forms, this book shows that fixed focus and zoom lenses can be optimized, starting from plane-parallel surfaces, in a brief time on a modern fast PC compared with traditional tools that require many days or weeks of tedious work. Loaded with tips and ideas resulting from more than 50 years of experience, the reader will improve their lens design skill. Experienced and aspiring lens designers who master the power of the tools, methods, and principles taught in this book will be able to develop excellent designs now and in the future.

About the author

Donald Dilworth is president of Optical Systems Design Inc and has been intensively involved in the development and application of computer software for optical design since 1961. He has extensive experience in most areas of lens design, particularly in thermal infrared systems, and he is the author of the well-known SYNOPSYS lens design program, which is used by lens designers worldwide. As author of SYNOPSYS and developer of the popular Pseudo-Second Derivative optimization method, Dilworth has advanced the state of the art in artificial intelligence.

Extent 526pp

Collection
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Series in Emerging Technologies in Optics and Photonics

Subject
Optics and photonics

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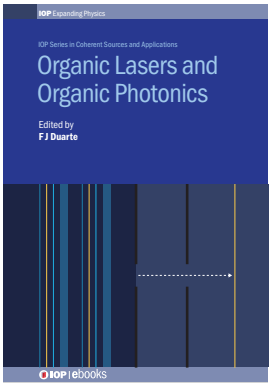

Organic Lasers and Organic Photonics

Edited by F J Duarte
Australian Institute of Physics, Australia

iopscience.org/book/978-0-7503-1572-2

About the book

Organic Lasers and Organic Photonics is the first book, since the early 1990s, to address the technology and applications of organic dye lasers and provide an insightful perspective into the vast fields of organic lasers and their applications. The latest generation of organic lasers have opened the horizon to the realm of miniaturized devices with their own array of applications. This book also provides a comprehensive insight into the world of organic dye molecules with chapters that also explore the exciting fields optogenetics, organic laser medicine, and quantum communications. This co-edited book has been compiled by leading experts in the field of organic lasers and organic photonics, each providing a unique insight into the practical applications of such lasers as well as electrically-pumped organic semiconductor coherent sources, their physics, technology and future prospects.

About the editor

F J Duarte is an award-winning laser physicist who is a Fellow for the Australian Institute of Physics and the Optical Society. He is a leading expert in the field of tuneable organic lasers and their applications, and numerous other related fields. Other contributors to this book include Peter Hegemann, Suneel Kateriya, Alfons Penzkofer, Sergei Popov, Kathleen M Vaeth and Elena Vasileva, all of whom are experts in their research areas and provide distinct perspectives to the rapidly-expanding fields of organic lasers and organic photonics.

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Collection
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Optics and photonics

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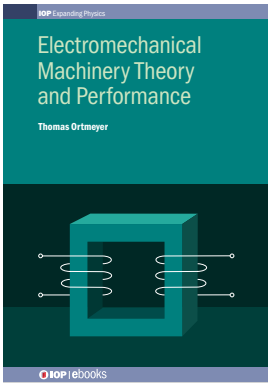

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Collection
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Subject
Materials

ISBN 9780750316620 (electronic)

ISBN 9780750316606 (print)

Electromechanical Machinery Theory and Performance

Thomas Ortmeyer
Clarkson University, USA

iopscience.org/book/978-0-7503-1662-0

About the book

Electromechanical Machinery Theory and Performance presents a detailed explanation of electromagnetic machines, giving specific focus on transformers and AC rotating machines that can be used in the preservation and transference of energy and power. This book is developed for students at both graduate and undergraduate level, and can be used by practicing engineers as well. The book explores different machines, transformers and converters that have become an essential part in the efficient use of both energy and power. It includes examples and numerical exercises that will enable students and engineers to efficiently practice and use certain calculations. Aimed as a one-semester course, this book gives a detailed analysis of modern machines and their application.

About the author

Thomas Ortmeyer began his career at Commonwealth Edison Company in the Operations Analysis Department. He then returned to Iowa State University to pursue graduate studies. Upon completion of his PhD, he joined the electrical and computer engineering department faculty at Clarkson University, where he is currently a Research Professor. At Clarkson, he has taught many courses in power engineering. He is currently involved in research in the areas of power distribution, distributed generation interconnection, microgrids and power system protection. He is a Life Fellow of IEEE.

Liquid Crystals

Benjamin Outram
Keio University, Japan

iopscience.org/book/978-0-7503-1362-9

About the book

Despite many of us staring at liquid crystals – in the form of liquid-crystal displays – for large portions of our waking life, for many, their science and beauty is an untold story full of surprise and wonder. This book takes you on a photographic journey through the science of liquid crystals. By the end, you'll be familiar with what they are, how they form and their role in producing the complexity of life on Earth. Presented in non-technical language, without any mathematics, this accessible text looks at spider webs, silk, display technology, lasers, dyes, detergents, DNA, cell membranes, drug-delivery mechanisms, anaesthesia and optical computing.

Extent 106pp

Collection
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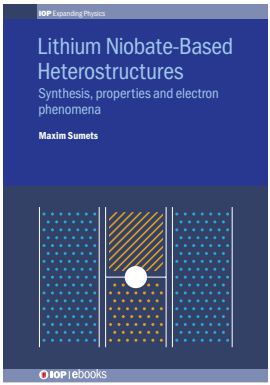
Subject
Materials

ISBN 9780750313629 (electronic)

ISBN 9780750313636 (print)

About the author

Benjamin Outram completed his DPhil at the University of Oxford's Department of Engineering Science, focussing on liquid-crystal science. His research won the Institute of Physics Optical Group Doctoral Thesis Prize. Since completing his DPhil, Outram received a Daiwa Scholarship and spent four years in Japan, where he completed a Japan Society for the Promotion of Science Postdoctoral Scholarship in Media Technology with a focus on virtual reality. His virtual reality work includes Crystal Vibes, Planet Juggle and Synesthesia VR, which have been showcased at the Sundance Film Festival, the Dubai International Film Festival and the Tokyo Game Show among others. Outram became interested in the photography of liquid crystals during his time at Oxford, where he has had two liquid-crystal photography exhibitions at the university's Linacre College. His footage has also been featured in a music video in collaboration with Max Cooper.



Lithium Niobate-Based Heterostructures

Synthesis, properties and electron phenomena

Maxim Sumets
The University of Texas Rio Grande Valley, USA

iopscience.org/book/978-0-7503-1729-0

Extent 220pp

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Subject
Materials

ISBN 9780750317290 (electronic)

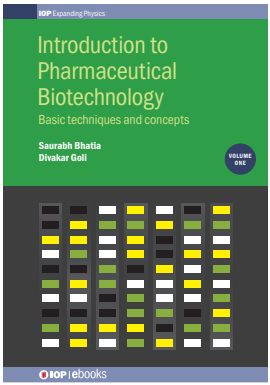
ISBN 9780750317276 (print)

About the book

With the use of ferroelectric materials in memory devices and the need for high-speed integrated optics devices, interest in ferroelectric thin films continues to grow. With their remarkable properties, such as energy nonvolatility, fast switching, radiative stability and unique optoacoustic and optoelectronic properties, *Lithium Niobate-Based Heterostructures: Synthesis, properties and electron phenomena* discusses why lithium niobate ($LiNbO_3$) is one of the most promising of all ferroelectric materials. Based on years of study, this book presents the systematic characterization of substructure and electronic properties of a heterosystem formed in the deposition process of lithium niobate films onto the surface of silicon wafers.

About the author

Maxim Sumets is a lecturer in the Department of Physics and Astronomy at The University of Texas Rio Grande Valley, USA. His field of research is materials science with a focus on the thin films, semiconductor heterostructures and ferroelectrics, and their application. He obtained his masters and PhD from the Voronezh State University, Russia, and has been actively involved in research and education for more than 20 years. His fields of research cover electrical and structural properties of materials.



Introduction to Pharmaceutical Biotechnology, Volume 1

Basic techniques and concepts

[1]Saurabh Bhatia
[2]Divakar Goli
[1]Amity University, India
[2] Acharya BM Reddy College of Pharmacy, India

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Collection
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Subject
Biomedical engineering

ISBN 9780750312998 (electronic)

ISBN 9780750313001 (print)

About the book

Animal biotechnology is a broad field including polarities of fundamental and applied research, as well as DNA science, covering key topics of DNA studies and its recent applications. In *Introduction to Pharmaceutical Biotechnology*, DNA isolation procedures, molecular markers and screening methods of the genomic library are explained in detail. Interesting areas such as isolation, sequencing and synthesis of genes, with broader coverage of the latter, are also described. The book begins with an introduction to biotechnology and its main branches, explaining both the basic science and the applications of biotechnology-derived pharmaceuticals, with special emphasis on their clinical use. It then moves on to the historical development and scope of biotechnology with an overall review of early applications that scientists employed long before the field was defined.

About the authors

Saurabh Bhatia is an Associate Professor at the Amity institute of Pharmacy, Amity University, India. He has academic experience in a number of specialized areas including pharmacology, natural products science, biotechnology and drug-delivery systems.

Divakar Goli, PhD, is currently the Campus Director of Acharya Institutes and Professor Principal at the Acharya B M Reddy College of Pharmacy, India. He is the editor of *Indian Journal of Pharmaceutical Sciences*, the official scientific publication of The Indian Pharmaceutical Association.

Introduction to Pharmaceutical Biotechnology, Volume 2

Enzymes, proteins and bioinformatics

Saurabh Bhatia
Amity University, India

iopscience.org/book/978-0-7503-1302-5

Extent 278pp

Collection
Expanding Physics

Subject
Biomedical engineering

ISBN 9780750313025 (electronic)

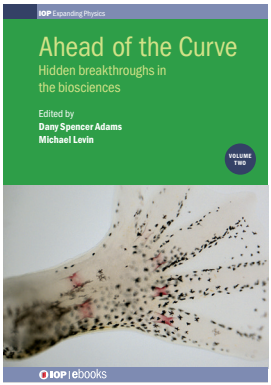
ISBN 9780750313032 (print)

About the book

Introduction to Pharmaceutical Biotechnology: Enzymes, proteins and bioinformatics provides background information and knowledge on genes, enzymes and proteins. Starting with the general properties, mechanisms, applications, production, immobilization and purification of enzymes, and ending with additional applications in biosensors and biotransformation reactions, the book is organized into three subjects. Additionally, the book addresses the characteristics of genomics, genome sequencing, comparative genomics and genomic evolution. The rapidly developing field of protein engineering is also discussed. This book will be of interest to biochemists, biologists, microbiologists, biotechnologists, food technologists and all others involved in the research and development of the biological applications of proteins and enzymes.

About the author

Saurabh Bhatia is an Associate Professor at the Amity Institute of Pharmacy, Amity University, India. He has academic experience in a number of specialized areas including pharmacology, natural products science, biotechnology and drug-delivery systems. Bhatia has promoted several marine algae and their derived polymers throughout India and has published a number of books in many areas of pharmaceutical science.



Ahead of the Curve, Volume 2

Hidden breakthroughs in the biosciences

Edited by Dany Spencer Adams and Michael Levin
Tufts University, USA

iopscience.org/book/978-0-7503-1677-4

About the book

The popular conception of science is of a steady, upward climb of progress. The reality is not that simple. Significant discoveries often stay unrecognized for decades, particularly if they conflict with the current paradigm or extend it in ways hard to imagine at the time. Ahead of the Curve: Hidden breakthroughs in the biosciences is a fascinating collection of lost research that the editors believe are important scientific contributions. The book highlights specific topics in biology including the roles of biophysical forces, mathematical descriptions of living systems, the importance of the no-treatment control, the fallacy of the lone pioneer, the power of light, and the cognitive aspects of biological systems with and without brains.

Extent 400pp

Collection
Expanding Physics

Subject
Medical physics and biophysics

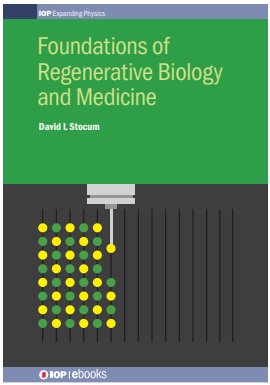
ISBN 9780750316774 (electronic)

ISBN 9780750316750 (print)

About the editors

Dany Adams is a research associate professor, Department of Biology, and Tufts Center for Regenerative and Developmental Biology affiliate, Allen Discovery Center at Tufts, Tufts University, USA.

Michael Levin is the Vannevar Bush Professor, Department of Biology, and the director of the Allen Discovery Center at Tufts and Tufts Center for Regenerative and Developmental Biology, Tufts University, USA.



Extent 330pp

Collection
Expanding Physics

Subject
Medical physics and biophysics

ISBN 9780750316262 (electronic)

ISBN 9780750316248 (print)

Foundations of Regenerative Biology and Medicine

David L Stocum
Indiana University, USA

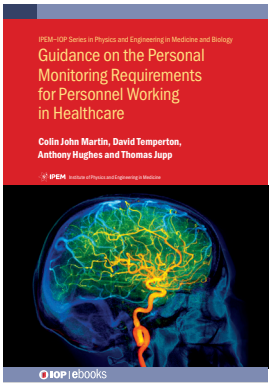
iopscience.org/book/978-0-7503-1626-2

About the book

Regenerative biology and medicine is a rapidly developing field that can revolutionize medicine. It is a nexus of convergent science, drawing from chemistry, physics, mathematics and bioengineering. *Foundations of Regenerative Biology and Medicine* introduces the essentials of regenerative biology and medicine to advanced undergraduates and beginning graduate students, as well as students and professionals outside the field who need (and want) an introduction to the subject. This relatively short book can be read in one semester and delivers the essential framework to understand the biological aspects of different mechanisms of regeneration and the therapeutic strategies that have emerged from this biology.

About the author

David L Stocum is Emeritus Professor of biology and Emeritus Dean of the School of Science at Indiana University–Purdue University Indianapolis. Stocum holds undergraduate degrees in biology and psychology, a MS in zoology and a PhD in cell and developmental biology. For 21 years he pursued an active research and teaching career in the School of Life Sciences at the University of Illinois Urbana–Champaign, where he also served administrative terms as Director of the Honors Biology Program and Acting Head of Anatomical Sciences. Stocum is known for his research on the regeneration of amphibian limbs, and for his writings on the subject of regenerative biology and medicine.



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Collection
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Subject
Medical physics and biophysics

ISBN 9780750321990 (electronic)

ISBN 9780750321976 (print)

Guidance on the Personal Monitoring Requirements for Personnel Working in Healthcare

[1]Colin John Martin
[2]David Temperton
[3]Anthony Hughes
[4]Thomas Jupp
[1]University of Glasgow, UK
[2]University Hospitals Birmingham NHS Foundation NHS Trust, UK
[3]Christie Medical Physics & Engineering, Royal Preston Hospital, UK
[4] Royal Surrey County Hospital NHS Foundation Trust, UK

iopscience.org/book/978-0-7503-2199-0

About the book

Arrangements for personal monitoring have evolved as dose limits and practices using radiation have developed. Therefore, new approaches, involving more personal dosimetry, are required and methods are needed that can be used to predict probable dose levels, so that risk assessments can be prepared to determine the level of dose monitoring for individual staff members. The authors of this text have included short reviews of dose levels to allow anticipated exposure levels within different clinical specialties to be predicted. It sets out recommendations that are designed to help radiation protection practitioners and healthcare workers assess exposure levels for personnel and determine monitoring requirements based on established rules.

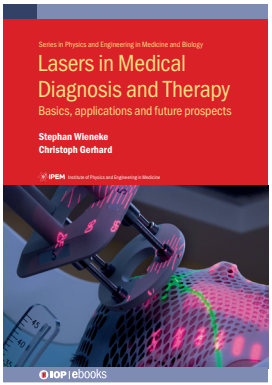
About the authors

Colin John Martin is an honorary senior clinical lecturer for the University of Glasgow.

David Temperton is a consultant clinical scientist and medical physics expert.

Anthony Hughes has been an RPA since 2007 and an RWA since 2011, specialising in nuclear medicine and PET.

Tom Jupp works in the radiation protection department at the Royal Surrey County Hospital NHS Foundation Trust as a medical physics expert.



Lasers in Medical Diagnosis and Therapy

Basics, applications and future prospects

[1] Stephan Wieneke
[2] Christoph Gerhard
[1]University of Applied Sciences and Arts HAWK, Germany
[2]Technical University of Applied Sciences of Wildau, Germany

iopscience.org/book/978-0-7503-1275-2

Extent 198pp

Collection
Expanding Physics

Series
IPEM–IOP Series in Physics and Engineering in Medicine and Biology

Subject
Medical physics and biophysics

ISBN 9780750312752 (electronic)

ISBN 99780750312776 (print)

About the book

Lasers in Medical Diagnosis and Therapy: Basics, applications and future prospects provides an overview on medical lasers and laser systems as well as laser applications in medical diagnosis and therapy. Since it was written by physicists, it focusses on the physics and underlying mechanisms of laser diagnosis and therapy, and thus initially covers the basics of laser-light generation, a selection of the most important laser types and systems commonly used in medicine, and the principles of laser-light guidance. The book should be used as a textbook for lectures, practise lessons and for the preparation of exams. It is suitable for students, lecturers and researchers in the fields of medical engineering and technology, medical physics, medicine and surgery, ophthalmology, dermatology, laser physics and development, and optical engineering.

About the authors

Stephan Wieneke is a professor for laser-plasma-hybrid technology at the University of Applied Sciences and Arts in Göttingen, Germany, where he has also taught applied laser medicine since 2004. In the last several years he was involved in the development and establishment of the new medical engineering course of study at the university.

Christoph Gerhard is a professor for laser and plasma technology at the Technical University of Applied Sciences of Wildau, Germany, and a visiting professor for optical system design at the Polytechnic University of Milan, Italy.

Magnetic Nanoparticles for Medical Diagnostics

Edited by Adarsh Sandhu and Hiroshi Handa
Tokyo Medical University, Tokyo

iopscience.org/book/978-0-7503-1584-5

Extent 200pp

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Expanding Physics

Series
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Subject
Medical physics and biophysics

ISBN 9780750315845 (electronic)

ISBN 9780750315821 (print)

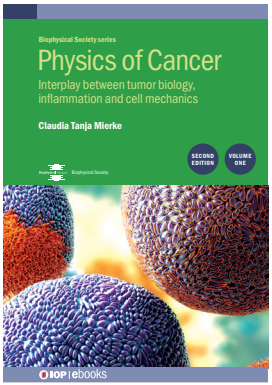
About the book

Magnetic Nanoparticles for Medical Diagnostics was written to encourage members of the medical profession to join experts from other research fields in exploring the unique physical properties of magnetic nanoparticles for medical applications. It demonstrates the evolution from small groups of scientists fabricating magnetic sensors to multidisciplinary research on wide-ranging medical applications of magnetic nanoparticles, illustrating the regenerative and dynamic nature of this area of research. It covers topics such as magnetic probe and magnetic nanoparticles for sentinel lymph node biopsy; magnetic separation of endosomes, exosomes, mitochondria and autophagosomes using magnetic beads; fluorescent magnetic beads for medical diagnostics and magnetic hyperthermia using implant type heating mediators.

About the editors

Adarsh Sandhu studied at the Tokyo Institute of Technology and University of Tokyo, and joined Fujitsu Laboratories Ltd, Japan, in 1986. In August 2002, he joined the Quantum Nanoelectronics Research Centre at the Tokyo Institute of Technology. Sandhu has worked as Deputy Director of the Electronics-Inspired Interdisciplinary Research Institute (EIIRIS), Toyohashi University of Technology and is currently a member of the Department of Engineering Science Graduate School of Information and Engineering, University of Electro-Communications, Tokyo.

Hiroshi Handa is a Professor at Tokyo Medical University and Emeritus Professor at Tokyo Institute of Technology. He has held positions at the University of Tokyo, Japan, and Massachusetts Institute of Technology, USA.



Physics of Cancer: Second edition, volume 1

Interplay between tumor biology, inflammation and cell mechanics

Claudia Tanja Mierke
University of Leipzig, Germany

iopscience.org/book/978-0-7503-1753-5

Extent 542pp

Collection
Expanding Physics

Series
Biophysical Society–IOP Series

Subject
Medical physics and biophysics

ISBN 9780750317535 (electronic)

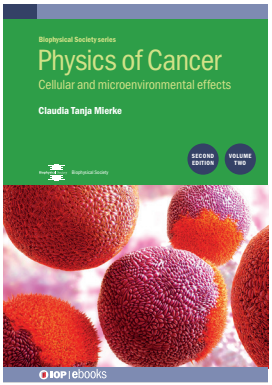
ISBN 9780750317511 (print)

About the book

In order to increase the healing opportunities of cancer, it is important to impair the dissemination and the spreading of cancer cells from the initial tumor and the formation of metastases in other organs or tissues of the human body. The underlying physical principles of these oncological processes are a major constituent of the research field highlighted in *Physics of Cancer*. This completely revised second edition is improved linguistically with multiple increases of the number of figures and the inclusion of several novel chapters such as actin filaments during matrix invasion, microtubuli during migration and matrix invasion, nuclear deformability during migration and matrix invasion, and the active role of the tumor stroma in regulating cell invasion.

About the author

Claudia Tanja Mierke has a background in biology and molecular oncology and is head of the biological physics division at the University of Leipzig where she regularly teaches molecular and cell biology, biophysics and soft matter physics to physicists. She is concerned with various research areas developing our understanding of the physical aspects of cancer.



Physics of Cancer: Second edition, volume 2

Cellular and microenvironmental effects

Claudia Tanja Mierke
University of Leipzig, Germany

iopscience.org/book/978-0-7503-2117-4

About the book

In order to increase the healing opportunities of cancer, it is important to impair the dissemination and the spreading of cancer cells from the initial tumor and the formation of metastases in other organs or tissues of the human body. The underlying physical principles of these oncological processes are a major constituent of the research field highlighted in *Physics of Cancer*. This completely revised second edition of is improved linguistically with multiple increases of the number of figures and the inclusion of several novel chapters such as actin filaments during matrix invasion, microtubuli during migration and matrix invasion, nuclear deformability during migration and matrix invasion, and the active role of the tumor stroma in regulating cell invasion.

Extent 488pp

Collection
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Series
Biophysical Society–IOP Series

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Medical physics and biophysics

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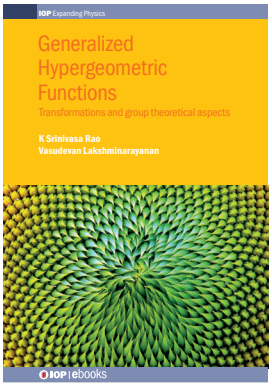
About the author

Claudia Tanja Mierke has a background in biology and molecular oncology and is head of the biological physics division at the University of Leipzig where she regularly teaches molecular and cell biology, biophysics and soft matter physics to physicists. She is concerned with various research areas developing our understanding of the physical aspects of cancer.



Extent 224pp

Collection
Expanding Physics

Subject
Mathematics and computation

ISBN 9780750314961 (electronic)

ISBN 9780750314947 (print)

Generalized Hypergeometric Functions

Transformations and group theoretical aspects

[1]K Srinivasa Rao
[2]Vasudevan Lakshminarayanan
[1]The Institute of Mathematical Sciences, India
[2]University of Waterloo, Ontario, Canada

iopscience.org/book/978-0-7503-1496-1

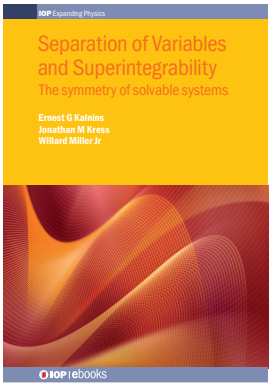
About the book

In 1813, Gauss first outlined his studies of the hypergeometric series, which has been of great significance in the mathematical modelling of physical phenomena. This detailed monograph outlines the fundamental relationships between the hypergeometric function and special functions. In nine comprehensive chapters, Rao and Lakshminarayanan present a unified approach to the study of special functions of mathematics using group theory. This book offers fresh insight into various aspects of special functions and their relationship, utilizing transformations and group theory and their applications. It will lay the foundation for deeper understanding for both experienced researchers and novice students.

About the authors

K Srinivasa Rao gained a PhD in theoretical physics from The Institute of Mathematical Sciences, and later retired from the same institute as a senior professor.

Vasudevan Lakshminarayanan has a PhD from the University of California, Berkley, and is currently a professor at the University of Waterloo.



Separation of Variables and Superintegrability

The symmetry of solvable systems

[1]Ernest G Kalnins
[2]Jonathan M Kress
[3]Willard Miller Jr
[1]University of Waikato, New Zealand
[2]University of New South Wales, Australia
[3]University of Minnesota, USA

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Extent 326pp

Collection
Expanding Physics

Subject
Mathematics and computation

ISBN 9780750313148 (electronic)

ISBN 9780750313155 (print)

About the book

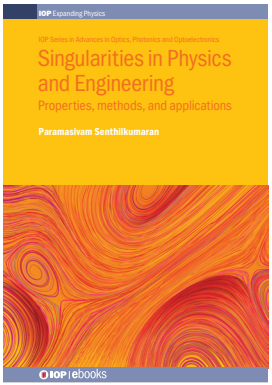
Separation of variables methods for solving partial differential equations are of immense theoretical and practical importance in mathematical physics. They are the most powerful tool known for obtaining explicit solutions of the partial differential equations of mathematical physics. The purpose of this book is to give an up-to-date presentation of the theory of separation of variables and its relation to superintegrability. Collating and presenting it in a unified, updated and a more accessible manner, the results scattered in the literature that the authors have prepared is an invaluable resource for mathematicians and mathematical physicists in particular, as well as science, engineering, geological and biological researchers interested in explicit solutions.

About the authors

Earnest G Kalnins is a professor at the University of Waikato in New Zealand. He is also a fellow of the Royal Society of New Zealand and has published three books and more than 150 research papers.

Jonathan M Kress is a senior lecturer in the School of Mathematics and Statistics at the University of New South Wales in Australia.

Willard J Miller is emeritus professor at the University of Minnesota. He is also an AMS fellow and author or co-author of three research monographs, two textbooks, two major review articles and more than 200 research papers.



Singularities in Physics and Engineering

Properties, methods, and applications

Paramasivam Senthilkumaran
Indian Institute of Technology Delhi, India

iopscience.org/book/978-0-7503-1698-9

Extent 248pp

Collection
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Series
IOP Series in Advances in Optics, Photonics and Optoelectronics

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Mathematics and computation

ISBN 9780750316989 (electronic)

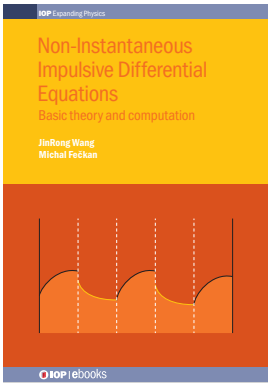
ISBN 9780750316965 (print)

About the book

Singularities in Physics and Engineering gives a thorough introduction to singularities and their development. It explains, in detail, important topics such as the types of singularities, their properties, detection and application, and emerging research trends. With new advances being generated continuously, the vibrant field of optics is covered here to give an essential foundation for all students and researchers interested in singular optics.

About the author

Paramasivam Senthilkumaran is currently working as a professor in the Physics Department at the Indian Institute of Technology Delhi. He was a senior project officer and received his PhD from the Indian Institute of Technology Madras in 1995. He was a recipient of the Young Scientist Award from the Indian National Science Academy, New Delhi, and Alexander von Humboldt fellowship, Germany, in 1997 and 2001 respectively. Senthilkumaran has been teaching undergraduate and postgraduate courses on a variety of subjects including basic physics, electromagnetic theory, optics and lasers, Fourier optics and holography. His research interests include optical beam shaping, optical phase singularities, Berry and Pancharatnam topological phases, fiber optics, holography, non-destructive testing techniques, shear interferometry, Talbot interferometry, speckle metrology and non-linear optics. He has authored/coauthored more than 100 research publications, has more than 15 years of experience researching singularities in optics, and has supervised eight doctoral theses.



Non-Instantaneous Impulsive Differential Equations

Basic theory and computation

[1]JinRong Wang
[2]Michal Fečkan
[1]Guizhou University, China
[2]Comenius University in Bratislava, Slovakia

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Collection
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Subject
Mathematics and computation

ISBN 9780750317047 (electronic)

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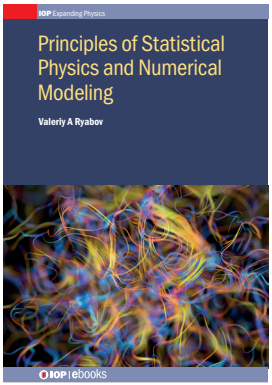
About the book

Many real-life processes can be characterised by rapid changes in their state. Some of these changes begin impulsively and are not negligible. For changes such as these, mathematical models called non-instantaneous differential equations are created. These models give rise to a new, hybrid dynamical system that can be used for many different purposes. Using a variety of equations, examples and solutions, this book will be an essential guide for researchers, graduate students and those interested in applied mathematics and related fields.

About the authors

JinRong Wang is a professor at Guizhou University in China and his expertise lies in numerical analysis, applied mathematics and differential equations.

Michal Fečkan is a professor at Comenius University in Bratislava and his research focuses on analysis and applied mathematics as well as numerical modelling and numerical analysis. Both authors of this book are known internationally for their expertise in both impulsive and non-instantaneous impulsive differential equations.



Principles of Statistical Physics and Numerical Modeling

Valeriy A Ryabov
National Research Centre Kurchatov Institute, Russia

iopscience.org/book/978-0-7503-1341-4

About the book

This unique text introduces classical statistical mechanics using molecular dynamic simulations to teach and explore the subject. Theory is presented and backed up with results and provision is made for students to develop and implement their own simulations. Although one of the main priorities of the text is the simplicity of the presentation, all the results of numerical simulations are accompanied by comprehensive theoretical treatment. Illustrated by numerous figures and animations, the book will be useful for students and professionals wishing to receive a contemporary understanding of statistical physics and use the methods in their modeling of properties of materials and biomolecular systems.

About the author

Valeriy A Ryabov is a leading scientist in the Department of Nuclear Technology at the National Research Centre Kurchatov Institute in Russia, with more than 100 journal publications and several books to his name. His research interests span the physics of irradiated material, molecular dynamics, statistical physics and solid-state physics.

Extent 152pp

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Expanding Physics

Subject
Mathematics and computation

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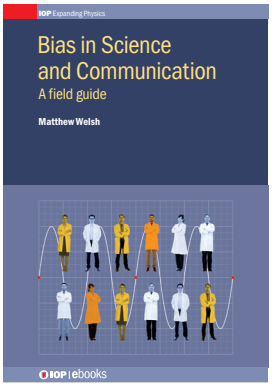

Bias in Science and Communication

A field guide

Matthew Welsh
University of Adelaide, Australia

iopscience.org/book/978-0-7503-1311-7

About the book

Bias is a natural outcome of our thinking patterns. The nature of our cognitive processes leads to inherent limitations, resulting in predictable biases in both our own judgements and the interpretation of our communications by the public, by policymakers and even other scientists. This book will introduce the concept of biases arising from cognitive limitations and tendencies with a focus of the implications of this for scientists in particular. It begins with an initial quiz designed to demonstrate key biases – allowing readers to look back at the responses that they provided prior to reading about specific biases and thus see, without the impact of hindsight bias, whether they were susceptible to the effects.

About the author

Matthew Welsh is a psychological scientist specialising in decision-making. His primary area of research is in decision-making under uncertainty, particularly as it relates to real-world problems. In his role at the Australian School of Petroleum, he researches how people's decision-making tendencies impact the choices that they make and the economic flow-on effects of this for industries such as oil and gas, which depend on expert judgement and estimation to reduce uncertainty. He teaches into the Australian School of Petroleum's decision-making courses at honours and master's levels; and into the School of Psychology's master's in organisational psychology.

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Subject
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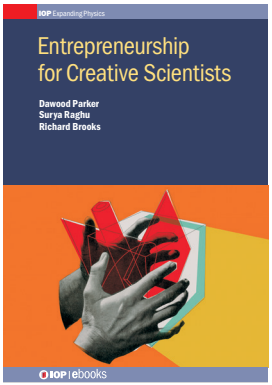

Entrepreneurship for Creative Scientists

[1]Dawood Parker
[2]Surya Raghu
[3]Richard Brooks
[1]Melys Diagnostics Ltd, UK
[2]Advanced Fluidics LLC, USA
[3]FD Solutions Ltd, UK

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Extent 130pp

Collection
Expanding Physics

Subject
Education and outreach

ISBN 9780750311465 (electronic)

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About the book

Through patenting and commercialization, scientists today can develop their work beyond a publication in a learned journal. Indeed, universities and governments are encouraging today's scientists and engineers to break their research out of the laboratory and into the commercial world. However, doing so is complicated and can be daunting for those more used to a research seminar than a boardroom. This book, written by experienced scientists and entrepreneurs, deals with businesses started by scientists based on innovation and sets out to clarify for scientists and engineers the steps necessary to take an idea along the path to commercialization and maximize the potential for success, regardless of the path taken.

About the authors

Dawood Parker MBE, FInstP, is a scientist, turned successful entrepreneur in the field of medical technology. He has been involved in university–industry collaborations and has initiated a number of start-up companies. He is currently Managing Director of Melys AFS Ltd and Melys Diagnostics Ltd.

Surya Raghu's technical expertise is in meso-, micro- and nano-fluidic devices and is involved in product development in joint collaborations with SMEs in the UK and the US.

Richard Brooks is a chartered accountant with more than 25 years' experience of working with start-ups and SMEs.

Measuring Time

Frequency measurements and related developments in physics

Masatoshi Kajita
National Institute of Information and Communications Technology, Japan

iopscience.org/book/978-0-7503-2124-2

About the book

This fascinating book recounts the importance of precise measurements and their inherent uncertainty, before telling the story of humankind's efforts to define and measure time with increasing accuracy and the effect this has on science. The effort to master time culminated in the development of modern atomic clocks – the most accurate clocks ever constructed. These advanced devices are accurate to one second in 15 billion years and now act as the primary standard for time and frequency measurement. Our improvements in the accurate measurement of time have played a pivotal role in the development of modern science, including the confirmation of Einstein's theory of relativity and the recent detection of gravity waves. Furthermore, the precise measurement of time and frequency afforded by atomic clocks, and other mechanisms, is being used to examine key questions about the fundamentals of our universe, such as the possibility of symmetry violation or the idea that there may be variation of the fundamental constants over time.

About the author

Masatoshi Kajita graduated from the Department of Applied Physics at the University of Tokyo in 1981 and obtained his PhD from the Department of Physics at the University of Tokyo in 1986. After working at the Institute for Molecular Science, he joined the National Institute of Information and Communications Technology (NICT), formally Communications Research Laboratory (CRL), in 1989. In 2009 he was guest professor at the Université de Provence in Marseille, France.

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Instrumentation and measurement

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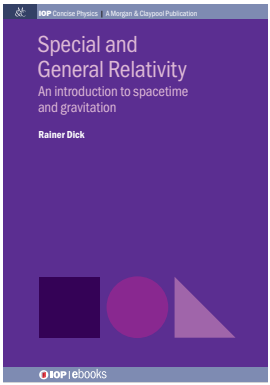

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Collection
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Subject
Astronomy and astrophysics

ISBN 9781643273792 (electronic)

ISBN 9781643273778 (print)

Special and General Relativity

An introduction to spacetime and gravitation

Rainer Dick
University of Saskatchewan, Canada

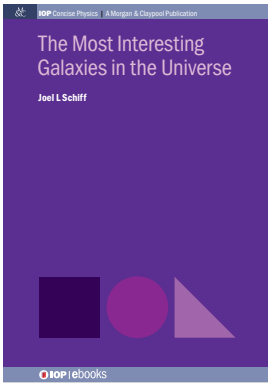
iopscience.org/book/978-1-64327-380-8

About the book

This book provides a concise introduction to the special theory of relativity and the general theory of relativity. The format has been chosen to provide the basis for a single semester course that can take the students all the way from the foundations of special relativity to the core results of general relativity: the Einstein equation, and the equations of motion for particles and light in curved spacetime. To facilitate access to the topics of special and general relativity for science and engineering students, without prior training in relativity or geometry, the relevant geometric notions are introduced and developed from the ground up. Students in physics, mathematics or engineering with an interest to learn Einstein's theories of relativity should be able to use this book already in the second semester of their third year. This text might also be used as the basis of a graduate-level introduction to relativity for students who did not learn relativity as part of their undergraduate training.

About the author

Rainer Dick studied physics at universities in Stuttgart, Karlsruhe and Hamburg, and he received a PhD from the University of Hamburg in 1990. He worked at the University of Munich, and the Institute for Advanced Study at Princeton in the USA, before joining the University of Saskatchewan in Canada, in 2000. Rainer's research interests span a wide range of topics from particle physics, cosmology and string theory, to materials physics and quantum optics. Rainer has published more than 100 papers in journals and conference proceedings, as well as the textbook *Advanced Quantum Mechanics: Materials and Photons*.



The Most Interesting Galaxies in the Universe

Joel L Schiff
University of Auckland, New Zealand

iopscience.org/book/978-1-64327-004-3

About the book

Prior to the 1920s it was generally thought, with a few exceptions, that our galaxy, the Milky Way, was the entire universe. Based on the work of Henrietta Leavitt with Cepheid variables, astronomer Edwin Hubble was able to determine that the Andromeda Galaxy and others had to lie outside our own. Moreover, based on the work of Vesto Slipher, involving the redshifts of these galaxies, Hubble was able to determine that the universe was not static, as had been previously thought, but expanding. The number of galaxies has also been expanding, with estimates varying from 100 billion to 2 trillion. While every galaxy in the universe is interesting just by its very fact of being, the author has selected 60 of those that possess some unusual qualities that make them of particular interest. These galaxies have complex evolutionary histories, with some having supermassive black holes at their core, others are powerful radio sources, a very few are relatively nearby and even visible to the naked eye, whereas the light from one recent discovery has been travelling for the past 13.4 billion years, and from a time when the universe was in its infancy.

About the author

Joel L Schiff has a PhD in mathematics from the University of California, Los Angeles. He spent his career at the University of Auckland and has written three books on mathematical subjects and one about the exotic nature of orchids, but astronomy has always remained a passion since receiving a small telescope as a young boy. He was the founder/publisher of the international journal *Meteorite*, and in 1999, he and his wife, discovered a new asteroid from their backyard observatory.

Extent 164pp

Collection
IOP Concise Physics

Subject
Astronomy and astrophysics

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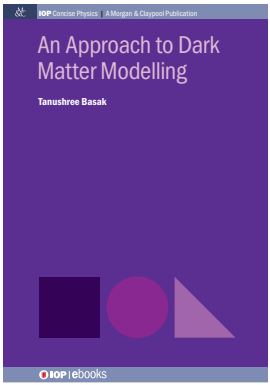
ISBN 9781643270012 (print)



Extent 64pp

Collection
IOP Concise Physics

Subject
Astronomy and astrophysics

ISBN 9781643271316 (electronic)

ISBN 9781643271293 (print)

An Approach to Dark Matter Modelling

Tanushree Basak
Indus University, India

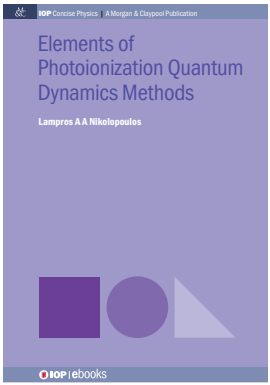
iopscience.org/book/978-1-64327-132-3

About the book

In the field of particle and astrophysics one of the major unresolved problems is to understand the nature and properties of dark matter, which constitutes almost 80% of the matter content of the universe. This book gives a pedagogical introduction to the field of dark matter in general, and in particular to the model building perspective. Starting from the evidence and need for dark matter, it goes into the deeper understanding of how to accommodate a dark matter candidate in a particle physics model. This book focuses on teaching the basic tools for model building of dark matter, starting from the easiest and gradually progressing to the most difficult. Although there are plenty of dark matter models available, this book concentrates on the important ones. It aims to motivate the reader to propose a new dark matter model complying with all observational constraints.

About the author

Tanushree Basak received her masters in physics from the University of Calcutta, India. She pursued her research interest by moving to the Physical Research Laboratory, India. She later earned her doctorate working on the phenomenology of particle dark matter models. She is currently working as an assistant professor of physics in the Department of Science and Humanities at Indus University, India. Her primary research fields are supersymmetry, physics beyond the standard model, dark matter and neutrino physics.



Extent 194pp

Collection
IOP Concise Physics

Subject
Atomic and molecular physics

ISBN 9781681747156 (electronic)

ISBN 9781681747132 (print)

Elements of Photoionization Quantum Dynamics Methods

Lampros A A Nikolopoulos
Dublin City University, Ireland

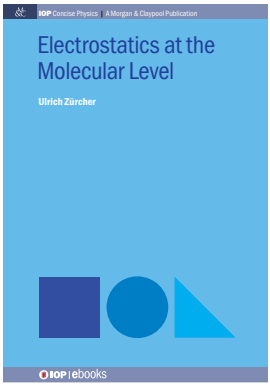
iopscience.org/book/978-1-68174-712-5

About the book

Elements of Photoionization Quantum Dynamics Methods focuses on the RMT approach to multiphoton quantum dynamics, which is employed to tackle the problem of laser-induced atomic dynamics. This recently developed formulation has shown the potential to become a mainstream *ab initio* theoretical approach, which is capable of describing the quantum dynamics of multielectron quantum systems exposed in ultrashort intense laser pulses lasting at the femtosecond timescale (~10^{-18} sec). The method itself builds on the division-of-space concept and has evolved as an extension of the well-established atomic *R*-matrix method to incorporate time in its formulation. It is this way that its name was inherited, *R*-matrix with time incorporation (RMT), although no *R*-matrix appears anywhere in the formulation.

About the author

Lampros A A Nikolopoulos is a lecturer at the School of Physical Sciences at Dublin City University (DCU). He earned his BSc (Hons) in physics from the physics department of the University of Athens, and his MSc and PhD in theoretical atomic physics from the University of Crete, Greece. His research interests include ultrashort laser-matter quantum dynamics and the development of high-performance computational methods for their *ab initio* description. He has (co)authored more than 80 journal articles, two book chapters, and has co-edited a special issue on short-wavelength free electron laser.



Electrostatics at the Molecular Level

Ulrich Zürcher
Cleveland State University, USA

iopscience.org/book/978-1-64327-186-6

About the book

Electrostatic forces are essential for the hierarchical structure of matter: electrons are bound to the atomic nucleus by electrostatic forces; atoms carry (partial) charges and ions with opposite charges attract and form (chemical) bonds. Small residual electrostatic forces between molecules allow them to form macroscopic structures such as crystals. *Electrostatics at the Molecular Level* begins with the basics and then dives deeper into the topic, with the aim to familiarize the reader with electrostatic forces at the atomic and molecular level. The purpose of this text is not to find the most accurate calculation of bond length and binding energies. It focusses, rather, on a discussion of appropriate scales (for mass, time and length, among others).

About the author

Ulrich Zürcher earned a PhD in theoretical physics from the University of Basel in Switzerland in 1989. He took several postdoctoral positions in theoretical physical chemistry (at the Massachusetts Institute of Technology and at Boston University) and statistical physics (at Clarkson University and now at the University of Michigan). He then began teaching at the undergraduate level: first at the University of Rhode Island and since 2003 at Cleveland State University. He was promoted to associate professor in 2010 and to professor in 2017.

Extent 116pp

Collection
IOP Concise Physics

Subject
Atomic and molecular physics

ISBN 9781643271859 (electronic)

ISBN 9781643271835 (print)

Extent 100pp

Collection
IOP Concise Physics

Subject
Atomic and molecular physics

ISBN 9781643274034 (electronic)

ISBN 9781643274010 (print)

Atomic Physics

Paul Ewart
University of Oxford, UK

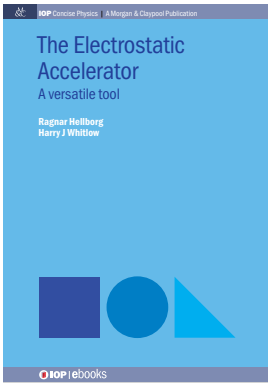
iopscience.org/book/978-1-64327-404-1

About the book

Atomic Physics provides a concise treatment of atomic physics and a basis to prepare for work in other disciplines that are underpinned by atomic physics, such as chemistry, biology and several aspects of engineering science. The focus is mainly on atomic structure since this is what is primarily responsible for the physical properties of atoms. After a brief introduction to some basic concepts, the perturbation theory approach follows the hierarchy of interactions starting with the largest. The other interactions of spin, and angular momentum of the outermost electrons with each other, the nucleus and external magnetic fields are treated in order of descending strength. A spectroscopic perspective is generally taken by relating the observations of atomic radiation emitted or absorbed to the internal energy levels involved. X-ray spectra are then discussed in relation to the energy levels of the innermost electrons. Finally, a brief description is given of some modern, laser-based, spectroscopic methods for the high-resolution study of the details of atomic structure.

About the author

Paul Ewart obtained a BSc and PhD in physics from Queen's University Belfast. He then became an SERC Advanced Fellow at the Blackett Laboratory at Imperial College London. Ewart's research work focuses on using lasers to study atomic and molecular physics, quantum optics and nonlinear spectroscopy. His current research includes interdisciplinary applications of laser spectroscopy to combustion and environmental physics, and he is a professor of physics and the head of the department of atomic and laser physics at the University of Oxford.



Extent 150pp

Collection
IOP Concise Physics

Subject
Atomic and molecular physics

ISBN 9781643273556 (electronic)

ISBN 9781643273532 (print)

The Electrostatic Accelerator

A versatile tool

[1]Ragnar Hellborg
[2]Harry J Whitlow
[1]Lund University, Sweden
[2]University of Louisiana at Lafayette, USA

iopscience.org/book/978-1-64327-356-3

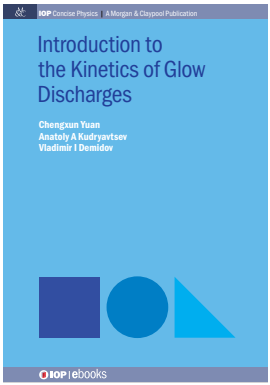
About the book

Electrostatic accelerators have been at the forefront of modern technology since 1932, when Sir John Cockroft and Ernest Walton developed the first accelerator. Although the electrostatic accelerator field is more than 90 years old, the field and the number of accelerators is growing more rapidly than ever. This book provides an overview of the basic science and technology that underlies the electrostatic accelerator field so it can serve as a reference guide and textbook for accelerator engineers as well as students and researchers who work with electrostatic accelerators.

About the authors

Ragnar Hellborg is an emeritus professor of applied physics at Lund University in Sweden. He has worked in the field of applied physics using electrostatic accelerators for more than 50 years.

Harry J Whitlow is a professor of physics and the director of the Louisiana Accelerator Center at the University of Louisiana at Lafayette, in the US. He has a long career in applying MeV ion accelerator-based methods to a wide range of fundamental and applied problems.



Introduction to the Kinetics of Glow Discharges

[1]Chengxun Yuan
[2]Anatoly Kudryavtsev
[3]Vladimir I Demidov
[1]Harbin Institute of Technology, China
[2]St Petersburg State University, Russia
[3]West Virginia University, USA

iopscience.org/book/978-1-64327-060-9

Extent 153pp

Collection
IOP Concise Physics

Subject
Atomic and molecular physics

ISBN 9781643270593 (electronic)

ISBN 9781643270579 (print)

About the book

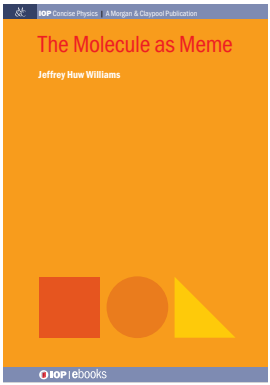
Electric glow discharges (glows) can be found almost everywhere, from atmospheric electricity to modern plasma technologies, and have long been the object of research. The main purpose of this book is to provide simple illustrations of the basic physical mechanisms and principles that determine the properties of electric glow discharges. It should enable readers to successfully participate in scientific and technical progress.

About the authors

Chengxun Yuan is the associate professor of the department of physics at Harbin Institute of Technology.

Anatoly A Kudryavtsev has been with St Petersburg State University since 1982.

Vladimir Demidov is a research professor at the department of physics and adjunct professor at the department of mathematics at West Virginia University.



Extent 146pp

Collection
IOP Concise Physics

Subject
Classical physics

ISBN 9781643272917 (electronic)

ISBN 9781643272894 (print)

The Molecule as Meme

Jeffrey Huw Williams
Bureau International des Poids et Mesures (BIPM), France

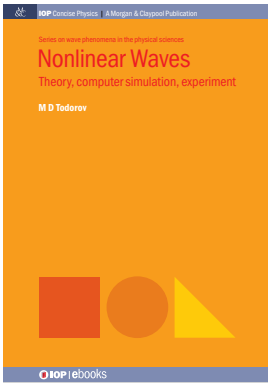
iopscience.org/book/978-1-64327-292-4

About the book

Until the mid-1920s, many physicists did not believe in the reality of molecules. Indeed, it was not until after the physics community had accepted Ernest Rutherford's 1913 solar-system-like model of the atom, and the quantum mechanical model of the coupling of electron spins in atoms, that physicists started to take seriously the necessity of explaining the chemical changes that chemists had been observing, investigating and recording since the days of the alchemists. This volume explores the concept of the molecule as a meme, or idea, that had been accepted in the chemistry community and then diffused outwards into the wider scientific community creating a new field of science, physical chemistry.

About the author

Jeffrey Huw Williams earned his PhD in chemical physics from at the University of Cambridge in 1981. His most recent position was as the head of publications and communications at the Bureau International des Poids et Mesures (BIPM), Sèvres. Since retirement, he has authored four other books in the IOP Concise Physics series: *Defining and Measuring Nature: The make of all things*, *Order from Force: A natural history of the vacuum*, *Quantifying Measurement: The tyranny of number* and *Crystal Engineering: How molecules build solids*.



Nonlinear Waves

Theory, computer simulation, experiment

M D Todorov
Technical University of Sofia, Bulgaria

iopscience.org/book/978-1-64327-047-0

About the book

This book concentrates upon the study of mathematical models of nonlinear solitary waves known as solitons. As the name indicates, a soliton is a localized wave that travels without changing its shape, such as an ocean wave. An important feature of solitons is that they keep their shapes after collisions with other solitons. Interesting to anybody who wants to unearth the real sense and nature of solitary waves, and the relevant mathematical tools to use for effective investigation and analysis of these phenomena, the text focuses on numerical analysis of solitons. The integrability and multidimensionality of solitons is inextricably bound up with the approach of investigation and, as the more physical systems are not fully integrable, even in one dimension, numerical analysis is the main tool to investigate and understand the pertinent physical mechanisms.

About the author

M D Todorov graduated in 1984 and received his PhD in 1989 from the St Kliment Ohridski University of Sofia, Bulgaria. Since 1990 he has been an associate professor and full professor (2012) with the Department of Applied Mathematics and Computer Science by the Technical University of Sofia, Bulgaria. For the last few years his primary research areas have been mathematical modeling, computational studies, and scientific computing of nonlinear phenomena including soliton interactions, nonlinear electrodynamics, nonlinear optics, mathematical biology and bioengineering, and astrophysics.

Extent 186pp

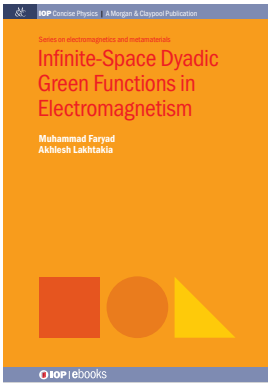
Collection
IOP Concise Physics

Series
IOP Series in Wave Phenomena in the Physical Sciences

Subject
Classical physics

ISBN 9781643270463 (electronic)

ISBN 9781643270449 (print)



Infinite-Space Dyadic Green Functions in Electromagnetism

[1]Muhammad Faryad
[2]Akhlesh Lakhtakia
[1]Lahore University of Management Sciences, Pakistan
[2]Pennsylvania State University, USA

iopscience.org/book/978-1-6817-4557-2

Extent 170pp

Collection
IOP Concise Physics

Series
IOP Series in Electromagnetics and Metamaterials

Subject
Classical physics

ISBN 9781681745589 (electronic)

ISBN 9781681745565 (print)

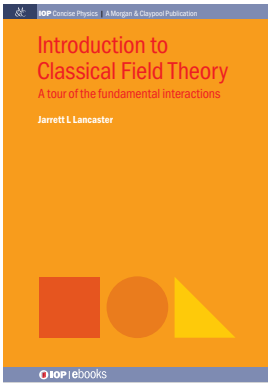
About the book

In any linear system the input and the output are connected by means of a linear operator. When the input can be notionally represented by a function that is null valued everywhere except at a specific location in spacetime, the corresponding output is an entity called the Green function in field theories. Dyadic Green functions are commonplace in electromagnetics, because both the input and the output are vector functions of space and time. Numerous research papers have been written on dyadic Green functions when both the input and the output are time harmonic and a linear homogeneous medium occupies all space. This book provides a self-contained survey of the state-of-the-art knowledge of infinite-space dyadic Green functions.

About the authors

Muhammad Faryad is an assistant professor of physics at the Lahore University of Management Sciences and he is a section editor of *Optik: International Journal for Light and Electron Optics*. His current research interests include electromagnetics of complex mediums, surface electromagnetic waves, photonic crystals, and solar cells.

Akhlesh Lakhtakia is the Charles Godfrey Binder (endowed) professor of engineering science and mechanics at Pennsylvania State University, and an adjunct professor of electrical engineering at the Indian Institute of Technology Kanpur. He was the editor-in-chief of the *Journal of Nanophotonics* from its inception in 2007 until 2013.



Extent 168pp

Collection
IOP Concise Physics

Subject
Classical physics

ISBN 9781643270838 (electronic)

ISBN 9781643270814 (print)

Introduction to Classical Field Theory

A tour of the fundamental interactions

Jarrett L Lancaster
High Point University, USA

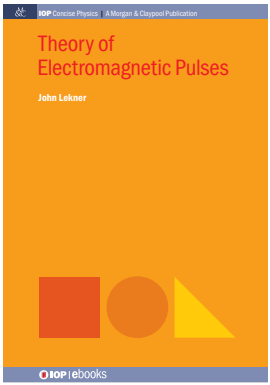
iopscience.org/book/978-1-64327-084-5

About the book

This book is a short introduction to classical field theory, and is most suitable for undergraduate students who have completed at least intermediate-level courses in electromagnetism and classical mechanics. The main theme of the book is showcasing the role of fields in mediating action-at-a-distance interactions. Suitable technical machinery is developed to explore at least some aspect of each of the four known fundamental forces in nature. Beginning with the physically-motivated introduction to field theory, the text covers the relativistic formulation of electromagnetism in great detail so that aspects of gravity and the nuclear interaction not usually encountered at the undergraduate level can be covered by using analogies with familiar electromagnetism. Special topics such as the behavior of gravity in extra compactified dimensions, magnetic monopoles and electromagnetic duality, and the Higgs mechanism are also briefly considered.

About the author

Jarrett L Lancaster obtained a BS in physics and applied mathematics from the University of North Carolina at Greensboro and his PhD in physics from New York University. His research focuses on dynamics of low-dimensional quantum systems and emergent phenomena. He worked previously as a postdoctoral researcher at the Joint School of Nanoscience and Nanoengineering and as a visiting assistant professor of physics at Roanoke College. He is currently an assistant professor of physics at High Point University.



Theory of Electromagnetic Pulses

John Lekner
Victoria University of Wellington, New Zealand

iopscience.org/book/978-1-6432-7022-7

About the book

This short monograph presents the theory of electromagnetic pulses in a simple and physical way. All pulses discussed are exact solutions of the Maxwell equations, and have finite energy, momentum and angular momentum. There are five chapters: Fundamentals, Solutions of the wave equation, Electromagnetic pulses, Angular momentum, and Lorentz transformations. Nine appendices cover mathematical or associated aspects, such as chiral measures of electromagnetic fields. The subject matter is restricted to free-space classical electrodynamics, but contact is made with quantum theory in proofs that causal pulses are equivalent to superpositions of photons.

Extent 100pp

Collection
IOP Concise Physics

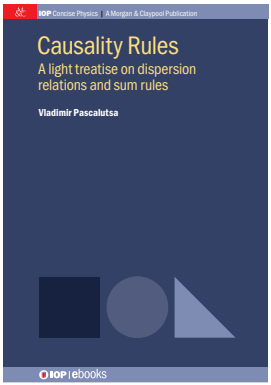
Subject
Classical physics

ISBN 9781643270210 (electronic)

ISBN 9781643270197 (print)

About the author

John Lekner is an emeritus professor of theoretical physics at Victoria University of Wellington, New Zealand. After an MSc at the University of Auckland and PhD at the University of Chicago, he taught at the Cavendish Laboratory, Cambridge, where he was also Fellow and tutor in physics at Emmanuel College. He has worked in statistical physics, electromagnetism, quantum theory and theory of fluids. He is the author of 150 papers and of the book *Theory of Reflection*.



Extent 84pp

Collection
IOP Concise Physics

Subject
Classical physics

ISBN 9781681749181 (electronic)

ISBN 9781681749167 (print)

Causality Rules

A light treatise on dispersion relations and sum rules

Vladimir Pascalutsa
Institute for Nuclear Physics, Johannes Gutenberg University Mainz, Germany

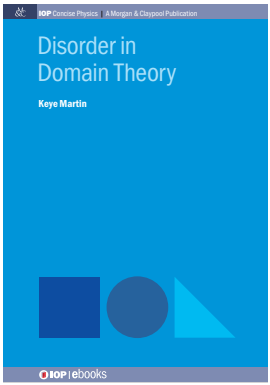
iopscience.org/book/978-1-6817-4919-8

About the book

Scattering of light by light is a fundamental process arising at the quantum level through vacuum fluctuations. This short book will explain how, remarkably enough, this quantum process can be described in terms of classical quantities, which are the fusion cross sections. The description is derived from general principles such as causality, unitarity, Lorentz and gauge symmetries. Thus, the reader will be introduced to a rigorous formulation of these fundamental concepts, as well as their physical interpretation, in the context of light-by-light scattering. The book will also demonstrate how these principles emerge from quantum loop calculations of light-by-light scattering within the Standard Model (SM) of particle physics. The final chapter will give a survey of timely applications of the light self-interaction. They range from non-linear optics to precision measurements of the muon anomaly and the dispersion of rays in cosmic microwave background (CMB), to the very recent discovery of light-by-light scattering at the Large Hadron Collider (LHC) at CERN.

About the author

Vladimir Pascalutsa is a tenured scientist at the Institute for Nuclear Physics at Johannes Gutenberg University of Mainz, Germany. Prior to this he studied and researched at the Kiev State University and Kernfysisch Versneller Instituut (KVI), before obtaining his PhD at the Institute for Theoretical Physics in Utrecht. He also held postdoctoral positions at NIKHEF (Amsterdam, the Netherlands), Flinders University (Adelaide, Australia), Ohio University (Athens OH, USA), the College of William and Mary (Williamsburg VA, USA), and the ECT* (Trento, Italy).



Disorder in Domain Theory

Keye Martin
Naval Research Laboratory, USA

iopscience.org/book/978-1-64327-274-0

About the book

Domain theory is a subject that emerged as a response to natural concerns in the semantics of computation, and it involves the study of ordered sets that possess an unusual amount of mathematical structure. *Disorder in Domain Theory* explores the connection between domain theory and quantum information science and the concept that relates them: disorder.

Extent 70pp

Collection
IOP Concise Physics

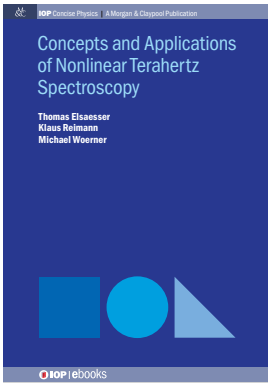
Subject
Condensed matter

ISBN 9781643272733 (electronic)

ISBN 9781643272719 (print)

About the author

Keye Martin earned a degree in computer science from The University of New Orleans and a doctorate in mathematics from Tulane University. He went on to become a research fellow at the University of Oxford. He is currently employed as a research mathematician at the Naval Research Laboratory in Washington DC, where he founded the section on informatic phenomena: a group of mathematicians, physicists and computer scientists interested in using natural systems to process information. He spends his spare time writing, proving theorems and playing music.



Concepts and Applications of Nonlinear Terahertz Spectroscopy

Thomas Elsaesser
Klaus Reimann
Michael Woerner
Max Born Institute, Germany

iopscience.org/book/978-1-64327-216-0

Extent 158pp

Collection
IOP Concise Physics

Subject
Optics and photonics

ISBN 9781643272153 (electronic)

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About the book

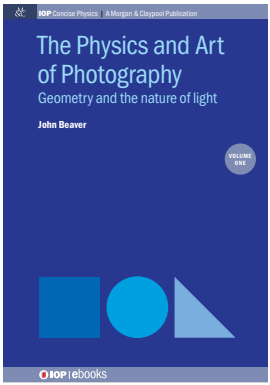
Terahertz (THz) radiation with frequencies between 100 GHz and 30 THz has developed into an important tool of science and technology, with numerous applications in materials characterization, imaging, sensor technologies and telecommunications. Recent progress in THz generation has provided ultrashort THz pulses with electric field amplitudes of up to several megavolts/cm. This development opens the new research field of nonlinear THz spectroscopy, in which strong light-matter interactions are exploited to induce quantum excitations and/or charge transport and follow their nonequilibrium dynamics in time-resolved experiments. This book introduces methods of THz generation and nonlinear THz spectroscopy; discusses the relevant theoretical concepts; and presents prototypical, experimental and theoretical results in condensed matter physics. The potential of nonlinear THz spectroscopy is illustrated by recent research, including an overview of the relevant literature.

About the authors

Thomas Elsaesser is a director at the Max Born Institute in Germany, and a professor of experimental physics at the Humboldt University of Berlin.

Klaus Reimann has worked as a scientist at the Max Born Institute, in the field of ultrafast mid-infrared and THz spectroscopy, since 1999.

Michael Woerner is a department head at the Max Born Institute, and holds a lecturer qualification (habilitation) in physics at the Humboldt University of Berlin.



Extent 176pp

Collection
IOP Concise Physics

Subject
Optics and photonics

ISBN 9781643273310 (electronic)

ISBN 9781643273297 (print)

The Physics and Art of Photography, Volume 1

Geometry and the nature of light

John Beaver
University of Wisconsin Oshkosh, USA

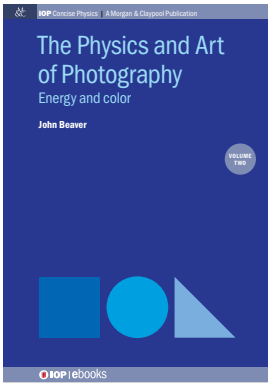
iopscience.org/book/978-1-64327-332-7

About the book

This book uses photography as a point of departure for learning about physics, while also using physics to ask fundamental questions about the nature of photography as an art. The topics center around hands-on applications and are most often illustrated by photographic processes that are inexpensive and easily accessible to students, including a versatile new process developed by the author, and herein first described in print. A central theme is the connection between the physical interaction of light and matter, and the artistry of the photographic processes and their results. In addition to focusing on the physics of light and the optics of lenses, extended discussions of topics less commonly covered in a beginning text are also explored, including symmetry in art and physics, different physical process of the scattering of light, photograms (photographic shadow prints) and the nature of shadows, elements of 2D design, pinhole photography and the view camera. These subjects have been chosen because of their role in a more general discussion of the relation between science and art that is of interest to readers of all backgrounds and levels of expertise.

About the author

John Beaver is a professor of physics and astronomy at the Fox Valley Campus of the University of Wisconsin Oshkosh, where he teaches physics, astronomy, photography and interdisciplinary courses. He earned his BS in physics and astronomy in 1985 from Youngstown State University, and his PhD in astronomy in 1992 from The Ohio State University. His published work in astronomy focuses on the topics of spectrophotometry of comets and gaseous nebulae, and multicolor photometry of star clusters.



Extent 178pp

Collection
IOP Concise Physics

Subject
Optics and photonics

ISBN 9781643273433 (electronic)

ISBN 9781643273419 (print)

The Physics and Art of Photography, Volume 2

Energy and color

John Beaver
University of Wisconsin Oshkosh, USA

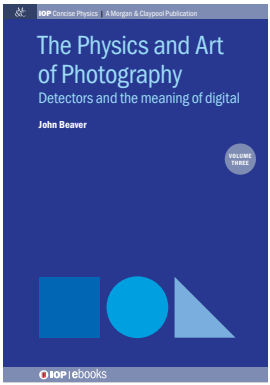
iopscience.org/book/978-1-64327-344-0

About the book

The Physics and Art of Photography: Energy and color focuses on the physics of energy, power, illuminance and intensity of light, and how these relate to the photographic exposure, including a detailed example that follows the emission of light from the Sun all the way through to the formation of the image in the camera. These concepts are described in both their traditional manner, but also using very-low-sensitivity photography as an example, which brings the physical concepts to the fore in a visible way. Color, in terms of the spectrum of light, is also considered: how it interacts with the subject, and how the camera's light detector interacts with the image focused upon it. But of equal concern is the only partially-understood and sometimes unexpected ways in which the human eye interprets this spectral stimulus as color. This volume covers basic photographic subjects such as shutter, aperture, ISO, metering and exposure value, as well as less familiar topics such as the Jones-Condit equation, Lambertian versus isotropic reflections, reflection and response curves, and the opponent-process model of color perception.

About the author

John Beaver is a professor of physics and astronomy at the Fox Valley Campus of the University of Wisconsin Oshkosh, where he teaches physics, astronomy, photography and interdisciplinary courses. He earned his BS in physics and astronomy in 1985 from Youngstown State University, and his PhD in astronomy in 1992 from The Ohio State University. His published work in astronomy focuses on the topics of spectrophotometry of comets and gaseous nebulae, and multicolor photometry of star clusters.



The Physics and Art of Photography, Volume 3

Detectors and the meaning of digital

John Beaver
University of Wisconsin Oshkosh, USA

iopscience.org/book/978-1-64327-386-0

About the book

This is the third volume in a three-part series that uses art photography as a point of departure for learning about physics, while also using physics to ask fundamental questions about the nature of photography as an art. This volume focuses on the physics and chemistry of photographic light-sensitive materials, as well as the human retina. It also considers the rudimentary nature of digital photography and its relationship to the analog photography that preceded it.

About the author

John Beaver is a professor of physics and astronomy at the Fox Valley Campus of the University of Wisconsin Oshkosh, where he teaches physics, astronomy, photography and interdisciplinary courses. He earned his BS in physics and astronomy in 1985 from Youngstown State University, and his PhD in astronomy in 1992 from The Ohio State University. His published work in astronomy focuses on the topics of spectrophotometry of comets and gaseous nebulae, and multicolor photometry of star clusters.

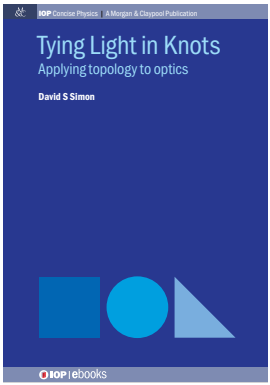
Extent 192pp

Collection
IOP Concise Physics

Subject
Optics and photonics

ISBN 9781643273853 (electronic)

ISBN 9781643273839 (print)



Tying Light in Knots

Applying topology to optics

David S Simon
Stonehill College, USA

iopscience.org/book/978-1-64327-234-4

About the book

Topology is the study of properties of geometrical objects that remain invariant as the object is bent, twisted, or otherwise continuously deformed. It has been an indispensable tool in particle physics and solid-state physics for decades, but in recent years it has become increasingly relevant in classical and quantum optics as well. It makes appearances through such diverse phenomena as Pancharatnam–Berry phases, optical vortices and solitons, and optical simulations of solid-state topological phenomena. The goal of this book is to provide in concise form the necessary mathematical background needed to understand these developments and to give a rapid survey of some of the optical applications where topological issues arise.

About the author

David S Simon received a bachelor's degree in mathematics and physics from The Ohio State University, followed by doctoral degrees in theoretical physics (Johns Hopkins) and engineering (Boston University). Originally trained in mathematical physics and quantum field theory, he now works primarily in quantum optics and related areas. After more than a decade teaching at Nova Southeastern University in Fort Lauderdale, he is currently a professor of physics in the Department of Physics and Astronomy at Stonehill College (Easton, MA) and a visiting researcher at Boston University.

Extent 132pp

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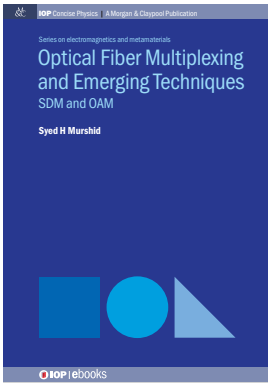

Optical Fiber Multiplexing and Emerging Techniques

SDM and OAM

Syed H Murshid
Florida Institute of Technology, USA

iopscience.org/book/978-1-68174-569-5

About the book

Starting with the history and fundamentals of optical fiber communications, *Optical Fiber Multiplexing and Emerging Techniques* introduces existing optical multiplexing techniques, and it focuses on the spatial domain multiplexing (SDM) and orbital angular momentum (OAM) of photon-based multiplexing. These two emerging multiplexing techniques have added new degrees of photon freedom to optical fibers.

About the author

Syed H Murshid is a professor of electrical and computer engineering at the Florida Institute of Technology in Melbourne, Florida. He received his BE in electronics engineering from NED University of Engineering and Technology, and his MS and PhD in electrical engineering from the Florida Institute of Technology. Murshid teaches optics and circuits courses at graduate and undergraduate level, and his research focuses on optical fiber communications and sensors. He holds 10 US and international patents, and he has made more than 30 patent disclosures.

Extent 134pp

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Series
IOP Series in Electromagnetics and Metamaterials

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Optics and photonics

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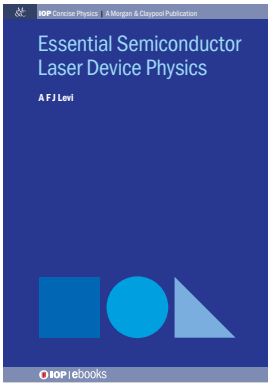

Essential Semiconductor Laser Device Physics

A F J Levi
University of Southern California, USA

iopscience.org/book/978-1-6432-7028-9

About the book

The invention of the semiconductor laser along with silica glass fiber has enabled an incredible revolution in global communication infrastructure of direct benefit to all. Development of devices and system concepts that exploit the same fundamental light-matter interaction continues. Researchers and technologists are pursuing a broad range of emerging applications, everything from automobile collision avoidance to secure quantum key distribution. This book sets out to summarize key aspects of semiconductor laser device physics and principles of laser operation. It provides a convenient reference and essential knowledge to be understood before exploring more sophisticated device concepts. The contents serve as a foundation for scientists and engineers, without the need to invest in specialized detailed study. Supplementary material in the form of MATLAB® is available for numerically generated figures.

About the author

A F J Levi joined the faculty at the University of Southern California in mid-1993 after working for 10 years at AT&T Bell Laboratories. He invented hot electron spectroscopy, discovered ballistic electron transport in heterostructure bipolar transistors, demonstrated room temperature operation of unipolar transistors with ballistic electron transport, created the first microdisk laser, and carried out work in parallel fiber optic interconnect components in computer and switching systems. To date he has published numerous scientific papers, several book chapters, is the author of the books *Applied Quantum Mechanics* and *Essential Classical Mechanics for Device Physics*, coeditor of the book *Optimal Device Design*, and holds 17 US patents.

Extent 110pp

Collection
IOP Concise Physics

Subject
Optics and photonics

ISBN 9781643270272 (electronic)

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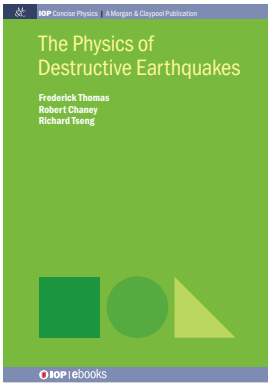


The Physics of Destructive Earthquakes

Frederick Thomas
Robert Chaney
Richard Tseng
Math Machines, Inc., USA

iopscience.org/book/978-1-64327-078-4

About the book

This book is a concise introduction to the interactions between earthquakes and human-built structures (buildings, dams, bridges, power plants, pipelines and more). It focuses on the ways in which these interactions illustrate the application of basic physics principles and concepts, including inertia, force, shear, energy, acceleration, elasticity, friction and stability.

Extent 104pp

Collection
IOP Concise Physics

Subject
Environment and energy

ISBN 9781643270777 (electronic)

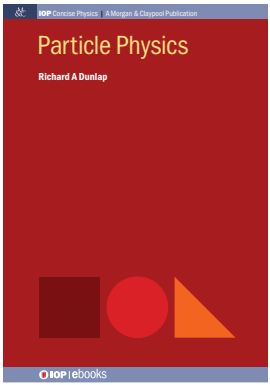
ISBN 9781643270753 (print)

About the authors

Frederick Thomas has a BS in physics, a PhD in science education and more than 30 years' experience teaching physics, astronomy and mathematics at the secondary school and introductory college levels.

Robert Chaney is a professor of mathematics at Sinclair Community College and has collaborated with Thomas for more than 20 years in the development of curriculum materials and hardware and in providing in-service workshops for high school and college faculty.

Richard Tseng, PhD, PE, specializes in soil dynamics, focusing on the study of the behavior of soil in relation to earthquake and liquefaction potential. He has performed soil studies for buildings, bridges, highways, airports, earth dams, and transmission and communications towers for more than 40 years.



Extent 128pp

Collection
IOP Concise Physics

Subject
Particle and nuclear physics

ISBN 9781643273617 (electronic)

ISBN 9781643273594 (print)

Particle Physics

Richard A Dunlap
Dalhousie University, Canada

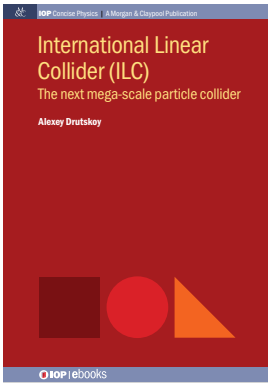
iopscience.org/book/978-1-64327-362-4

About the book

Our understanding of subatomic particles has developed over many years and a clear picture of the different particles, their interactions and their interrelationships only emerged in the latter part of the 20th century. The development of the Standard Model provided clarification of the way in which various particles, specifically the hadrons, relate to one another and the way in which their properties are determined by their structure. Only recently has the final piece of, perhaps, the final model been clarified with the observation of the Higgs boson. The description of particle structure on the basis of the Standard Model, along with recent discoveries concerning neutrino properties, provides us with a comprehensive picture of the properties of subatomic particles. Part I of this book provides an overview of the Standard Model of particle physics including an overview of the discovery and properties of the Higgs boson. Part II summarizes the important investigations into the physics of neutrinos and provides an overview of the interpretation of these studies.

About the author

Richard A Dunlap received a BS in physics from Worcester Polytechnic Institute, an AM in physics from Dartmouth College and a PhD in physics from Clark University. Since then, he has been a faculty member at Dalhousie University, where he was appointed Faculty of Science Killam Research Professor in physics from 2001 to 2006 and served as the director of the Dalhousie University Institute for Research in Materials from 2009 to 2015. He is currently a research professor in the Department of Physics and Atmospheric Science.



Extent 62pp

Collection
IOP Concise Physics

Subject
Particle and nuclear physics

ISBN 9781643273259 (electronic)

ISBN 9781643273235 (print)

International Linear Collider (ILC)

The next mega-scale particle collider

Alexey Drutskoy
Moscow Engineering Physics Institute, Russia

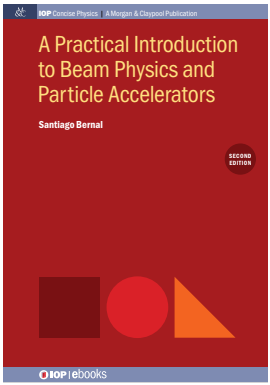
iopscience.org/book/978-1-64327-326-6

About the book

The natural and most powerful way of obtaining new knowledge in particle physics is to build a new collider with a larger energy. To this end, the Large Hadron Collider (LHC) was created and is now operating at the world record center-of-mass energy of 13 TeV. Although the design of colliders with a larger energy of 50–100 TeV has been discussed, the practical realization of such a project is not possible for another 20–30 years. Of course, many new results are expected from LHC over the next decade. However, we must also think about other opportunities, and in particular the construction of more dedicated experiments. There are many potentially promising projects, however, the most obvious possibility to achieve significant progress in particle physics in the near future is the construction of a linear e^+e^- collider with energies in the range of 250–1000 GeV. Such a project, the International Linear Collider, is proposed to be built in Kitakami, Japan. This book will discuss why this project is important and which new discoveries can be expected with this collider.

About the author

Alexey Drutskoy is a lead scientist at the Lebedev Physical Institute (LPI) and a professor at the Moscow Engineering Physics Institute, and Moscow Institute of Physics and Technology. Previously, he worked on the ARGUS collaboration, the H1 collaboration, and the Belle collaboration. He is a current member of the DO collaboration, and the ILD collaboration.



A Practical Introduction to Beam Physics and Particle Accelerators, 2nd Edition

Santiago Bernal
University of Maryland, USA

iopscience.org/book/978-1-64327-090-6

About the book

The second edition of this book continues to provide a brief exposition of the principles of beam physics and particle accelerators with emphasis on numerical examples. It includes revisions and additions to every section with new material, figures, improved notation, and new or enhanced computer resources. There is also a reorganization of the contents and new sections. The latter include material on transfer maps, thermodynamics of beams, additional aspects of envelope matching, betatron resonances and dispersion with space charge, closed orbits, and beam cooling. The appendix has been completely reorganized, revised and updated and now includes short descriptions of the map code MaryLie, and the particle-in-cell code Warp.

Extent 148pp

Collection
IOP Concise Physics

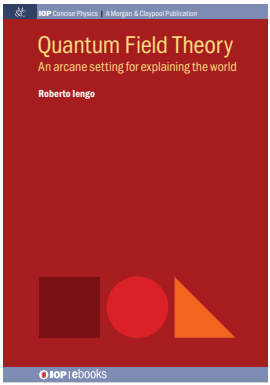
Subject
Particle and nuclear physics

ISBN 9781643270890 (electronic)

ISBN 9781643270913 (print)

About the author

Santiago Bernal obtained a BSc in physics from the Universidad Nacional de Colombia, Colombia, in 1981, a MSc in physics from Georgia Tech in 1983, and a PhD in physics from the University of Maryland in 1999. He is the junior coauthor with Charles L Joseph (Rutgers University) of *Modern Devices: The Simple Physics of Modern Technology* (Wiley, 2015). In addition to beam and accelerator physics, Bernal is interested in statistical mechanics and educational aspects of physics.



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Collection
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Subject
Particle and nuclear physics

ISBN 9781643270524 (electronic)

ISBN 9781643270500 (print)

Quantum Field Theory

An arcane setting for explaining the world

Roberto Iengo
Scuola Internazionale Superiore di Studi Avanzati, Italy

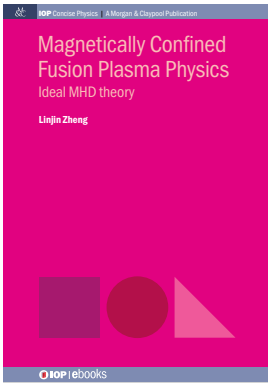
iopscience.org/book/978-1-6432-7053-1

About the book

While there are many good books in particle physics, very seldom, if ever, has a non-specialist comprehensive description of quantum field theory appeared. The intention of this short book is to offer a guided tour of that innermost topic of theoretical physics. Written in plain English and avoiding the mathematical apparatus, but still describing its various facets up to the research frontier, this book gives a glimpse of what the human mind has been capable of imagining for dealing with the behaviour of nature at the most fundamental level.

About the author

Roberto Iengo is a professor at the PhD Graduate School SISSA (Trieste, Italy), now retired but still affiliated to the Theoretical Particle Physics group. He is author (also spelt as Jengo) of many scientific publications in various aspects of quantum field theory and string theory. He has taught for years a course in quantum field theory for PhD students. He has also been director of the SISSA interdisciplinary laboratory of humanities and science and of the master in science communication.



Magnetically Confined Fusion Plasma Physics

Ideal MHD theory

Linjin Zheng
University of Texas at Austin, USA

iopscience.org/book/978-1-64327-138-5

About the book

This book describes the ideal magnetohydrodynamic (MHD) theory for magnetically confined fusion plasmas. Advanced topics are presented in an attempt to fill the gap between up-to-date research developments and plasma physics textbooks. Each topic is self-contained and trackable, with the mathematical treatments detailed and underlying physics explained. Both analytical theories and numerical schemes are also provided, and the current research developments in this field as well as the future prospects are discussed.

About the author

Linjin Zheng is a theoretical physicist for controlled thermonuclear fusion plasmas. He received his PhD from the Institute of Physics at the Chinese Academy of Sciences in Beijing. He is currently working at the Institute for Fusion Studies at The University of Texas at Austin. His major contributions, with his colleagues, include the reformulation of gyrokinetic theory, development of the theoretical interpretation for the so-called edge localized modes, invention of the free boundary ballooning representation, discoveries of 2nd toroidal Alfvén eigenmodes and current interchange tearing modes.

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Collection
IOP Concise Physics

Subject
Plasmas

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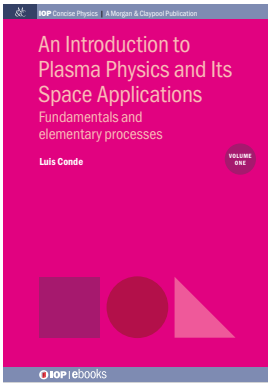

An Introduction to Plasma Physics and Its Space Applications, Volume 1

Fundamentals and elementary processes

Luis Conde
Universidad Polytechnica Madrid, Spain

iopscience.org/book/978-1-64327-174-3

About the book

This introductory text is an expanded version of class notes and lectures that the author used to teach students of aerospace engineering and physics for several years. Covering the basic kinetic theory of neutral gases in equilibrium, as well as the physical description of plasmas as a statistical system of interacting particles and advanced concepts of kinetic theory, the book is intended as a reading guide that is accessible to students and non-specialists.

About the author

Luis Conde is a professor of physics at the Universidad Politécnica de Madrid (UPM). He received his PhD in physics from Madrid Open University. He has held positions with the Spanish National Research Council and the Complutense University of Madrid, and he joined the UPM faculty of Aerospace Engineering as a member of the Department of Applied Physics. He is Fellow of the European Physical Society and has authored/co-authored 45 journal articles and 46 conference papers.

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Collection
IOP Concise Physics

Subject
Plasmas

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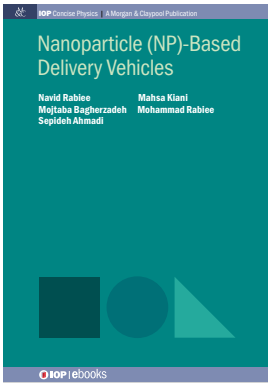

Nanoparticle (NP)-Based Delivery Vehicles

[1]Navid Rabiee
[2]Mahsa Kiani
[2]Mojtaba Bagherzadeh
[2]Mohammad Rabiee
[3]Sepideh Ahmadi
[1]Shahid Beheshti University, Iran
[2]Department of Chemistry, Sharif University of Technology, Iran
[3]Shahid Beheshti University of Medical Sciences, Iran

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Extent 64pp

Collection
IOP Concise Physics

Subject
Materials

ISBN 9781643274515 (electronic)

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About the book

Gene therapy as a potential method for the treatment of genetic disorders and other malignancies, as well as the treatment of many cancers, has attracted a great amount of attention in recent years. *Nanoparticle (NP)-Based Delivery Vehicles* looks at smart nanostructures and how these are considered a promising approach when applied to drug- and gene-delivery systems, in addition to how to solve the problems related to the inefficient transfer of medication to the affected cells.

About the authors

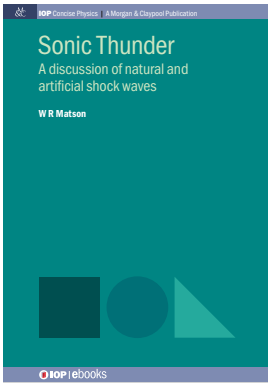
Navid Rabiee graduated with an MSc in inorganic chemistry from Shahid Beheshti University, Iran, in 2018.

Mahsa Kiani joined ANNRG in 2019 to collaborate with Mahdi Karimi's research lab at Iran University of Medical Science, in Iran.

Mojtaba Bagherzadeh is a professor at the Department of Chemistry of Sharif University of Technology, Iran.

Mohammad Rabiee is an associate professor at the Biomedical Engineering Department of Amirkabir University of Technology, Iran.

Spideh Ahmadi is currently working on smart nanostructures applied in therapeutic agent delivery systems.



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Collection
IOP Concise Physics

Subject
Materials

ISBN 9781681749655 (electronic)

ISBN 9781681749631 (print)

Sonic Thunder

A discussion of natural and artificial shock waves

W R Matson
South Dakota State University

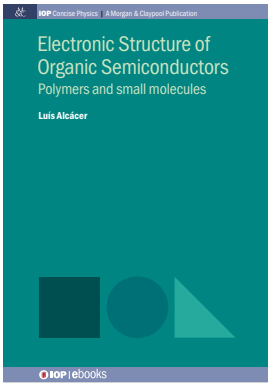
iopscience.org/book/978-1-68174-966-2

About the book

The study of shock-wave formation and dynamics begins with a study of waves, themselves. Simple harmonic motion is used to analyze the physical mechanisms of wave generation and propagation, and the principle of superposition is used to mathematically generate constructive and destructive interference. Further development leads to the shock singularity where a single wave of immense magnitude propagates and decays through various media. Correlations with the fields of thermodynamics, meteorology, crater formation and acoustics are made, as well as a few special applications.

About the author

W R Matson received his doctoral degree in condensed matter from Oklahoma State University in 2004. Since that time, he has been an assistant professor at universities in Michigan, Chicago, Minnesota and South Dakota. His current research interest is complex flow dynamics in the vicinity of rigid boundaries and obstructive objects. He is also the author of *Earthquakes: The sound of multi-modal waves*.



Electronic Structure of Organic Semiconductors

Polymers and small molecules

Luís Alcácer
Instituto de Telecomunicações and Instituto Superior Técnico, Portugal

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Extent 134pp

Collection
IOP Concise Physics

Subject
Materials

ISBN 9781643271675 (electronic)

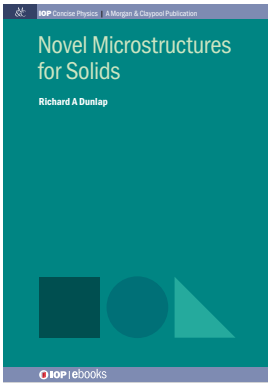
ISBN 9781643271651 (print)

About the book

Written from the perspective of an experimental chemist, this book puts together some of the fundamentals from chemistry, solid-state physics and quantum chemistry to help with understanding and predicting the electronic and optical properties of organic semiconductors. The text is intended to assist graduate students and researchers in the field of organic electronics to use theory to design more efficient materials for organic electronic devices such as organic solar cells, light-emitting diodes and field-effect transistors. After addressing some of the basics in solid-state physics, a comprehensive introduction to molecular orbitals and band theory leads into a description of computational methods based on Hartree–Fock and density functional theory (DFT) – for predicting geometry conformations – frontier levels and energy band structures. Topological defects and transport and optical properties are then addressed, and one of the most commonly used transparent conducting polymers, PEDOT:PSS, is described in detail.

About the author

Luís Alcácer obtained his PhD from the University of California, Riverside. He was a professor at the Instituto Superior Técnico (IST) at Universidade de Lisboa, where he lectured in the areas of chemical physics, solid-state physics and quantum mechanics. He is now an emeritus professor at IST and a senior researcher at Instituto de Telecomunicações. He is the author of two books in Portuguese: *Introduction to Quantum Mechanics with Applications to Modern Computational Chemistry* and *The Devil in the Quantum World*.



Novel Microstructures for Solids

Richard A Dunlap
Dalhousie University, Canada

iopscience.org/book/978-1-64327-338-9

Extent 126pp

Collection
IOP Concise Physics

Subject
Materials

ISBN 9781643273372 (electronic)

ISBN 9781643273358 (print)

About the book

In the early part of the 20th century, X-rays were used for the investigation of the atomic structure of solids. Until the 1980s, experimental evidence suggested that virtually all solid materials were either amorphous or ordered three-dimensional structures with translational and rotational symmetry that were described by classical crystallographic concepts. Since then, a number of structures that stretch the concept of a crystalline material have been discovered. In 1984, a solid phase, known as a quasicrystal, that possessed long-range order but lacked the periodicity of a crystalline material, was observed. At about the same time, novel molecular structures were observed for elemental carbon and, more recently, carbon has been prepared as a two-dimensional material. This book reviews some of the recently-discovered materials with novel microstructures. Part I describes the structure and properties of quasicrystalline materials, while Part II gives an overview of some of the unique phases that have been observed for elemental carbon. These unusual structures are discussed in the context of related materials with traditional crystallographic order.

About the author

Richard A Dunlap received a BS in physics from Worcester Polytechnic Institute, an AM in physics from Dartmouth College and a PhD in physics from Clark University. Since receiving his PhD he has been a faculty member of the Department of Physics and Atmospheric Science at Dalhousie University, where he is currently a research professor. He is the author of four other books; *Experimental Physics: Modern Methods*, *The Golden Ratio and Fibonacci Numbers*, *An Introduction to the Physics of Nuclei and Particles*, and *Sustainable Energy*.

Metamaterial Multiverse

Igor I Smolyaninov
University of Maryland, USA

iopscience.org/book/978-1-64327-368-6

About the book

Many of the physical properties of our universe, such as the relative strength of the fundamental interactions and the value of the cosmological constant, appear to be fine-tuned for the existence of human life. One possible explanation of this assumes the existence of a multiverse that consists of a large number of individual universes having different physical properties. Intelligent observers populate only a small subset of these universes, which are optimal for life. This book reviews several interesting metamaterial systems that capture many features of important cosmological models and offer insights into the physics of many other non-trivial space–time geometries, such as microscopic black holes, closed time-like curves (CTCs) and the Alcubierre warp drive.

About the author

Igor I Smolyaninov is a Fellow of the Optical Society of America and a recipient of the Scientific American 50 Award. He graduated from the Moscow Institute of Physics and Technology in 1985 and received his PhD in 1990 from the Kapitza Institute for Physical Problems of the Russian Academy of Sciences. He is the author of another book in the Concise Physics series, *Hyperbolic Metamaterials*.

Extent 116pp

Collection
IOP Concise Physics

Series
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Materials

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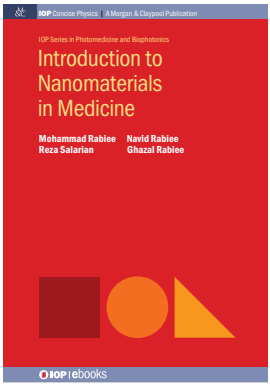

Introduction to Nanomaterials in Medicine

[1]Mohammad Rabiee
[2]Navid Rabiee
Reza Salarian
Ghazal Rabiee
[1]University of Technology, Iran
[2]Shahid Beheshti University, Iran

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Extent 98pp

Collection
IOP Concise Physics

Series
IOP Series in Photomedicine and Biophotonics

Subject
Medical physics and biophysics

ISBN 9781643274157 (electronic)

ISBN 9781643274133 (print)

About the book

Advancement in the field of nanotechnology has revolutionized the field of medicines and pharmaceuticals in the 20th century. This book, considering the importance of nanomaterials and their application in medicine, as well as the significant growth of biomaterials in research fields, introduces the variables law (Rabiee's theory) for the implementation of this research and the establishment of a proper strategy.

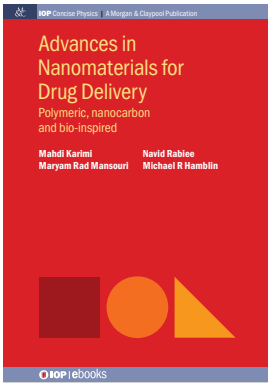
About the authors

Mohammad Rabiee is an associate professor in the Biomedical Engineering Department of Amirkabir University of Technology, Tehran, Iran.

Navid Rabiee worked on drug-delivery systems based on biocompatible and biodegradable polymers associated with different types of the sensitizers, especially porphyrins, under the supervision of Mohammad Rabiee at Amirkabir University of Technology, Tehran, Iran.

Reza Salarian is an assistant professor of biomedical engineering at Maziar University, Noor, Iran. He also worked as a researcher at Amirkabir University of Technology, Tehran, Iran.

Ghazal Rabiee is an MSc student in Inorganic Chemistry with a major in Inorganic Catalysis at Shahid Beheshti University, Tehran, Iran. Her work has resulted in the publication of approximately four peer-reviewed journal articles and one book.



Advances in Nanomaterials for Drug Delivery

Polymeric, nanocarbon and bio-inspired

[1]Mahdi Karimi
[2]Navid Rabiee
[3]Maryam Rad Mansouri
[4]Michael R Hamblin
[1]Iran University of Medical Sciences, Iran
[2]Shahid Beheshti University, Iran
[3]Isfahan University of Medical Science, Iran
[4]Massachusetts General Hospital, Harvard Medical School, USA

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Extent 78pp

Collection
IOP Concise Physics

Subject
Medical physics and biophysics

ISBN 9781681742908 (electronic)

ISBN 9781681742885 (print)

About the book

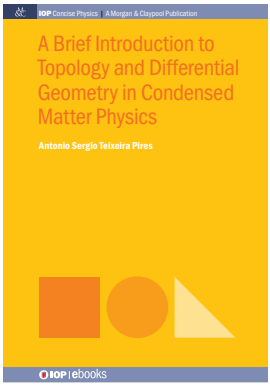
Nanomedicine is a developing field that includes different disciplines such as material science, chemistry, and engineering and medicine devoted to the design, synthesis and construction of high-tech nanostructures. The ability of these structures to have their chemical and physical properties tuned by structural modification, has allowed their use in drug-delivery systems, gene-therapy delivery and various types of theranostic approaches. This book covers advances based on different drug-delivery systems: polymeric and hyper-branched nanomaterials, carbon-based nanomaterials, nature-inspired nanomaterials and pathogen-based carriers.

About the authors

Mahdi Karimi is an assistant professor in the department of medical nanotechnology at Iran University of Medical Sciences.

Navid Rabiee joined the Advances Nanobiotechnology and Nanomedicine Research Group in 2017 to collaborate with Mahdi Karimi's research lab at the Iran University of Medical Science.

Michael R Hamblin is a principal investigator at the Wellman Center for Photomedicine, Massachusetts General Hospital, and an associate professor at Harvard Medical School.



A Brief Introduction to Topology and Differential Geometry in Condensed Matter Physics

Antonio Sergio Teixeira Pires
Universidade Federal de Minas Gerais, Brazil

iopscience.org/book/978-1-64327-374-7

About the book

In recent years, there have been great advances in the applications of topology and differential geometry to problems in condensed matter physics. Concepts drawn from topology and geometry have become essential to the understanding of several phenomena in the area. The main purpose of this book is to provide a brief, self-contained introduction to some mathematical ideas and methods from differential geometry and topology, and to show a few applications in condensed matter.

About the author

Antonio Sergio Teixeira Pires is a professor of physics at the Universidade Federal de Minas Gerais in Brazil. He works in quantum field theory applied to condensed matter, is a member of the Brazilian Academy of Science, was an editor of the *Brazilian Journal of Physics* and a member of the Advisory Board of the *Journal of Condensed Matter Physics*. Pires is also the author of *AdS/CFT Correspondence in Condensed Matter*, which is also published as part of the Concise Physics series.

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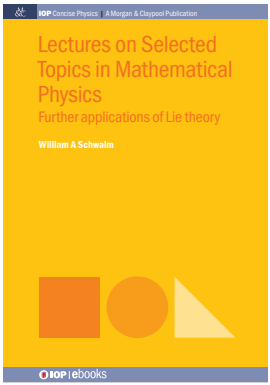

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Lectures on Selected Topics in Mathematical Physics

Further applications of Lie theory

William A Schwalm
University of North Dakota, USA

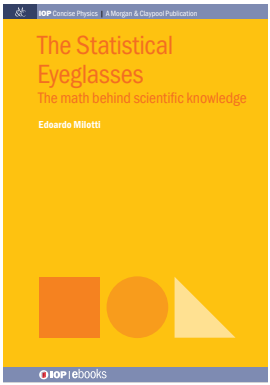
iopscience.org/book/978-1-64327-350-1

About the book

This book is the sequel to *Lectures on Selected Topics in Mathematical Physics: Introduction to Lie Theory with Applications*. This volume is devoted mostly to Lie groups, Lie algebras and generating functions, both for standard special functions and for the solution of certain types of physical problems. It is an informal treatment of these topics, which is intended for physics graduate students or others with a physics background who want a brief and informal introduction to the subjects addressed, in a style and vocabulary that is not completely unfamiliar.

About the author

William A Schwalm has been with the Department of Physics and Astrophysics at the University of North Dakota since 1980. His research is in condensed matter theory and application of mathematical methods to physical problems. He is also the author of *Lectures on Selected Topics in Mathematical Physics: Elliptic Functions and Elliptic Integrals* and *Lectures on Selected Topics in Mathematical Physics: Introduction to Lie Theory with Applications*.



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The Statistical Eyeglasses

The math behind scientific knowledge

Edoardo Milotti
University of Trieste, Italy

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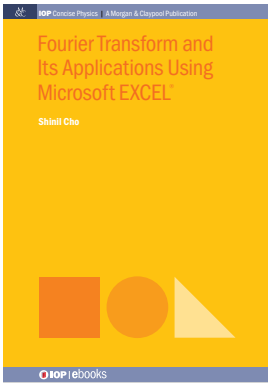
About the book

Science often deals with hard-to-see phenomena, and they only stand out and become real when viewed through the lens of complex statistical tools. This book is not a textbook about statistics applied to science – there are already many excellent books to choose from – rather, it gives an overview of the basic principles that physical scientists use to analyze their data and bring out the order of nature from the fog of background noise.

About the author

Edoardo Milotti is a professor of physics at the University of Trieste, Italy. After working mostly in experimental particle physics, he has also authored papers on noise processes in physics, and on the physics of cancer. His long-time research interests are in the direction of the analysis of experimental data and in the modeling of complex phenomena. He has published more than 200 scientific papers in peer-reviewed scientific journals. He lives in Trieste with his wife Alessandra.



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Fourier Transform and Its Applications Using Microsoft EXCEL®

Shinil Cho
La Roche College, USA

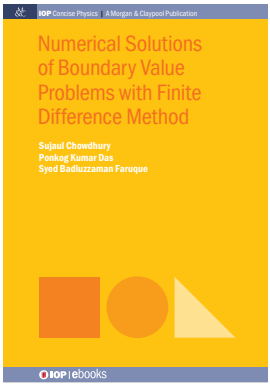
iopscience.org/book/978-1-64327-286-3

About the book

This book demonstrates Microsoft EXCEL®-based Fourier transform of selected physics examples, as well as describing spectral density of the auto-regression process in relation to Fourier transform. Rather than offering rigorous mathematics, the book provides readers with an opportunity to gain an understanding of Fourier transform through the examples. They will acquire and analyze their own data following the step-by-step procedure outlined, and a hands-on acoustic spectral analysis is suggested as the ideal long-term student project.

About the author

Shinil Cho attended Rikkyo University in Tokyo, Japan for his BS. He gained his MS from Seoul National University in Seoul, Korea and his PhD from The Ohio State University. Cho held post-doctoral fellowships at The Ohio State University and the University of Florida, and was a visiting professor at the University of South Carolina. He has been at La Roche College, where he is currently an associate professor, since 1995. Cho's current research interests include quantum computation, biometrics and physics education.



Numerical Solutions of Boundary Value Problems with Finite Difference Method

Sujaul Chowdhury
Ponkog Kumar Das
Syed Badiuzzaman Faruque
Shahjalal University of Science and Technology, Bangladesh

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About the book

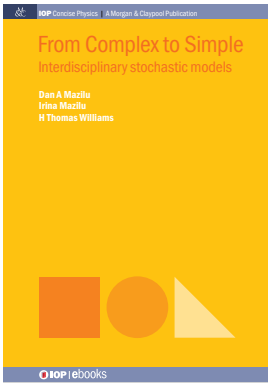
Containing an extensive illustration of the use of finite difference method in solving boundary value problems numerically, a wide class of differential equations have been numerically solved in this book. Starting with differential equations of elementary functions like hyperbolic, sine and cosine, special functions such as Hermite, Laguerre and Legendre are solved. Airy function, stationary localised wavepacket, the quantum mechanical problem of the particle in a 1D box and polar equation of motion under gravitational interaction are also explored.

About the authors

Sujaul Chowdhury is a professor in the Department of Physics at Shahjalal University of Science and Technology (SUST), Bangladesh. He obtained a BSc in physics in 1994 and a MSc in physics in 1996 from SUST. He obtained a PhD in physics from the University of Glasgow, UK, in 2001.

Ponkog Kumar Das is an assistant professor in the Department of Physics at SUST.

Syed Badiuzzaman Faruque is a professor in the Department of Physics at SUST. He is a researcher with interest in quantum theory, gravitational physics and material science.



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From Complex to Simple

Interdisciplinary stochastic models

Dan A Mazilu
Irina Mazilu
H Thomas Williams
Washington and Lee University, USA

iopscience.org/book/978-1-64327-120-0

About the book

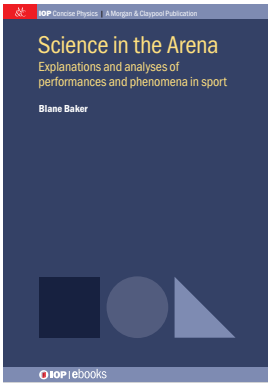
This book presents simple interdisciplinary stochastic models meant as a gentle introduction to the field of non-equilibrium statistical physics. It focuses on the analysis of two-state models with cooperative effects, which are versatile enough to be applied to many physical and social systems. The book also explores a variety of mathematical techniques to solve the master equations that govern these models: matrix theory, empty-interval methods, mean field theory, a quantum approach and mapping onto classical Ising models. The models discussed are at the confluence of nanophysics, biology, mathematics and the social sciences, and they provide a pedagogical path toward understanding the complex dynamics of particle self-assembly with the tools of statistical physics.

About the authors

Dan A Mazilu is an associate professor of physics at Washington and Lee University, where he has been since 2008.

Irina Mazilu is a professor of physics at Washington and Lee University, which she joined in 2004.

H Thomas Williams earned his BS and PhD in physics from the University of Virginia. He spent time at the National Bureau of Standards, the Universität Erlangen-Nürnberg and Kaman Sciences. Following this, he spent the majority of his career at Washington and Lee University.



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Science in the Arena

Explanations and analyses of performances and phenomena in sport

Blane Baker
William Jewell College, USA

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About the book

The arena of sport is filled with marvelous performances and feats that, at times, seem almost beyond belief. As curious onlookers, we often wonder whether or not athletes will reach certain peaks and what determines their limits of athletic performance. Science, with its emphasis on theoretical development and experimental results, is uniquely equipped to answer these kinds of questions. Over the past two decades, I have been asked innumerable questions related to how science can provide these kinds of insights. *Science in the Arena* is written as an outgrowth of those interactions with the primary goal of communicating useful and understandable scientific explanations of athletic performance.

About the author

Blane Baker is a professor of physics at his alma mater William Jewell College where he returned to teach in 1999. Over his tenure, he has taught general physics, electronics and quantum mechanics, along with a popular sport science course for non-science majors. Baker is an active contributor to the American Association of Physics Teachers (AAPT) and serves on the National Council of Society of Physics Students (SPS). His areas of interest include electronics, sustainable energy and materials science.

Outside the Research Lab, Volume 2

Physics in vintage and modern transport

Sharon Ann Holgate

iopscience.org/book/978-1-64327-270-2

About the book

This book explores the physics and technology inherent to preserving and restoring old forms of transport as well as creating modern transport for today and for our future needs. This book provides readers with an interesting insight into some of the diverse applications for physics outside of research laboratories. It also covers several different aspects of transport, ranging from the restoration of vintage buses to the materials used in the latest supercars.

About the author

Sharon Ann Holgate has a doctorate in experimental physics from the University of Sussex. She has worked for 20 years as a freelance science writer and broadcaster. She was a co-author on a children's science book, *The Way Science Works*, and a contributor to the popular science books *30-Second Quantum Theory* and *30-Second Energy*. She has written two other books: *Understanding Solid State Physics*, and *Outside the Research Lab, Volume 1*.

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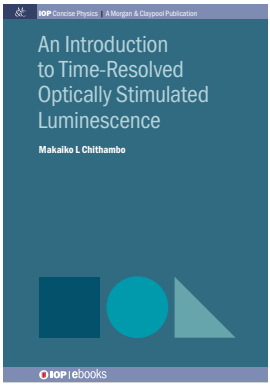

An Introduction to Time-Resolved Optically Stimulated Luminescence

Makaiko L Chithambo
Rhodes University, South Africa

iopscience.org/book/978-1-64327-198-9

About the book

Time-resolved optical stimulation of luminescence is established as an important method for the measurement of optically stimulated luminescence. It provides a means to study dynamics involving charge transfer between point defects in materials by separating in time the stimulation and emission of luminescence. This book advances the reader's understanding of the dynamics of luminescence in materials by providing an overview of the topic and examples.

About the author

Makaiko L Chithambo is a professor of physics and the head of the Physics and Electronics Department at Rhodes University in Grahamstown, South Africa. He earned his PhD from The University of Edinburgh, his MPhil from the University of Sussex, and he received his BSc from the University of Malawi, Chancellor College. Chithambo has published extensively in the area of time-resolved techniques, he has organised international symposia for luminescence in 2008 and 2012, chaired a national conference in 2015 and organised an international conference in 2017.

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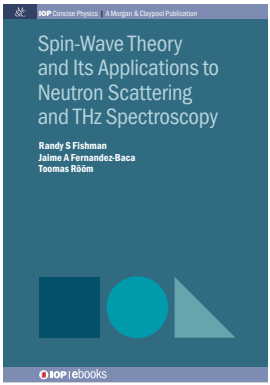

Spin-Wave Theory and Its Applications to Neutron Scattering and THz Spectroscopy

[1]Randy S Fishman
[1]Jaime A Fernandez-Baca
[2]Toomas Rõõm
[1]Oak Ridge National Lab, USA
[2]National Institute of Chemical Physics and Biophysics, Estonia

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About the book

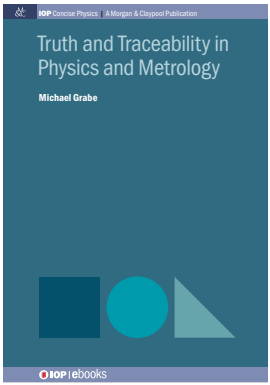
This book discusses the experimental techniques of inelastic neutron scattering and THz spectroscopy and provides the theoretical tools required to analyze their measurements using spin-wave theory. Assuming a background in elementary statistical mechanics and a familiarity with the quantized harmonic oscillator, this work presents a comprehensive review of spin-wave theory and its applications to both inelastic neutron scattering and THz spectroscopy.

About the authors

Randy Fishman is a distinguished staff scientist at Oak Ridge National Lab (ORNL). As a condensed-matter theorist, he studies the complex magnetic states of oxides and molecule-based magnets, frequently in collaboration with neutron scientists and optical spectroscopists.

Jaime A Fernandez-Baca is a distinguished research staff member in ORNL's quantum condensed matter division, and the leader of the Triple Axis Spectroscopy Group at the High Flux Isotope Reactor.

Toomas Rõõm is currently a research professor at the National Institute of Chemical Physics and Biophysics in Tallinn, Estonia. His research interest is in combining infrared and terahertz spectroscopy with high magnetic fields and low temperatures for studies of magnetic and correlated electron materials.



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Truth and Traceability in Physics and Metrology

Michael Grabe
Physikalisch-Technische Bundesanstalt Braunschweig, Germany

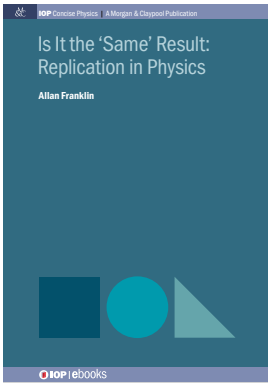
iopscience.org/book/978-1-64327-096-8

About the book

Metrological data is known to be blurred by the imperfections of the measuring process. For about two centuries, regular or constant errors were not the focal point of experimental activities, only irregular or random errors were. To address this here, *Truth and Traceability in Physics and Metrology* discusses a new error concept that dispenses with the common practice to randomize unknown systematic errors. Instead, unknown systematic errors are treated as what they are, namely unknown constants. Furthermore, the ideas considered point to a methodology to steadily localize the true values of the measures and, consequently, traceability.

About the author

Michael Grabe studied physics at the University of Stuttgart and earned his Dr. rer. nat. from the Technical University of Braunschweig, Institute for Physical Chemistry, where he was a research assistant and lecturer in physical chemistry and applied computer science. He now works at the Physikalisch-Technische Bundesanstalt Braunschweig, focusing on legal metrology, computerized interferometric length measurements, procedures for the assessment of measurement uncertainties and adjustment of the fundamental constants of physics.



Is It the 'Same' Result: Replication in Physics

Allan Franklin
University of Colorado, USA

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Instrumentation and measurement

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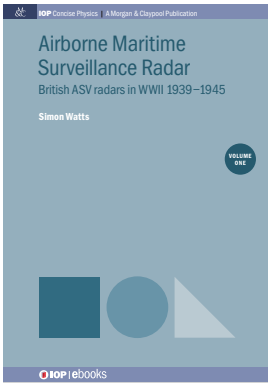
About the book

Replication, the independent confirmation of experimental results and conclusions, is regarded as the "gold standard" in science. This book examines the question of successful or failed replications and demonstrates that answering that question is not always easy. It presents clear examples of successful replications – the discoveries of the Higgs boson and of gravity waves – and failed replications, including early experiments on the fifth force, a proposed modification of Newton's Law of universal gravitation and the measurements of "G", the constant in that law. Other case studies illustrate some of the difficulties and complexities in deciding whether a replication is successful or failed. The text also discusses how that question has been answered. These studies include the "discovery" of the pentaquark in the early 2000s and the continuing search for neutrinoless double beta decay and it argues that although successful replication is the goal of scientific experimentation, it is not always easily achieved.

About the author

Allan Franklin is an emeritus professor of physics at the University of Colorado. His current research area is the history and philosophy of science, particularly on the roles of experiment. In 2016, Franklin received the Abraham Pais Prize for History of Physics from the American Physical Society. He is the author of 11 books including, most recently, *Shifting Standards*: *Experiments in Particle Physics in the Twentieth Century* and *What Makes a Good Experiment?*: *Reasons and Roles in Science*.



Airborne Maritime Surveillance Radar, Volume 1

British ASV radars in WWII 1939–1945

Simon Watts

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About the book

Today, air-to-surface vessel (ASV) radars, or more generally airborne maritime surveillance radars, are installed on maritime reconnaissance aircraft for long-range detection, tracking and classification of surface ships (ASuW—anti-surface warfare) and for hunting submarines (ASW—anti-submarine warfare). Such radars were first developed in the UK during WWII as part of the response to the threat to shipping from German U-boats. This book describes the ASV radars developed in the UK and used by RAF Coastal Command during WWII for long-range maritime surveillance.

About the author

Simon Watts graduated from the University of Oxford in 1971, obtained an MSc and DSc from the University of Birmingham in 1972 and 2013, respectively, and a PhD from the CNAA in 1987. He is author and co-author of more than 80 journal and conference papers, a book on sea clutter, and *Airborne Maritime Surveillance Radar*.

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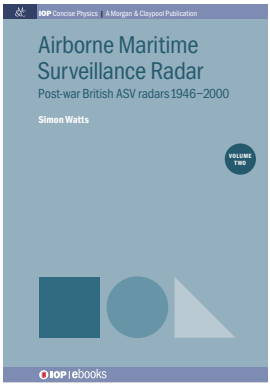

Airborne Maritime Surveillance Radar, Volume 2

Post-war British ASV radars 1946–2000

Simon Watts

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About the book

Today, air-to-surface vessel (ASV) radars, or more generally maritime surveillance radars, are installed on maritime reconnaissance aircraft for long-range detection, tracking and classification of surface ships (ASuW—anti-surface warfare) and for hunting submarines (ASW—anti-submarine warfare). Such radars were first developed in the UK during WWII as part of the response to the threat to shipping from German U-Boats. This book describes the ASV radars developed in the UK after WWII (1946–2000) and used by the RAF for long-range maritime surveillance.

About the author

Simon Watts graduated from the University of Oxford in 1971, obtained an MSc and DSC from the University of Birmingham in 1972 and 2013, respectively, and a PhD from the CNAA in 1987. He is author and co-author of more than 80 journal and conference papers, a book on sea clutter, and *Airborne Maritime Surveillance Radar*.

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