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Collection
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Condensed matter physics

ISBN 9780750312721 (electronic)

ISBN 9780750312738 (print)

Random Telegraph Signals in Semiconductor Devices

[1]Eddy Simoen
[2]Cor Claeys
[1]Imec and Ghent University, Belgium
[2]Imec and KU Leuven, Belgium

iopscience.org/book/978-0-7503-1272-1

About the book

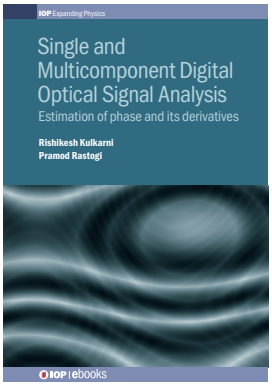
Following their first observation in 1984, random telegraph signals (RTS) were initially a purely scientific tool to study fundamental aspects of defects in semiconductor devices. As semiconductor devices move to the nanoscale however, RTS have become an issue of major concern to the semiconductor industry, both in the development of current technology, such as memory devices and logic circuits, as well as in future semiconductor devices beyond the silicon roadmap, such as nanowire, TFET and carbon nanotube-based devices.

It has become clear that the reliability of state-of-the-art and future CMOS technology nodes is dominated by RTS and single-trap phenomena, and so its understanding is of vital importance for the modelling and simulation of the operation and the expected lifetime of CMOS devices and circuits. It is the aim of this book to provide a comprehensive and up-to-date review of one of the most challenging issues facing the semiconductor industry, from the fundamentals of RTS to applied technology.

About the authors

Eddy Simoen is Senior Researcher at imec and Professor at Ghent University, Belgium.

Cor Claeys is Director of Advanced Semiconductor Technologies at imec, and Professor at KU Leuven, Belgium.



Single and Multicomponent Digital Optical Signal Analysis

Estimation of phase and its derivatives

Rishikesh Kulkarni and Pramod Rastogi
EPFL University, Switzerland

iopscience.org/book/978-0-7503-1469-5

Extent 200pp

Collection
Expanding Physics

Subject
Sensors and instrumentation

ISBN 9780750314695 (electronic)

ISBN 9780750314671 (print)

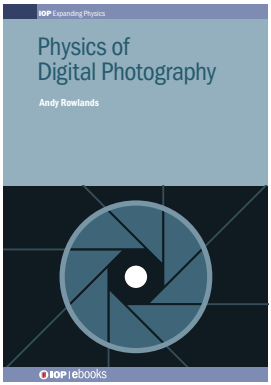
About the book

Optical techniques such as electronic speckle pattern interferometry, holographic interferometry, and fringe projection have emerged as the prominent tools for non-contact measurements, with applications ranging from biology to materials science. In these processes, information about the measured physical quantity is stored in the phase or associated derivatives of an interference fringe pattern. Consequently, a reliable estimation of phase and its derivatives, commonly referred to as fringe analysis becomes a primary requirement for the application and interpretation of these optical techniques. Here, leading researchers in fringe analysis methods present a review of the tools and methods of multicomponent fringe analysis and interferometric data, and outline a wide range of digital signal-processing-based interferometric data-processing techniques.

About the authors

Rishikesh Kulkarni is a doctorial assistant and researcher at EPFL in Switzerland.

Pramod Rastogi is a professor at the EPFL in Switzerland and has published more than 180 scientific papers and has edited eight books in the field of optical metrology. A recipient of many awards including the SPIE Dennis Gabor Award and Society for Experimental Mechanics Hetényi Award. He is a Fellow of the Society of the Photo-Optical Instrumentation Engineers and the Optical Society of America as well as a member of the Swiss Academy of Engineering Sciences.



Extent 330pp

Collection
Expanding Physics

Subject
Applied and industrial physics

ISBN 9780750312424 (electronic)

ISBN 9780750312431 (print)

Physics of Digital Photography

Andy Rowlands

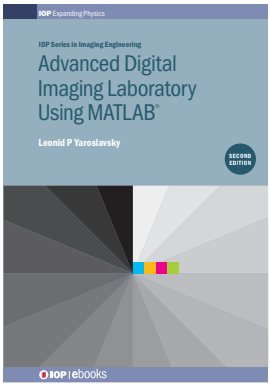
iopscience.org/book/978-0-7503-1242-4

About the book

Physics is fundamental to all aspects of digital photography. This book works through the photographic imaging chain starting from the physics of image capture through to the conversion of the raw data into a viewable image. The author's aim is to show how knowledge of the underlying physics can be used by a photographer or imaging scientist to maximise the technical quality of the final image. With the increasing use of digital photography in a research environment, scientists and engineers need to better understand the science behind digital photography to fully exploit this tool in their research. As well as an academic readership, this book will be of interest to professional and serious amateur photographers wanting a better understanding of the technical aspects of digital photography.

About the author

Andy Rowlands obtained a first-class degree in mathematics and physics from the University of Warwick in 2000, followed by a PhD in physics. In 2009, he took a sabbatical from physics and moved to China to pursue his interest in photography. During this time he became interested in the application of physics to photography. An extensive knowledge of the theoretical concepts involved and practical experience as a freelance photographer puts the author in a unique position to develop this text.



Advanced Digital Imaging Laboratory Using MATLAB®

Second Edition

Leonid P Yaroslavsky
Tel Aviv University, Israel

iopscience.org/book/978-0-7503-1233-2

Extent 200pp

Collection
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Series
IOP Series in Imaging Engineering

Subject
Applied and industrial physics

ISBN 9780750312332 (electronic)

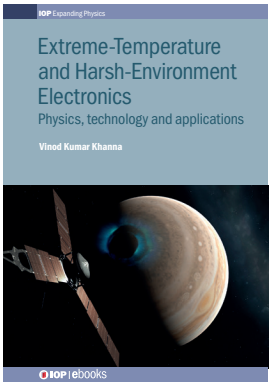
ISBN 9780750312349 (print)

About the book

The first edition of this text book focussed on providing practical hands-on experience in digital imaging techniques for graduate students and practitioners keeping to a minimum any detailed discussion on the underlying theory. In this new extended edition, the author builds on the strength of the original edition by expanding the coverage to include formulation of the major theoretical results that underlie the exercises as well as introducing numerous modern concepts and new techniques. Whether you are studying or already using digital imaging techniques, developing proficiency in the subject is not possible without mastering practical skills. Including more than 100 MATLAB® exercises, this book delivers a complete applied course in digital imaging theory and practice.

About the author

Leonid P Yaroslavsky is a professor emeritus at Tel Aviv University. A fellow of the Optical Society of America, Prof. Yaroslavsky is an author and editor of more than 20 books and more than 100 peer-reviewed publications on digital image processing and digital holography.



Extreme-Temperature and Harsh-Environment Electronics

Physics, technology and applications

Vinod Kumar Khanna
CSIR-Central Electronics Engineering Research Institute, India
and CSIR-CEERI, India

iopscience.org/book/978-0-7503-1155-7

About the book

Electronic devices and circuits are employed by a range of industries in testing conditions from extremes of high- or low-temperature, in chemically corrosive environments, subject to shock and vibration or exposure to radiation. This book describes the diverse measures necessary to make electronics capable of coping with such situations as well as to gainfully exploit any new phenomena that take place only under these conditions.

About the author

Vinod Kumar Khanna is an Emeritus Scientist at CSIR-Central Electronics Engineering Research Institute, Pilani, India, and Emeritus Professor at the Academy of Scientific and Innovative Research, India. He is former Chief Scientist and Head of the MEMS and Microsensors Group, CSIR-CEERI, Pilani.

Extent 488pp

Collection
Expanding Physics

Subject
Applied and industrial physics

ISBN 9780750311557 (electronic)

ISBN 9780750311564 (print)

Extent 574pp

Collection
Expanding Physics

Subject
Applied and industrial physics

ISBN 9780750313506 (electronic)

ISBN 9780750313513 (print)

Mechatronics

Dynamical systems approach and theory of holors

Bogdan Fijalkowski
Cracow University of Technology, Poland

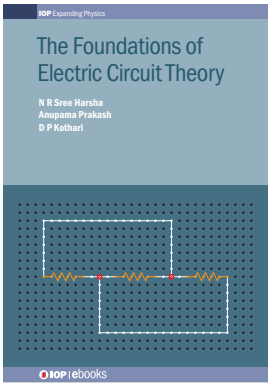
iopscience.org/book/978-0-7503-1350-6

About the book

Mechatronics offers new solutions and unprecedented flexibility in developing and understanding transportation systems, industrial production processes, and aerospace, automotive and traction components, etc. This book focusses on exploiting a dynamical systems approach and theory of holors in mechatronics for modelling and characterization of various dynamical systems. Written as an introductory textbook for advanced students, it can be used by teachers and students both in lessons and independently. It includes subject knowledge and pedagogical support for teachers of mechatronics. This title will also be an essential reference for practising scientists and engineers working in the field of mechatronics.

About the author

Bogdan Fijalkowski has worked in both industry and academia and was Director of the Electrotechnics and Industrial Electronics Institute and Head of Automotive Mechatronics Institution at the Cracow University of Technology, Poland. He holds 25 patents and has published 26 books and book chapters in addition to more than 200 technical papers.



The Foundations of Electric Circuit Theory

[1]N R Sree Harsha
[2]Anupama Prakash
[3]D P Kothari
[1]University of Bristol, UK
[2]RV College of Engineering, India
[3]MVSR Engineering College

iopscience.org/book/978-0-7503-1266-0

Extent 205pp

Collection
Expanding Physics

Subject
Applied and industrial physics

ISBN 9780750312660 (electronic)

ISBN 9780750312677 (print)

About the book

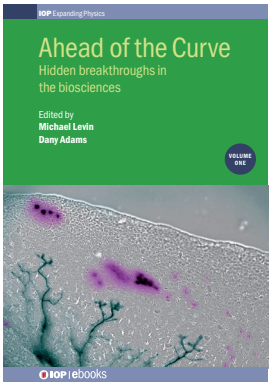
Circuit theory is one of the most important tools of the electrical engineer, and it can be derived with suitable approximations from Maxwell's equations. Despite this, university courses treat electromagnetism and circuit theory as two separate subjects and at advanced level, students can lack a basic understanding of the classical electromagnetism applied in the context of electric circuits to fully appreciate and apply circuit theory and understand its limitations. Here the authors build on their graduate teaching experiences and lectures to treat these topics as a single subject and derive and present the important results from circuit analyses, such as Kirchhoff's laws and Ohm's law, using the ideas of the classical electromagnetism.

About the authors

N R Sree Harsha is an electrical engineer and a physics enthusiast. His research interests include classical electromagnetism and the theory of relativity and he was head of the Electrical Systems for the 'Chimera' Formula-Hybrid Project.

Anupama Prakash is an associate professor at the Department of Electrical and Electronics Engineering, RV College of Engineering, Bangalore, India.

Dwarkadas Pralhaddas Kothari is an educationist and professor who is currently the Director Research at MVSR Engineering College. As recognition of his contributions to engineering education, he was honoured as an IEEE Fellow.



Ahead of the Curve

Hidden breakthroughs in the biosciences: Volume 1

Edited by
Michael Levin and Dany Adams
Tufts University, USA

iopscience.org/book/978-0-7503-1326-1

Extent 276pp

Collection
Expanding Physics

Subject
Biophysics

ISBN 9780750313261 (electronic)

ISBN 9780750313278 (print)

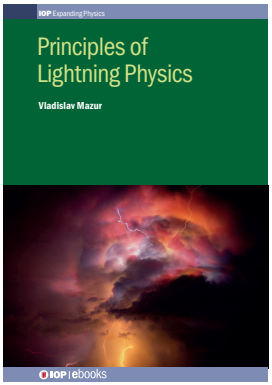
About the book

This unique book is a compendium of carefully curated published papers in the biosciences, which have (or will) precipitate a profound change in prevailing paradigms and research programs. A mix of new and classic papers, it shows the limitations of current thought or identifies novel vistas for investigations that have not yet been explored. The purpose of the book is to highlight scientific gems, most unrecognized, that suggest revisions to key pillars of thought in the biological sciences and further the education of young scientists. This will be achieved by including reprints of papers that demonstrate counter-paradigm, novel directions for future research featuring commentary from current, notable researchers in a variety of areas.

About the editors

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.

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.



Extent 183pp

Collection
Expanding Physics

Subject
Geophysics and planetary science

ISBN 9780750311526 (electronic)

ISBN 9780750311533 (print)

Principles of Lightning Physics

Vladislav Mazur
National Severe Storms Laboratory, USA

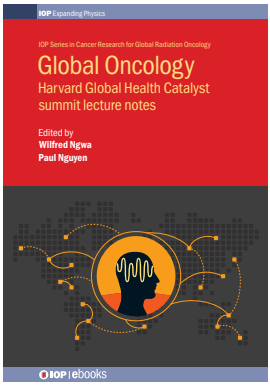
iopscience.org/book/978-0-7503-1152-6

About the book

Principles of Lightning Physics presents and discusses the most up-to-date physical concepts that govern many lightning events in nature, including lightning interactions with man-made structures, at a level suitable for researchers, advanced students and well-educated lightning enthusiasts. The author's approach to understanding lightning – to seek out, and show what is common to all lightning flashes – is illustrated by an analysis of each type of lightning and the multitude of lightning-related features. The book examines the work that has gone into the development of new physical concepts, and provides critical evaluations of the existing understanding of the physics of lightning and the lexicon of terms and definitions presently used in lightning research.

About the author

Vladislav Mazur has been a physicist at the National Severe Storms Laboratory in Norman, Oklahoma, a division of the National Oceanic and Atmospheric Administration, since 1984. His research interests include lightning physics, lightning-aircraft interactions, computer simulations of lightning processes, interaction of lightning with ground structures, and lightning protection and its physical aspects. He was a pioneer of high-speed photography of lightning in the early 1990s.



Global Oncology

Harvard Global Health Catalyst summit lecture notes

Edited by
Wilfred Ngwa and Paul Nguyen
Dana Farber/Harvard Cancer Center and University of Massachusetts, USA

iopscience.org/book/978-0-7503-1359-9

About the book

The Harvard Global Health Catalyst summit is a premier yearly event bringing together leaders from across the world to share knowledge, discuss, and partner in developing innovative solutions to vexing health problems and advocating for progress towards improved health outcomes that save lives. The current main focus is on cancer, notably the emerging field of global radiation oncology, cancer prevention and advocacy. Given the importance, projected growth and newness of the field of global radiation oncology, this book chronicles the highly educational and eye-opening talks by health leaders at this growing yearly event. It serves as an educational and insightful reference for anyone interested in the rapidly growing field of global health.

About the editors

Wilfred Ngwa is the Director of the Global Health Catalyst program at Dana Farber/Harvard Cancer Center and a professor of radiation oncology and faculty medical physicist at Harvard Medical School and the University of Massachusetts. He also currently holds an international guest professorship at the University of Heidelberg, Germany. He has published two books and won a number of awards and prizes, including the 2015 BRIght Futures Prize for innovative new technology designed for use during radiotherapy to kill cancer cells that have spread to other parts of the body.

Paul Nguyen MD is the Director of Prostate Brachytherapy, Senior Physician, and Associate Professor of Radiation Oncology at Harvard Medical School.

Extent 200pp

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Expanding Physics

Series
IOP Series in Cancer Research for Global Radiation Oncology

Subject
Medical physics and biomedical engineering

ISBN 9780750313599 (electronic)

ISBN 9780750313605 (print)

Design and Shielding of Radiotherapy Treatment Facilities

IPEM Report 75

Edited by
Patrick Horton and [1]David Eaton
[1]Mount Vernon Hospital

iopscience.org/book/978-0-7503-1440-4

About the book

Design and Shielding of Radiotherapy Treatment Facilities provides readers with a single point of reference for all aspects of shielding design and radiation protection advice to the construction and modification of radiotherapy facilities. The book assembles a faculty of national and international experts on all modalities including megavoltage and kilovoltage photons, brachytherapy and high-energy particles, and on conventional and Monte Carlo shielding calculations. Their consensus and expertise is reflected through the list of chapters, and the editors have also ensured a consistent message throughout the text by face-to-face discussion and thorough revisions of the original IPEM Report 75. This book is a comprehensive reference for qualified experts and radiation-shielding designers in radiation physics and also useful to administrators, planners, architects, constructors and others involved in the design of radiotherapy facilities.

About the editors

Patrick Horton is retired from the Royal Surrey County Hospital NHS Foundation Trust, UK.

David Eaton is a lead clinical scientist, national radiotherapy trials QA group, Mount Vernon Hospital, Northwood, UK.

Extent 330pp

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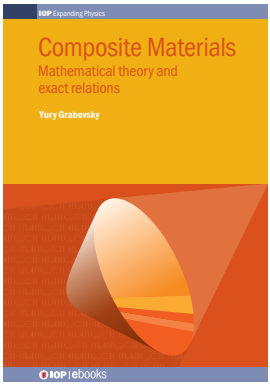
Expanding Physics

Series
IOP Series in Cancer Research for Global Radiation Oncology

Subject
Medical physics and biomedical engineering

ISBN 9780750314404 (electronic)

ISBN 9780750314411 (print)



Composite Materials

Mathematical theory and exact relations

Yury Grabovsky
Temple University, USA

iopscience.org/book/978-0-7503-1048-2

About the book

The mathematical method of composites has reached a very high level of maturity and developments have increased our understanding of the relationship between the microstructure of composites and their macroscopic behaviour.

This book provides a self-contained unified approach to the mathematical foundation of the theory of composites, leading to the general theory of exact relations. It also provides complete lists of exact relations in many specific physically relevant contexts, such as conductivity, fibre-reinforced elasticity, piezoelectricity, thermoelectricity and more.

About the author

Yury Grabovsky is an associate professor in the Department of Mathematics in the College of Science and Technology at Temple University, Philadelphia, USA.

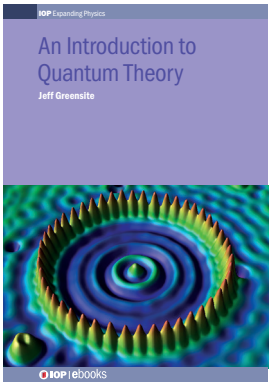
Extent 224pp

Collection
Expanding Physics

Subject
Mathematical and computational physics

ISBN 9780750310482 (electronic)

ISBN 9780750310499 (print)



An Introduction to Quantum Theory

Jeff Greensite
San Francisco State University, USA

iopscience.org/book/978-0-7503-1167-0

About the book

Written in a lucid and engaging style, the author takes readers from an overview of classical mechanics and the historical development of quantum theory through to advanced topics. The mathematical aspects of quantum theory necessary for a firm grasp of the subject are developed in the early chapters, but an effort is made to motivate that formalism on physical grounds. Including animated figures and their respective Mathematica® codes, this book provides a complete and comprehensive text for students in physics, maths, chemistry and engineering needing an accessible introduction to quantum mechanics.

About the author

Jeff Greensite is a Professor of Physics at San Francisco State University with interests in theoretical high-energy physics, lattice gauge theory, quantum gravity, and string theory.

Extent 531pp

Collection
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Subject
Quantum physics

ISBN 9780750311670 (electronic)

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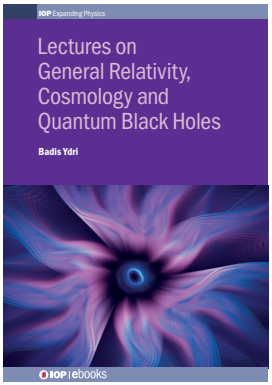


Lectures on General Relativity, Cosmology and Quantum Black Holes

Badis Ydri
Université Badji Mokhtar, Annaba, Algeria

iopscience.org/book/978-0-7503-1478-7

Extent 330pp

Collection
Expanding Physics

Subject
Astronomy and astrophysics

ISBN 9780750314787 (electronic)

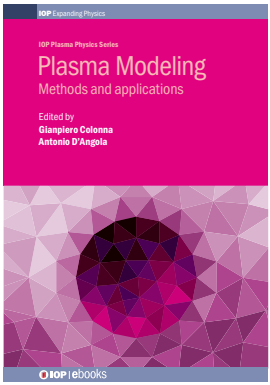
ISBN 9780750314763 (print)

About the book

The physical interpretation of the mathematical descriptions of general relativity gives rise to a range of exciting consequences in cosmology. An understanding of general relativity is therefore a prerequisite for students wishing to pursue further courses or research projects in cosmology and its various subfields from black holes to gravitational waves. Written for advanced students and including numerous exercise problems, this book is a rigorous resource for students in theoretical physics and mathematics requiring an introduction to the implications and interpretation of general relativity in areas of modern cosmological research. Readers of this text will be well prepared to follow the theoretical developments in the field and undertake research projects as part of an MSc or PhD programme.

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, Dublin, Ireland, and a regular ICTP Associate at the Abdus Salam Center for Theoretical Physics, Trieste, Italy.



Plasma Modeling

Methods and applications

Edited by
[1]Gianpiero Colonna
[2]Antonio D'Angola
[1]National Research Council (CNR), Italy
[2]University of Basilicata, Italy

iopscience.org/book/978-0-7503-1200-4

About the book

Plasma Modeling: Methods and applications presents and discusses the different approaches that can be adopted for plasma modeling, giving details about theoretical and numerical methods. The book is intended to assist and direct students and researchers, who want to develop research activity in the field of plasma physics, in the choice of the best model for the problem of interest. The book is organised in three parts. The first describes kinetic models used in plasma investigations, consisting of the solution of the Boltzmann equation using different approaches. The second part develops the theory of fluid equations and of hybrid models, and the third part is devoted to applications, considering some practical problems of interest in different fields.

Extent 406pp

Collection
Expanding Physics

Series
IOP Plasma Physics Series

Subject
Plasma physics

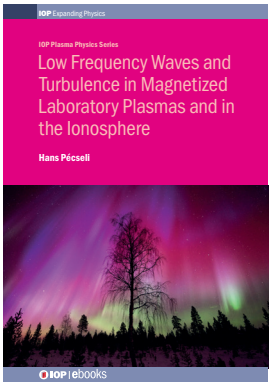
ISBN 9780750312004 (electronic)

ISBN 9780750312011 (print)

About the editors

Gianpiero Colonna is Senior Researcher in the PLASMI-LAB at the National Research Council (CNR), Bari, Italy. His research activities are focused on plasma modeling, state-to-state self-consistent kinetics in gas discharges and hypersonic flows, thermodynamic and transport properties of plasmas, and modeling plasma plumes produced by nanosecond laser pulses.

Antonio D'Angola is Assistant Professor at the University of Basilicata in Italy. His scientific interests are numerical methods for the simulation of plasmas using particle-in-cell and Monte Carlo codes, the calculation of thermodynamic and transport properties of ionized plasmas for industrial and aerospace applications, the investigations of radio-frequency thermal discharges, non-neutral plasmas for ultra-high vacuum systems and laser–plasma interactions for medical applications.



Low Frequency Waves and Turbulence in Magnetized Laboratory Plasmas and in the Ionosphere

Hans Pécseli
University of Oslo, Norway

iopscience.org/book/978-0-7503-1251-6

Extent 630pp

Collection
Expanding Physics

Series
IOP Plasma Physics Series

Subject
Plasma physics

ISBN 9780750312516 (electronic)

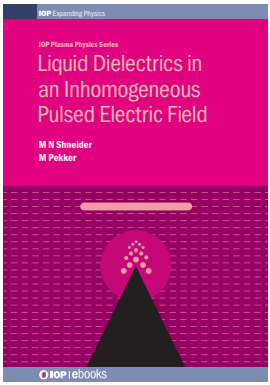
ISBN 9780750312523 (print)

About the book

Low Frequency Waves and Turbulence in Magnetized Laboratory Plasmas and in the Ionosphere was developed from courses taught by the author at the universities of Oslo and Tromsø in Norway. Suitable for undergraduates, graduate students and researchers, the first part of the book is devoted to discussing some relevant plasma instabilities and the free energy that drives them. In the second part, the more advanced topics of nonlinear models and the interactions of many modes are discussed. Theoretical tools available for turbulence modelling are also outlined. The book summarizes a number of studies of low-frequency plasma waves, drift waves in particular, from laboratory and space experiments.

About the author

Hans Pécseli is professor in plasma-space physics at the University of Oslo, Norway. He has contributed to the literature on plasma and space physics, meteorology and also marine biology. He served as a member of the sub-committees of the national science foundations in Norway and Denmark, and as consultant for the national science foundations in Sweden and Finland. He is a fellow of the American Physical Society, a member of the Royal Danish Academy of Sciences and Letters, and the Norwegian Academy of Sciences and Letters.



Liquid Dielectrics in an Inhomogeneous Pulsed Electric Field

[1]M N Shneider
[2]M Pekker
[1]Princeton University, USA
[2]George Washington University, USA

iopscience.org/book/978-0-7503-1245-5

Extent 155pp

Collection
Expanding Physics

Series
IOP Plasma Physics Series

Subject
Plasma physics

ISBN 9780750312455 (electronic)

ISBN 9780750312462 (print)

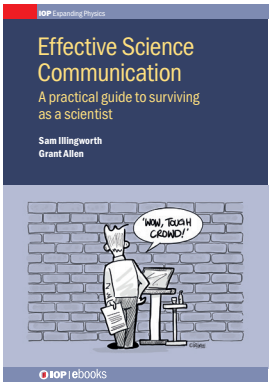
About the book

This book comprehensively describes the phenomena that occur in liquid dielectrics under the influence of an inhomogeneous pulsed electric field. Written by leading experts in the field, it is the first of its kind to address numerous potential applications such as the technology of high-voltage insulation in pulsed inhomogeneous fields, and applications related to cavitation development in liquid dielectrics, plasma treatment of different materials and plasma medicine dealing with living cells. *Liquid Dielectrics in an Inhomogeneous Pulsed Electric Field* is intended for a broad audience, from students to engineers and scientists, who are interested in current research questions in electrodynamics and hydrodynamics of liquid dielectrics.

About the authors

Mikhail Shneider is a senior scientist in the Applied Physics Group at the Mechanical and Aerospace Engineering Department, Princeton University. His research interests include the theoretical study of gas discharge physics, physical gas dynamics, biophysics, atmospheric electrical phenomena, non-linear optics, and laser–matter interaction.

Mikhail Pekker is research scientist in the Department of Mechanical and Aerospace Engineering at George Washington University. His research interests are the theoretical study of gas discharge physics and biophysics.



Extent 153pp

Collection
Expanding Physics

Subject
General physics

ISBN 9780750311700 (electronic)

ISBN 9780750311717 (print)

Effective Science Communication

A practical guide to surviving as a scientist

[1]Sam Illingworth
[2]Grant Allen
[1]Manchester Metropolitan University, UK
[2]University of Manchester, UK

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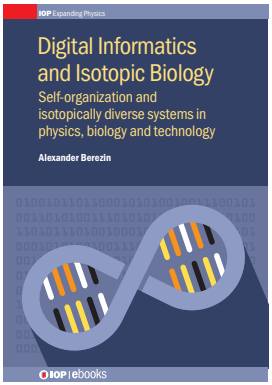
About the book

Effective Science Communication: A practical guide to surviving as a scientist is devoted to the variety of ways that scientists are expected to communicate in their day-to-day professional lives. It includes practical advice on how to publish your work in scientific journals, apply for grants, and effectively communicate your research to both scientific and non-scientific audiences. There are chapters devoted to constructing a digital footprint, dealing with the media, and influencing science policy. There are a number of useful exercises throughout the book that will help you to become a more effective communicator, providing a helping hand in your scientific journey to not only survive, but to prosper in the process.

About the authors

Sam Illingworth is a Senior Lecturer in Science Communication at Manchester Metropolitan University. His current research looks at ways in which science can be used to empower society, as well as the relationship between science and poetry.

Grant Allen is a Reader in Atmospheric Science at the University of Manchester where his research interests focus on trace gas measurement methods and remote sensing.



Digital Informatics and Isotopic Biology

Self-organization and isotopically diverse systems in physics, biology and technology

Alexander Berezin
McMaster University, Canada

iopscience.org/book/978-0-7503-1293-6

About the book

Digital Informatics and Isotopic Biology discusses self-organization and the emergence of order at the atomic scale with a particular emphasis on the digital information that can be carried by proper ordering of stable isotopes. This ushers in the concept of isotopic biology as a complimentary level to the "common" biology. The book discusses the area of isotopic randomness (isotopicity) and numerous implications of it for physics, biology, biomedicine, informatics, and other areas of science. It offers a unique and original view and may be the first milestone of this novel emerging area. The character of the book is highly interdisciplinary with numerous philosophical and historical discourses and comments.

Extent 179pp

Collection
Expanding Physics

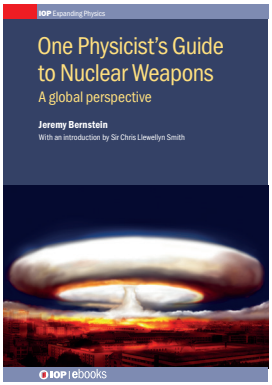
Subject
General physics

ISBN 9780750312936 (electronic)

ISBN 9780750312943 (print)

About the author

Alexander Berezin is a Professor (Emeritus) of Engineering Physics at McMaster University. He is active in many areas of physics and several other disciplines, and is largely known as an interdisciplinary scientist. Some of his published work touches controversial, largely unexplored and emergent areas, such as possible physical foundations of homeopathy, physics of consciousness, simulated realities and parallel universes. He also has publications on arts, architecture, tourism and social issues related to science policy and education.



One Physicist's Guide to Nuclear Weapons

A global perspective

Jeremy Bernstein
with an introduction by Sir Chris Llewellyn Smith

Stevens Institute of Technology, USA

iopscience.org/book/978-0-7503-1308-7

Extent 97pp

Collection
Expanding Physics

Subject
General physics

ISBN 9780750313087 (electronic)

ISBN 9780750313094 (print)

About the book

One Physicist's Guide to Nuclear Weapons presents a truly global look at the history, use, and issues surrounding nuclear weapons from the perspective of physicist and writer Jeremy Bernstein. A first-hand witness to the development and science of nuclear weapons, he is in a unique position to highlight the ways in which nuclear weapons work with a writing style that is suitable for lay readers and scientists alike. Bernstein brings the reader on a journey from the Nevada nuclear-testing fields in the 1950s to the present day situations in Iran and North Korea, while delving into the physics and science behind the bomb. With an introduction by Sir Chris Llewellyn Smith, this book is a testament to the last 70 years of the nuclear age, affecting every human being on the planet.

About the author

Jeremy Bernstein is a professor emeritus of physics at the Stevens Institute of Technology in Hoboken, New Jersey. He was a staff writer for the *New Yorker* from 1961 to 1995. Additionally, he was an adjunct professor at the Rockefeller University and a former vice-president of the Board of Trustees of the Aspen Center for Physics of which he is now an Honorary Trustee.

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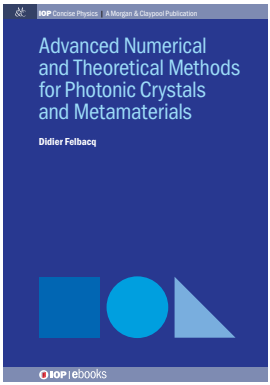

Advanced Numerical and Theoretical Methods for Photonic Crystals and Metamaterials

Didier Felbacq
University of Montpelier, France

iopscience.org/book/978-1-68174-302-8

About the book

This book provides a set of theoretical and numerical tools useful for the study of wave propagation in metamaterials and photonic crystals. While concentrating on electromagnetic waves, most of the material can be used for acoustic (or quantum) waves. For each presented numerical method, numerical code written in MATLAB® is presented. The codes are limited to 2D problems and can be easily translated in Python or Scilab, and used directly with Octave as well.

About the author

Didier Felbacq is a full professor of physics at the University of Montpelier. He is involved in theoretical and numerical research in close collaboration with experimentalists. His current activities cover electron transport in transistors for terahertz emission and detection, second harmonic emission in photonic crystals, excitons in 2D materials, quantum metamaterials, thermal metamaterials, acoustic metamaterials, and biophysics. He received his PhD in physics from École Centrale de Marseille in 1992 and is a former member of the Institut Universitaire de France.

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Collection
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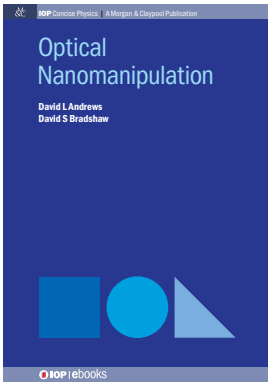

Extent 107pp

Collection
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Subject
Optics and photonics

ISBN 9781681744667 (electronic)

ISBN 9781681743004 (print)

Optical Nanomanipulation

David L Andrews and David S Bradshaw
University of East Anglia, UK

iopscience.org/book/978-1-68174-466-7

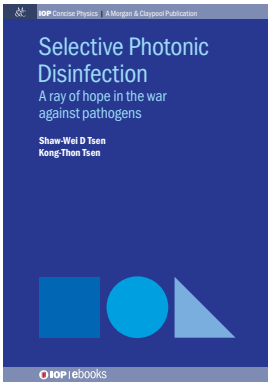
About the book

This book provides a broad introductory survey of the remarkable field of optical nanomanipulation. It establishes and clearly differentiates the physical principles and provides a snapshot of many prominent current applications. The first chapters introduce and develop core theory focusing on the physical significance and the most salient parameters. The remaining chapters are full of copious examples and illustrations that explain and exhibit the features and uses of mechanisms involved. *Optical Nanomanipulation* is an amenable introduction for the non-specialist to the more advanced methods.

About the authors

David L Andrews leads research at the University of East Anglia on fundamental molecular photonics, energy harvesting and transport, optomechanical forces, quantum and nonlinear optics. Andrews is a Fellow of the SPIE, The Optical Society of America, the Royal Society of Chemistry, and the Institute of Physics.

David S Bradshaw is an honorary research associate at the University of East Anglia. He received his PhD in theoretical chemical physics from East Anglia. His long-running interests include optical trapping, resonance energy transfer, optical binding and nonlinear optics.



Extent 102pp

Collection
Concise Physics

Subject
Optics and photonics

ISBN 9781681743547 (electronic)

ISBN 9781681743004 (print)

Selective Photonic Disinfection

A ray of hope in the war against pathogens

[1]Shaw-Wei D Tsen
[2]Kong-Thon Tsen
[1]Washington University School of Medicine, USA
[2]Arizona State University, USA

iopscience.org/book/978-1-68174-354-7

About the book

Pathogens such as viruses and bacteria are among the greatest threats to human health worldwide. In today's era of population growth and international travel, new technologies are desperately needed to combat the spread of known and emerging pathogens.

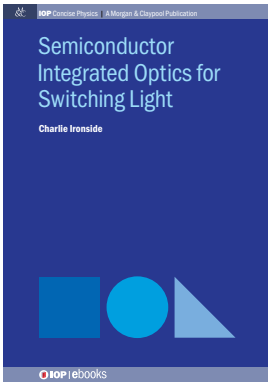
This book presents a new concept for pathogen inactivation called selective photonic disinfection (SEPHODIS). The SEPHODIS technology inactivates pathogens by mechanical means, a total paradigm shift from traditional chemical and physical methods. The unique strength of SEPHODIS resides in its capability to inactivate pathogens while preserving desirable materials such as human cells and proteins. The technology also avoids the need to use chemicals, drastically reducing the risk of side effects. These properties make SEPHODIS ideal for important biomedical applications such as safeguarding blood products and therapeutics against pathogens, as well as producing effective and safe vaccines to combat infectious disease.

Written in a style that is both technically informative and easy to comprehend for the layman reader, this book illustrates the story of SEPHODIS from its initial discovery and bench studies to its real-world applications.

About the authors

Shaw-Wei David Tsen, MD, PhD, has more than 10 years of experience in laser research, virology research, and immunology research, with particular emphasis on pathogen inactivation, transfusion safety, and vaccine immunology.

Kong-Thon Tsen, PhD, is professor at the Department of Physics and the Center for Biophysics at Arizona State University. His research focuses on the interaction of light with solid-state and biological systems, dynamical properties of lattice vibrations in low-dimensional and nanostructure semiconductors.



Extent 95pp

Collection
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Subject
Optics and photonics

ISBN 9781681745220 (electronic)

ISBN 9781681743004 (print)

Semiconductor Integrated Optics for Switching Light

Charlie Ironside
Curtin University, Australia

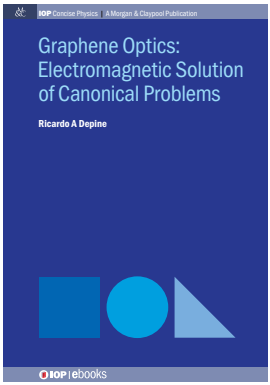
iopscience.org/book/978-1-68174-522-0

About the book

This book covers the technology of switching or modulating light in semiconductor optical waveguides. Currently, a key function for optical communications systems is the conversion of data from an electrical signal to an optical signal for transmission in very low loss optical fibres and the converse process of optical to electrical conversion the O/E/O data conversion. This conversion between electronic and photonic signals imposes an energy consumption overhead on optical communication systems. So many research workers have been attracted to ultrafast all-optical switching of data in different formats. As a way of introduction to all-optical switching in semiconductor waveguides, the book covers the electro-optic effect, electroabsorption and electrorefraction; effects that can be used in semiconductor optical modulation devices. But the book focuses on all-optical switching using second- and third-order optical nonlinearities in AlGaAs optical waveguides. It covers a variety of device configurations including integrated nonlinear couplers and Mach-Zehnder interferometers. Further, it provides design software in suit of Mathematica notebooks that can be used to explore the device design.

About the author

Charlie Ironside is a professor in the Department of Physics and Astronomy at Curtin University, Western Australia. He received his PhD from Heriot-Watt University, Edinburgh, and in 1998 was appointed Professor of Quantum Electronics at the University of Glasgow. He has more than 30 years of experience in semiconductor optoelectronics research and in particular, microfabrication of photonic components. He is a Fellow of the IET, a Fellow of the IOP, and senior member of IEEE. Along with hundreds of papers, he has co-authored five patents.



Graphene Optics: Electromagnetic Solution of Canonical Problems

Ricardo A Depine
University of Buenos Aires, Argentina

iopscience.org/book/978-1-68174-310-3

About the book

This book is a rigorous but concise macroscopic description of the interaction between electromagnetic radiation and structures containing graphene sheets (two-dimensional structures). It presents canonical problems with translational invariant geometries, in which the solution of the original vectorial problem can be reduced to the treatment of two scalar problems, corresponding to two basic polarization modes. The book includes computational problems and makes use of the Python programming language to make numerical calculations accessible to any science student. Many figures within are accompanied by Python scripts.

About the author

Ricardo A Depine is a Permanent Professor with the Department of Physics at the University of Buenos Aires (UBA), where he leads the research activities of the Applied Electromagnetics Group and teaches electromagnetic theory and optics. He is also Principal Researcher of the Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET).

Extent 135pp

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Collection
Concise Physics

Subject
Sensors and instrumentation

ISBN 9781681743387 (electronic)

ISBN 9781681743363 (print)

Confocal Microscopy

Jian Liu and Jiubin Tan
Harbin Institute of Technology, China

iopscience.org/book/978-1-68174-338-7

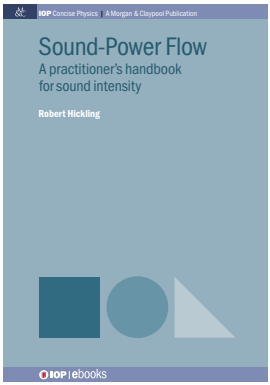
About the book

The confocal microscope is appropriate for imaging cells or the measurement of industrial artefacts. However, junior researchers and instrument users sometimes misuse imaging concepts and metrological characteristics, such as position resolution in industrial metrology and scale resolution in bio-imaging. And, metrological characteristics or influence factors in 3D measurement such as height assessment error caused by 3D coupling effect are so far not yet identified. In this book, the authors outline their practices by the working experiences on standardization and system design.

This book assumes little previous knowledge of optics, but rich experience in engineering of industrial measurements, in particular with profile metrology or area surface topography will be very helpful to understand the theoretical concerns and value of the technological advances. It should be useful for graduate students or researchers as extended reading material, as well as microscope users alongside their handbook.

About the authors

Jian Liu is professor and vice-dean of the School of Electrical Engineering and Automation, Harbin Institute of Technology, China, and Honorary Professor at the University of Nottingham, UK. His academic interests lie in the theories and implementations of optical microscopes, the development of confocal microscopes, applied optics and optical metrology. He is a council member of the China Optical Society for Engineering and China Instrument and Control Society, and a board member of *Journal of Microscopy, Surface Topography: Metrology and Properties* and *Optics Communications*.



Sound-Power Flow

A practitioner's handbook for sound intensity

Robert Hickling
Sonometrics Inc.

iopscience.org/book/978-1-68174-454-4

About the book

Sound-Power Flow: A practitioner's handbook for sound intensity is a guide for practitioners and research scientists in different areas of acoustical science. There are three fundamental quantities in acoustics: sound pressure, sound particle velocity, and sound intensity. This book is about sound intensity and demonstrates the advantages and uses of acoustical sensing compared with other forms of sensing. It describes applications such as: measuring total sound power; directional hearing of humans and mammals; echolocation; measuring sound-power flow in ducts; and uses of non-contact, focused, high-frequency, pulse-echo ultrasonic probes.

This book presents computational approaches using standard mathematics, and relates these to the measurement of sound-power flow in air and water. It also uses linear units rather than logarithmic units – this making computation in acoustics simpler and more accessible to advanced mathematics and computing. The book is based on work by the author and his associates at General Motors, the University of Mississippi, and Sonometrics.

About the author

Robert Hickling is the owner and president of Sonometrics Inc. His main area of research is engineering acoustics with particular focus on the application of sound-intensity measurement, motor vehicle and environmental noise, and noise and overpressure due to airbags. He has been an industry consultant for Delphi, Autoliv and Takata, and is a member of the SAE, ASME, Institute of Noise Control Engineering and the Acoustical Society of America.

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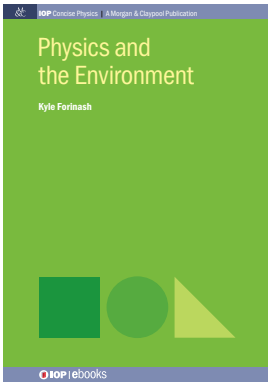

Extent 236pp

Collection
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Subject
Environmental physics and green energy

ISBN 9781681744940 (electronic)

ISBN 9781681744926 (print)

Physics and the Environment

Kyle Forinash
Indiana University Southeast, USA

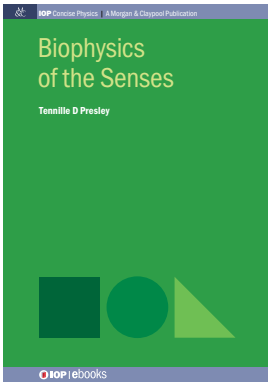
iopscience.org/book/978-1-68174-494-0

About the book

Physics and the Environment directly connects the physical world to environmental issues that the world is facing today and will face in the future. It shows how the first and second laws of thermodynamics limit the efficiencies of fossil-fuel energy conversions to less than 100%, while also discussing how clever technologies can enhance overall performance. It also extensively discusses renewable forms of energy, their physical constraints and how we must use science and engineering as tools to solve problems instead of opinion and politics.

About the author

Kyle Forinash is Professor of Physics at Indiana University Southeast in New Albany, Indiana. He has published technical papers on non-linear dynamics, in addition to pedagogical papers about the use of computers and cell phones for data collection in student laboratories. He is the author of two books, one on mathematical physics and the other on environmental physics. His current interests include applications of physics to environmental issues and open-source computer simulations for physics education.



Biophysics of the Senses

Tennille D Presley
Winston-Salem State University, USA

iopscience.org/book/978-1-68174-175-8

About the book

Biophysics of the Senses connects fundamental properties of physics to biological systems, relating them directly to the human body. It includes discussions of the role of charges and free radicals in disease and homeostasis, how aspects of mechanics impact normal body functions, human bioelectricity and circuitry, forces within the body, and biophysical sensory mechanisms. This is an exciting view of how sensory aspects of biophysics are utilized in everyday life for students who are curious but struggle with the connection between biology and physics.

About the author

Tennille D Presley, PhD, is a tenured Associate Professor at Winston-Salem State University (WSSU). She received her PhD from The Ohio State University and was the first African-American to graduate from the biophysics program. She joined WSSU in 2010 and was recently Visiting Faculty at Brookhaven National Laboratory. She has published more than a dozen articles in free radical research and her current research involves investigating the effect of thermodynamics on free radicals and proteins in a state of vascular dysfunction.

Extent 70pp

Collection
Concise Physics

Subject
Biophysics

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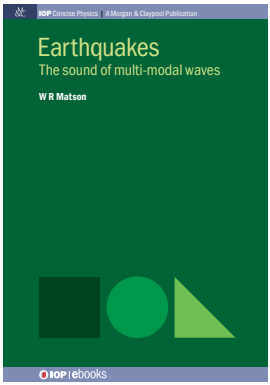


Extent 91pp

Collection
Concise Physics

Subject
Geophysics and planetary science

ISBN 9781681743301 (electronic)

ISBN 9781681743288 (print)

Earthquakes

The sound of multi-modal waves

W R Matson
University of Minnesota, DePaul University,
and Central Michigan University, USA

iopscience.org/book/978-1-68174-330-1

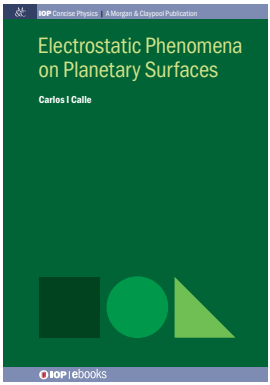
About the book

This book is an introduction to wave dynamics as they apply to earthquakes, among the scariest, most unpredictable, and deadliest natural phenomena on Earth. Since studying seismic activity is essentially a study of wave dynamics, this text starts with a discussion of types and representations, including wave-generation mechanics, superposition, and spectral analysis. Simple harmonic motion is used to analyze the mechanisms of wave propagation, and driven and damped systems are used to model the decay rates of various modal frequencies in different media.

Direct correlation to earthquakes in California, Mexico, and Japan is used to illustrate key issues, and actual data from an event in California is presented and analyzed. Our Earth is a dynamic and changing planet, and seismic activity is the result. Hundreds of waves at different frequencies, modes, and amplitudes travel through a variety of different media, from solid rock to molten metals. Each media responds differently to each mode; consequently the result is an enormously complicated dynamic behavior. Earthquakes should serve well as a complimentary text for an upper-school course covering waves and wave mechanics, including sound and acoustics and basic geology. The mathematical requirement includes trigonometry and series summations, which should be accessible to most upper-school and college students. Animation, sound files, and videos help illustrate major topics.

About the author

W R Matson has been an Assistant Professor at the University of Minnesota, DePaul University, and Central Michigan University since receiving his doctorate from Oklahoma State University in 2004. He completed his post-doctoral fellowship at Emory University in the area of destructive rheology and shock physics, during which he developed integrated experimental technology including time-dependent second-order dynamic feedback controls for a remotely governed three-dimensional experimental apparatus.



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Collection
Concise Physics

Subject
Geophysics and planetary science

ISBN 9781681744780 (electronic)

ISBN 9781681743288 (print)

Electrostatic Phenomena on Planetary Surfaces

Carlos I Calle
NASA Kennedy Space Center, USA

iopscience.org/book/978-1-68174-478-0

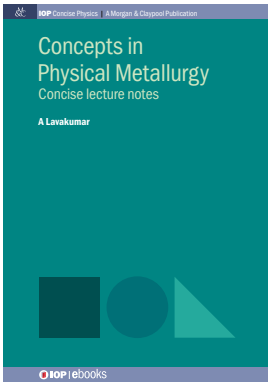
About the book

The diverse planetary environments in the solar system react in somewhat different ways to the encompassing influence of the Sun. These different interactions define the electrostatic phenomena that take place on and near planetary surfaces. The desire to understand the electrostatic environments of planetary surfaces goes beyond scientific inquiry. These environments have enormous implications for both human and robotic exploration of the solar system.

This book describes in some detail what is known about the electrostatic environment of the solar system from early and current experiments on Earth as well as what is being learned from the instrumentation on the space exploration missions (NASA, European Space Agency, and the Japanese Space Agency) of the last few decades. It begins with a brief review of the basic principles of electrostatics.

About the author

Carlos I Calle is the founder and manager of NASA's Electrostatics and Surface Physics Laboratory at the Kennedy Space Center. He received his PhD in theoretical nuclear physics from Ohio University. He is currently working on the problem of electrostatic phenomena on planetary surfaces, particularly on Mars and the Moon, developing instrumentation for future planetary exploration missions. He has authored more than 150 papers, several books, and is the recipient of two awards from NASA for outstanding contributions to the space program.



Extent 178pp

Collection
Concise Physics

Subject
Materials science

ISBN 9781681744742 (electronic)

ISBN 9781681744728 (print)

Concepts in Physical Metallurgy

Concise lecture notes

A Lavakumar
Veer Surendra Sai University of Technology, Odisha, India

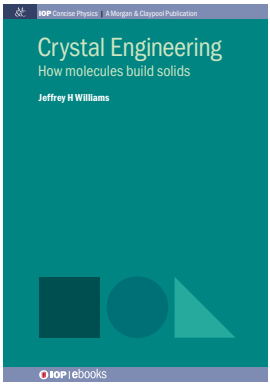
iopscience.org/book/978-1-68174-474-2

About the book

The progress of civilization can be, in part, attributed to their ability to employ metallurgy. This book is an introduction to multiple facets of physical metallurgy, materials science, and engineering. As all metals are crystalline in structure, attention is focussed on these structures, and how the formation of these crystals is responsible for certain aspects of the material's chemical and physical behaviour. *Concepts in Physical Metallurgy: Concise lecture notes* also discusses the mechanical properties of metals, the theory of alloys, and physical metallurgy of ferrous and non-ferrous alloys.

About the author

Avala Lavakumar is a physical metallurgist and assistant professor in the Department of Metallurgy and Materials Engineering, Veer Surendra Sai University of Technology, Odisha, India. His primary research area is phase transformations of steels, super alloys, and their mechanical behaviours. He received his bachelor's degree from the JNTU in Hyderabad and his master's in industrial metallurgy from the National Institute of Technology in Durgapur, India.



Extent 145pp

Collection
Concise Physics

Subject
Materials science

ISBN 9781681746265 (electronic)

ISBN 9781681744728 (print)

Crystal Engineering

How molecules build solids

Jeffrey H Williams
Formerly at Bureau International des Poids et Mesures (BIPM), France

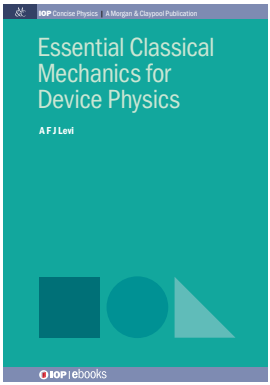
iopscience.org/book/978-1-68174-626-5

About the book

There are more than 20 million chemicals in the literature, with new materials being synthesized each week. Most of these molecules are stable, and the three-dimensional arrangement of the atoms in the molecules, in the various solids may be determined by routine X-ray crystallography. When this is done, it is found that this vast range of molecules, with varying sizes and shapes can be accommodated by only a handful of solid structures. This limited number of architectures for the packing of molecules of all shapes and sizes, to maximize attractive intermolecular forces and minimizing repulsive intermolecular forces, allows us to develop simple models of what holds the molecules together in the solid. In this volume we look at the origin of the molecular architecture of crystals; a topic that is becoming increasingly important and is often termed, crystal engineering. Such studies are a means of predicting crystal structures, and of designing crystals with particular properties by manipulating the structure and interaction of large molecules. That is, creating new crystal architectures with desired physical characteristics in which the molecules pack together in particular architectures; a subject of particular interest to the pharmaceutical industry.

About the author

Jeffrey H Williams was head of publications at the Bureau International des Poids et Measures (BIPM) from 2003–2008. He received his PhD in chemical physics from Cambridge in 1981 and published more than 60 technical papers until leaving research in 1992 to join the world of science publishing. At BIPM, he was the editor of the journal *Metrologia*, the leading technical publication for research on all matters related to weights and measures. He is the author of two other IOP ebooks, *Order from Force* and *Defining and Measuring Nature*.



Essential Classical Mechanics for Device Physics

A F J Levi
University of Southern California, USA

iopscience.org/book/978-1-68174-414-8

About the book

Continued advances in the precision manufacturing of new structures at the nanometer scale have provided unique opportunities for device physics. This book sets out to summarize those elements of classical mechanics most applicable for scientists and engineers studying device physics. Supplementary MATLAB® materials are available for all figures generated numerically.

About the author

Anthony Levi is a Professor of Electrical Engineering and Physics at the University of Southern California (USC). He joined USC in 1993 after working for 10 years at AT&T Bell Laboratories. He invented hot electron spectroscopy and discovered ballistic electron transport in heterostructure bipolar transistors. He also created the first microdisk laser. His current research includes optimal design of high-performance electronic and photonic systems, RF photonics, and very small lasers. He holds 17 US patents and is the author of the book *Applied Quantum Mechanics*.

Extent 103pp

Collection
Concise Physics

Subject
Electronic materials and devices

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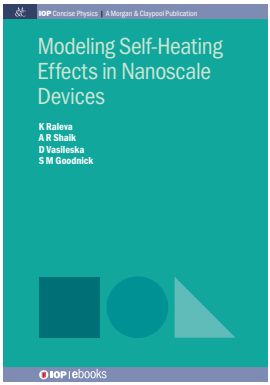

Modeling Self-Heating Effects in Nanoscale Devices

[1]K Raleva
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Extent 108pp

Collection
Concise Physics

Subject
Electronic materials and devices

ISBN 9781681741871 (electronic)

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About the book

It is generally acknowledged that modeling and simulation are preferred alternatives to trial-and-error approaches to semiconductor fabrication in the present environment, where the cost of process runs and associated mask sets is increasing exponentially with successive technology nodes. Hence, accurate physical device simulation tools are essential to accurately predict device and circuit performance. Accurate thermal modeling and the design of microelectronic devices and thin-film structures at the micro- and nanoscales poses a challenge to electrical engineers who are less familiar with the basic concepts and ideas in sub-continuum heat transport. This book aims to bridge that gap. Efficient heat-removal methods are necessary to increase device performance and device reliability. The authors provide readers with a combination of nanoscale experimental techniques and accurate modeling methods that must be employed in order to determine a device's temperature profile.

About the authors

Katerina Raleva is currently an Associate Professor of Electronics at the Faculty of Electrical Engineering and Information Technologies (FIET), Skopje, Macedonia.

Abdul Rawoof Shaik is currently pursuing a PhD at Arizona State University working on modeling defect migration in cadmium telluride solar cells.

Dragica Vasileska is a Professor of Electrical Engineering at Arizona State University. She is a Senior Member of both IEEE and APS and is the author of many articles, conference proceedings and books.

Stephen M Goodnick is the Director of the Arizona Initiative for Nano-Electronics.

Radiative Properties of Semiconductors

[1]N M Ravindra
[2]Sita Rajyalaxmi Marthi
[3]Asahel Banobre
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[2]Osmania University, Hyderabad, India

iopscience.org/book/978-1-68174-176-5

About the book

Optical properties, particularly in the infrared range of wavelengths, continue to be of enormous interest to both material scientists and device engineers. The need for the development of standards for data of optical properties in the infrared range of wavelengths is very timely considering the ongoing transition of nanotechnology from fundamental R&D to manufacturing. Radiative properties play a critical role in the processing, process control and manufacturing of semiconductor materials, devices, circuits and systems. The design and implementation of real-time process control methods in manufacturing requires the knowledge of the radiative properties of materials. Sensors and imagers operate on the basis of the radiative properties of materials. This book reviews the optical properties of various semiconductors in the infrared range of wavelengths. Theoretical and experimental studies of the radiative properties of semiconductors are presented. Previous studies, potential applications and future developments are outlined.

Extent 165pp

Collection
Concise Physics

Subject
Electronic materials and devices

ISBN 9781681741765 (electronic)

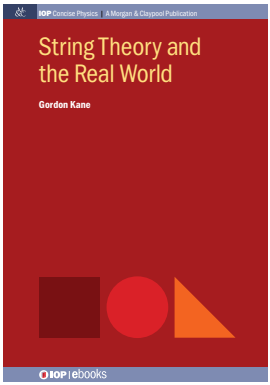
ISBN 9781681744124 (print)

About the authors

N M Ravindra (Ravi) is Professor of Physics at the New Jersey Institute of Technology (NJIT). He was the Chair of the Physics Department (2009–2013) and Director, Interdisciplinary Program in Materials Science and Engineering at NJIT (2009–2016). Ravi is the Editor-in-Chief of *Emerging Materials Research* and Series Editor of *Emerging Materials: Processing, Performance and Applications*, Momentum Press.

Sita Rajyalaxmi Marthi (Laxmi) received a BSc in physics and MSc in applied physics from Osmania University, Hyderabad, India.

Asahel Banobre received his BS and MS in applied physics with honors from the New Jersey Institute of Technology (NJIT) in 2003 and 2006, respectively.



Extent 69pp

Collection
Concise Physics

Subject
High energy and particle physics

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ISBN 9781681744889 (print)

String Theory and the Real World

Gordon Kane
University of Michigan, USA

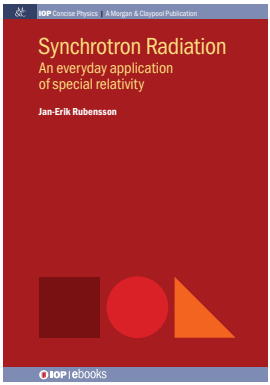
iopscience.org/book/978-1-68174-490-2

About the book

This book attempts to explain why "string theory" may provide the comprehensive underlying theory that describes and explains our world. It is an enthusiastic view of how compactified string/M-theories (plus data that may be reachable) seem to have the possibilities of leading to a comprehensive underlying theory of particle physics and cosmology, perhaps soon. We are living in a hugely exciting era for science, one during which it may be possible to achieve a real and true understanding of our physical world.

About the author

Gordon Kane is the Victor Weisskopf Distinguished University Professor at the University of Michigan and Director Emeritus at the Michigan Center for Theoretical Physics (MCTP), a leading center for the advancement of theoretical physics. He was director of the MCTP from 2005–2011 and Victor Weisskopf Collegiate Professor of Physics from 2002–2011. He received the Lilienfeld Prize from the American Physical Society in 2012, and the J J Sakurai Prize for Theoretical Particle Physics in 2017. Kane is an internationally recognized scientific leader in theoretical and phenomenological particle physics, and theories for physics beyond the Standard Model. In recent years, he has been a leader in string phenomenology. Kane has been with the University of Michigan since 1965.



Extent 84pp

Collection
Concise Physics

Subject
High energy and particle physics

ISBN 9781681741796 (electronic)

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Synchrotron Radiation

An everyday application of special relativity

Jan-Erik Rubensson
Uppsala University, Sweden

iopscience.org/book/978-1-68174-179-6

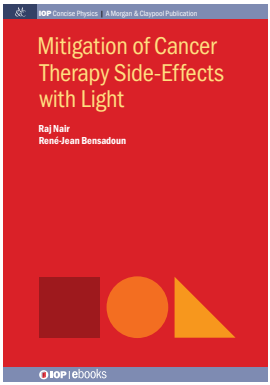
About the book

Synchrotron radiation is the name given to the radiation that occurs when charged particles are accelerated in a curved path or orbit. Classically, any charged particle that moves in a curved path or is accelerated in a straight-line path will emit electromagnetic radiation. Various names are given to this radiation in different contexts. Thus circular particle accelerators are called synchrotrons – this is where charged particles are accelerated to very high speeds and the radiation is referred to as synchrotron radiation.

Suitable for a summer short course or a one-term lecture series, this text introduces the subject, starting with some historical background then covering basic concepts such as flux, intensity, brilliance, emittance and Liouville's theorem. The book then covers the properties of synchrotron radiation, insertion devices, beamlines and monochromators before finishing with an introduction to free electron lasers and an overview of the most common techniques and applications of this technology.

About the author

Jan-Erik Rubensson is physics professor at Uppsala University, where he teaches basic mechanics and optics on the bachelor level, and he has the responsibility for the master-level course in synchrotron radiation. His research focuses on the refinement of methods related to soft X-ray inelastic X-ray scattering (RIXS), and is spokesperson for VERITAS, the RIXS-dedicated beamline at the MAX IV laboratory. He investigates non-linear scattering processes at X-ray free-electron lasers, primarily via an imaging spectrometer at the European XFEL in Hamburg.



Mitigation of Cancer Therapy Side-Effects with Light

[1]Raj Nair
[2]René-Jean Bensadoun
[1]Griffith University, Australia
[2]Nice High Energy Centre, France

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Extent 47pp

Collection
Concise Physics

Subject
Medical physics and biomedical engineering

ISBN 9781681741390 (electronic)

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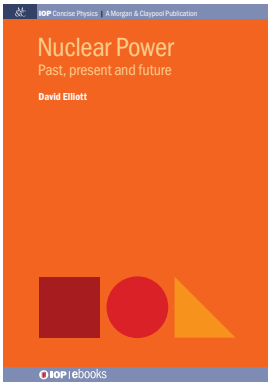
About the book

"Light" from low-level laser therapy (LLLT), through a process called photobiomodulation (PBM), has been in existence in supportive care in cancer, in particular in the management of oral mucositis (OM) in patients undergoing chemotherapy, radiation therapy and haematopoietic stem cell transplantation. In this book, the authors attempt to portray the current status of the supportive care interventions that are possible with PBM using LLLT in patients undergoing cancer treatment for solid tumours, haematological malignancies, and head and neck cancers.

About the authors

Raj Nair is Professor of Oral Medicine/Oral Oncology, Oral Pathology and Human Diseases at Griffith University, Gold Coast, Australia. He has received his oral medicine training from Harvard University, USA, and University of London, UK. He has published in the field of oral medicine, pathology, microbiology and immunology, and presented at numerous international conferences.

René-Jean Bensadoun is a Radiation Oncologist and Professor of Oncology-Radiotherapy. He currently heads the Nice High Energy Centre (private structure of radiotherapy and supportive care). He has published more than 220 articles in peer-reviewed journals, and authored two books published in the US on the use of low-energy laser in cancer.



Extent 82pp

Collection
Concise Physics

Subject
Nuclear physics

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ISBN 9781681745046 (print)

Nuclear Power

Past, present and future

David Elliott
The Open University, UK

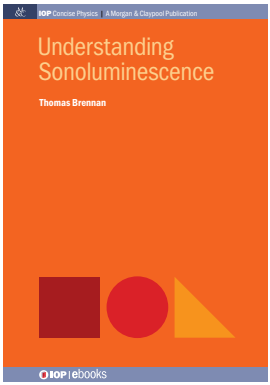
iopscience.org/book/978-1-68174-506-0

About the book

This book looks at the early history of nuclear power, at what happened next, and at its longer-term prospects. The main question is: can nuclear power overcome the problems that have emerged? It was once touted as the ultimate energy source, freeing mankind from reliance on dirty, expensive fossil energy. Sixty years on, nuclear only supplies around 11.5% of global energy and is being challenged by cheaper energy options. While the costs of renewable sources, like wind and solar, are falling rapidly, nuclear costs have remained stubbornly high. Its development has also been slowed by a range of other problems, including a spate of major accidents, security concerns and the as yet unresolved issue of what to do with the wastes that it produces. In response, a new generation of nuclear reactors is being developed, many of them actually revised versions of the ideas first looked at in the earlier phase. Will this new generation of reactors bring nuclear energy to the forefront in the future?

About the author

David Elliott worked initially with the UK Atomic Energy Authority at Harwell and the Central Electricity Generating Board before moving to The Open University, where he is now an Emeritus Professor. During his time at The Open University, he created several courses in design and innovation, with special emphasis on how the innovation development process can be directed towards sustainable technologies. He has published numerous books, reports and papers, especially in the area of developing sustainable and renewable energy technologies and systems.



Understanding Sonoluminescence

Thomas Brennan
Ferris State University, USA

iopscience.org/book/978-1-68174-366-0

About the book

Sonoluminescence is the transformation of sound into light. To most who know how to do sonoluminescence, it's just a little glowing bubble levitating in a flask of water. But it holds some surprises that have been overlooked. This book looks to reform our scientific understanding of sonoluminescence and explore the practical applications as an energy source.

Extent 97pp

Collection
Concise Physics

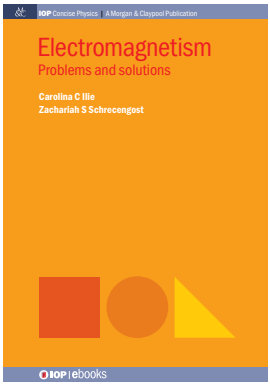
Subject
Nuclear physics

ISBN 9781681743660 (electronic)

ISBN 9781681745046 (print)

About the author

Thomas Brennan is a professor of physics at Ferris State University in Big Rapids, Michigan, where he's taught physics and astronomy since 2014. He completed his PhD thesis on the topic of sonoluminescence in 2009 at the Illinois Institute of Technology. He also received a BA in physics from the University of Chicago and an MS in physics from UCLA. His research interests include both experimental and mathematical physics as well as astronomy.



Extent 177pp

Collection
Concise Physics

Subject
Classical physics

ISBN 9781681744308 (electronic)

ISBN 9781681744285 (print)

Electromagnetism

Problems and solutions

[1]Carolina C Ilie
[2]Zachariah S Schrecengost
[1]State University of New York at Oswego, USA
[2]State University of New York, USA

iopscience.org/book/978-1-68174-430-8

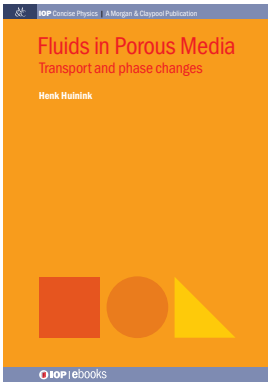
About the book

Electromagnetism: Problems and solutions is an ideal companion book for the undergraduate student – sophomore, junior, or senior – who may want to work on more problems and receive immediate feedback while studying. Each chapter contains brief theoretical notes followed by the problem text with the solution and ends with a brief bibliography. Also presented are problems more general in nature, which may be a bit more challenging.

About the authors

Carolina C Ilie is an Associate Professor at State University of New York at Oswego where she teaches electromagnetic theory and designs various problems for her students' exams, group work and quizzes. Dr Ilie received the President's Award for Teaching Excellence in 2016 and the Provost Award for Mentoring in Scholarly and Creative Activity in 2013.

Zachariah S Schrecengost is a State University of New York alumni. He finished his BS with a double major in physics and computer science and minor in mathematics. He took the advanced electromagnetic theory course with Dr Ilie.



Fluids in Porous Media

Transport and phase changes

Henk Huinink
Eindhoven University of Technology, the Netherlands

iopscience.org/book/978-1-68174-298-4

About the book

This book introduces the reader to the field of the physics of processes occurring in porous media. It targets master and PhD students who need to gain fundamental understanding of the impact of confinement on transport and phase-change processes. The book gives brief overviews of topics such as thermodynamics, capillarity and fluid mechanics in order to launch the reader smoothly into the realm of porous media. In-depth discussions are given of phase-change phenomena in porous media, single-phase flow, unsaturated flow and multiphase flow. In order to make the topics concrete, the book contains numerous example calculations. Also, as much experimental data as possible is included to give the reader the ability to quantify phenomena.

About the author

Hendrik Pieter (Henk) Huinink is a physical chemist and assistant professor at Eindhoven University of Technology, the Netherlands, in the group Transport in Permeable Media (TPM). He graduated at the Wageningen University in 1998, with a PhD in soft matter physics. He joined the applied physics department of TUE, where he started to work on modeling of transport in porous media and thin films, and has become more involved in NMR imaging studies on transport phenomenon.

Extent 47pp

Collection
Concise Physics

Subject
Classical physics

ISBN 9781681742984 (electronic)

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Excel® VBA for Physicists

A primer

Bernard V Liengme
St Francis Xavier University, Canada

iopscience.org/book/978-1-68174-462-9

About the book

This book is both an introduction and a demonstration of how Visual Basic for Applications (VBA) can greatly enhance Microsoft Excel® by giving users the ability to create their own functions within a worksheet and to create subroutines to perform repetitive actions. The book is written so readers are encouraged to experiment with VBA programming with examples using fairly simple physics or non-complicated mathematics such as root finding and numerical integration. Tested Excel® workbooks are available for each chapter and there is nothing to buy or install.

About the author

Bernard V Liengme is a Retired Professor of Chemistry and Lecturer in Information Systems of St Francis Xavier University in Nova Scotia, Canada. He is the author of *A Guide to Microsoft Excel® for Business and Management* (two editions), and *A Guide to Microsoft Excel® for Scientists and Engineers* (six editions). More recently published is *Modelling Physics with Microsoft Excel®* and *SMath for Physics: A primer*, both IOP ebooks. Bernard has been awarded the Microsoft Most Valued Professional award in Excel® in eight consecutive years.

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Mathematical and computational physics

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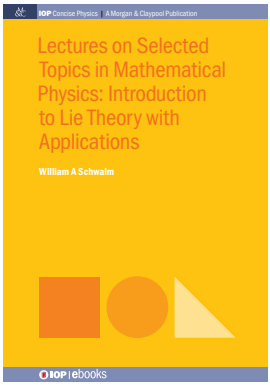

Lectures on Selected Topics in Mathematical Physics: Introduction to Lie Theory with Applications

William A Schwalm
University of North Dakota, USA

iopscience.org/book/978-1-68174-450-6

About the book

This book provides an introduction to Lie theory for first-year graduate students and professional physicists who may not have come across the theory in their studies. In particular, it is a summary overview of the theory of finite groups, a brief description of a manifold, and then an informal development of the theory of one-parameter Lie groups, especially as they apply to ordinary differential equations. The treatment is informal, but systematic and reasonably self-contained, as it assumes a familiarity with basic physics and applied calculus, but it does not assume additional mathematical training. Interested readers should have a fair chance of finding symmetries of a second-order differential equation and should be able to use it to reduce the order of the differential equation.

About the author

William A Schwalm received his PhD from Montana State University in 1978 in condensed matter theory. He held a postdoctoral position at the University of Utah before coming to University of North Dakota (UND) in 1980. Dr Schwalm belongs to the American Physical Society. He has received awards for teaching from both UND and the University of Utah.

Extent 86pp

Collection
Concise Physics

Subject
Mathematical and computational physics

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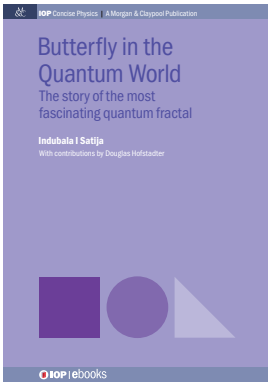


Extent 350pp

Collection
Concise Physics

Subject
Quantum physics

ISBN 9781681741819 (electronic)

ISBN 9781681740539 (print)

Butterfly in the Quantum World

The story of the most fascinating quantum fractal

Indubala I Satija
with contributions by Douglas Hofstadter

George Mason University, USA

iopscience.org/book/978-1-68174-181-9

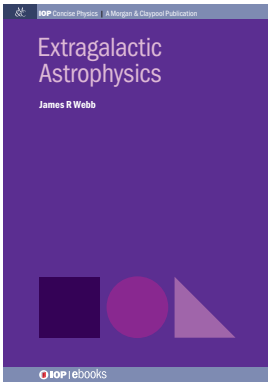
About the book

Butterfly in the Quantum World by Indu Satija, with contributions by Douglas Hofstadter, is the first book ever to tell the story of the "Hofstadter butterfly", a beautiful and fascinating graph lying at the heart of the quantum theory of matter. The butterfly came out of a simple-sounding question: What happens if you immerse a crystal in a magnetic field? What energies can the electrons take on? From 1930 onwards, physicists struggled to answer this question, until 1974, when graduate student Douglas Hofstadter discovered that the answer was a graph consisting of nothing but copies of itself nested down infinitely many times. This wild mathematical object caught the physics world totally by surprise, and it continues to mesmerize physicists and mathematicians today.

The butterfly plot is intimately related to many other important phenomena in number theory and physics, including Apollonian gaskets, the Foucault pendulum, quasicrystals, the quantum Hall effect and many more. Its story reflects the magic, the mystery and the simplicity of the laws of nature, and Indu Satija, in a wonderfully personal style, relates this story, enriching it with a vast number of lively historical anecdotes, many photographs, beautiful visual images and even poems, making her book a great feast for the eyes, for the mind and for the soul.

About the author

Indu Satija received her masters in physics from Bombay University and her doctorate in theoretical physics from Columbia University. She is currently a physics professor at George Mason University where she researches topological insulators, Bose-Einstein condensates and solitons. She has published numerous scientific articles and this is her first book. She lives in Potomac, a suburb of Washington, DC, with her husband Sushil, a physicist at the National Institute of Standards and Technology.



Extragalactic Astrophysics

James R Webb
Florida International University, USA

iopscience.org/book/978-1-68174-410-0

About the book

Extragalactic Astrophysics synthesizes the most important topics in the field of extragalactic astrophysics at the advanced undergraduate and graduate level, providing the reader with the foundation and tools for research in any of these areas. It attempts to cover a broad range of topics for a graduate-level class in a physics department where students' available credit hours for astrophysics classes are limited. The sections cover galactic structure, external galaxies, galaxy clustering, active galaxies, general relativity and cosmology.

About the author

James R Webb is currently a full professor of physics at Florida International University (FIU). He received his bachelors in physics at Ball State University, and his masters and PhD in astronomy at the University of Florida. His research is the study of blazar variability on all timescales and, although primarily an optical astronomer, has worked in the UV, X-ray and gamma-ray spectral domains as well.

Extent 124pp

Collection
Concise Physics

Subject
Astronomy and astrophysics

ISBN 9781681744100 (electronic)

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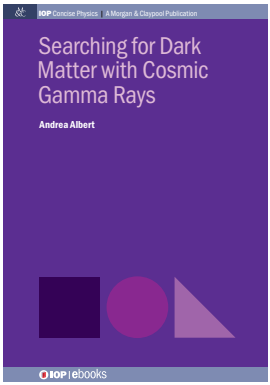


Extent 64pp

Collection
Concise Physics

Subject
Astronomy and astrophysics

ISBN 9781681742700 (electronic)

ISBN 9781681744087 (print)

Searching for Dark Matter with Cosmic Gamma Rays

Andrea Albert
Los Alamos National Laboratory, USA

iopscience.org/book/978-1-68174-270-0

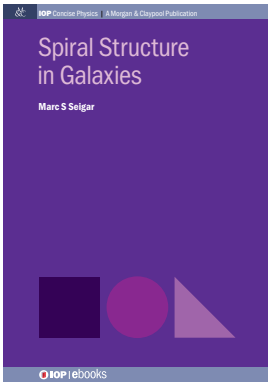
About the book

This book summarizes the evidence for dark matter and what we can learn about its particle nature using cosmic gamma rays. Reviewing results from recent experiments including anomalies that some have attributed to dark matter, this book also discusses how our observations complement other dark matter searches and prospects for future experiments.

It has almost been 100 years since Fritz Zwicky first detected hints that most of the matter in the universe doesn't directly emit or reflect light. Since then, the observational evidence for dark matter has continued to grow. Dark matter may be a new kind of particle that is governed by physics beyond our Standard Model of particle physics. In many models, dark matter annihilation or decay produces gamma rays. There are a variety of instruments observing the gamma-ray sky from tens of MeV to hundreds of TeV. Some make deep, focused observations of small regions, while others provide coverage of the entire sky. Each experiment offers complementary sensitivity to dark matter searches in a variety of target sizes, locations, and dark matter mass scales. This book provides a concise review of recent experiments.

About the author

Andrea Albert is the Marie Curie Distinguished Postdoctoral Fellow at Los Alamos National Laboratory where she continues the hunt for dark matter signals using both the Fermi LAT and the HAWC Observatory. She first became interested in particle astrophysics while studying at Rice University and earned her doctorate at The Ohio State University.



Spiral Structure in Galaxies

Marc S Seigar
University of Minnesota, Duluth, USA

iopscience.org/book/978-1-68174-610-4

About the book

How does it happen that billions of stars can co-operate to produce the beautiful spirals that characterize so many galaxies, including ours? This book reviews the history behind the discovery of spiral galaxies and the problems faced when trying to explain the existence of spiral structure within them. In the book, subjects such as galaxy morphology and structure are addressed as well as several models for spiral structure. The evidence in favor or against these models is discussed. The book ends by discussing how spiral structure can be used as a proxy for other properties of spiral galaxies, such as their dark-matter content and their central supermassive black-hole masses, and why this is important.

About the author

Marc Seigar is a Professor of Physics and Astronomy and the Head of the Department of Physics and Astronomy at the University of Minnesota Duluth (UMD). He is also the Director of the Marshall W Alworth Planetarium at UMD. Professor Seigar has published numerous papers and articles in conference proceedings in the field of galaxy dynamics, spiral structure, and dark matter. He is the author of *Dark Matter in the Universe*, IOP Concise Physics, a Morgan & Claypool publication, 2015.

Extent 95pp

Collection
Concise Physics

Subject
Astronomy and astrophysics

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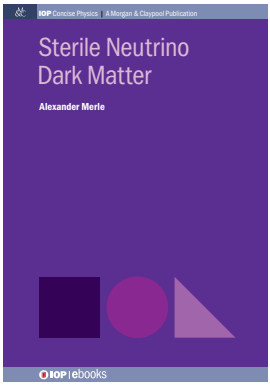

Sterile Neutrino Dark Matter

Alexander Merle
Max Planck Institute for Physics, Germany

iopscience.org/book/978-1-68174-482-7

About the book

This book is a new look at one of the hottest topics in contemporary science, dark matter. It is the pioneering text dedicated to sterile neutrinos as candidate particles for dark matter, challenging some of the standard assumptions that may be true for some dark-matter candidates, but not for all. So, this can be seen either as an introduction to a specialized topic or an out-of-the-box introduction to the field of dark matter in general. No matter if you are a theoretical particle physicist, an observational astronomer, or a ground-based experimentalist, no matter if you are a graduate student or an active researcher, you can benefit from this text, for a simple reason: a non-standard candidate for dark matter can teach you a lot about what we truly know about our standard picture of how the universe works.

About the author

Alexander Merle obtained his PhD from Heidelberg University in 2009. He is currently in a senior postdoc position at the Max Planck Institute for Physics. His main research is theoretical elementary particle physics and cosmology, with a particular focus on neutrinos, dark matter, and their interconnections. He has written more than 60 papers on various topics; is an active contributor to the field of keV sterile neutrino dark matter, having discovered the production mechanism (FIMP scalar decay) that is currently in best agreement with data.

Extent 108pp

Collection
Concise Physics

Subject
Astronomy and astrophysics

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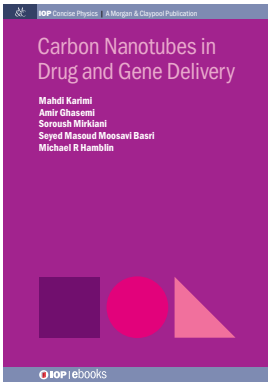

Carbon Nanotubes in Drug and Gene Delivery

[1]Mahdi Karimi, [2]Amir Ghasemi, [3]Soroush Mirkiani, [4]Seyed Masoud Mousavi Basri and [5]Michael R Hamblin

[1]Iran University of Medical Sciences, Tehran, Iran
[2]Sharif University of Technology, Iran
[3]Student, The University of Tehran Faculty of New Sciences and Technologies, Iran
[4]Bioenvironmental Research Center, Sharif University of Technology, Iran
[5]Massachusetts General Hospital, Harvard Medical School, USA

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Extent 100pp

Collection
Concise Physics

Subject
Nanoscience and nanotechnology

ISBN 9781681742625 (electronic)

ISBN 9781681742618 (print)

About the book

Recent important discoveries and developments in nanotechnology have had a remarkable and ever-increasing impact on many industries, especially materials science, pharmaceuticals, and biotechnology. Nanocarriers have been investigated for a wide variety of different medical applications. Some examples of these nanocarriers include polymersomes, liposomes, micelles and carbon-based nanomaterials. Within this book, the authors describe different features of carbon nanotubes (CNTs), survey the properties of both the multi-walled and single-walled varieties, and cover their applications in drug and gene delivery. In addition, the book explains the structure and properties of CNTs prepared by different method, and discussed their isolation and purification.

About the authors

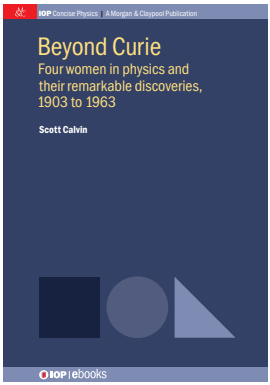
Mahdi Karimi, PhD, is Assistant Professor in the Department of Medical Nanotechnology at Iran University of Medical Sciences.

Amir Ghasemi is Engineering Expert at Parsa Polymer Sharif.

Soroush Mirkiani is currently studying degradable Brushite bone cements at The University of Tehran Faculty of New Sciences and Technologies.

Seyed Masoud Mousavi Basri is affiliated with the Bioenvironmental Research Center at Sharif University of Technology.

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



Beyond Curie

Four women in physics and their remarkable discoveries, 1903 to 1963

Scott Calvin
Sarah Lawrence College, USA

iopscience.org/book/978-1-68174-646-3

Extent 165pp

Collection
Concise Physics

Subject
General physics

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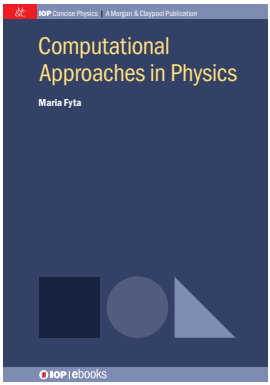
About the book

In the 116 year history of the Nobel Prize in Physics, only two women have won the award; Marie Curie (1903) and Maria Mayer (1963). During the 60 years between those awards, several women did work in physics of similar calibre, including Cecilia Payne, Lise Meitner and Chien-Shiung Wu. This book discusses their work (along with Mayer), providing biographies for each along with the science of their discoveries. The biographies focus on how society and the scientific community treated them and how this treatment was certainly influenced by their gender while also outlining their responses to the challenges that they faced, which adds to the admiration they so richly deserve. *Beyond Curie* answers many fascinating historical and scientific questions. How did each physicist get to the event that each one is known for? What obstacles did they face and what decisions did they need to make? Who were their allies, their rivals and their detractors? How was their work recognized at the time? These questions could be asked of any scientist who has made a major discovery and some aspects of the answers have little to do with the gender of the scientists in question. However, others are entirely due to the fact that each was a woman. The book also discusses the Nobel prize process and even how childcare played a role in their lives.

About the author

Scott Calvin received his PhD in chemical physics from the City University of New York. He has taught, conducted research, and advised students in a wide variety of institutions including the Naval Research Laboratory, Brookhaven National Laboratory, the Hayden Planetarium, Sarah Lawrence College and several others. He is the author of *We Can Do It! A Problem Solving Graphic Novel Guide for General Physics*, and open source artisanal pop-up book *National Synchroton Light Source II: Long Island's State of the Art X-Ray Microscope*.



Extent 136pp

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Computational Approaches in Physics

Maria Fyta
University of Stuttgart, Germany

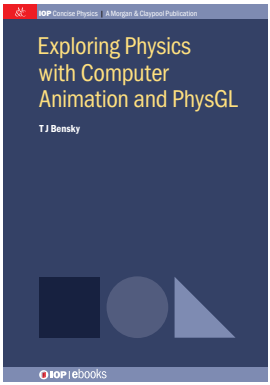
iopscience.org/book/978-1-68174-418-6

About the book

Computational Approaches in Physics reviews computational schemes that are used in the simulations of physical systems. These range from very accurate *ab initio* techniques up to coarse-grained and mesoscopic schemes. The choice of the method is based on the desired accuracy and computational efficiency. A bottom-up approach is used to present the various simulation methods used in physics, starting from the lower level and the most accurate methods, up to particle-based ones. The book outlines the basic theory underlying each technique and its complexity, addresses the computational implications and issues in the implementation, as well as present representative examples. A link to the most common computational codes, commercial or open source is listed in each chapter. The strengths and deficiencies of the variety of techniques discussed in this book are presented in detail and visualization tools commonly used to make the simulation data more comprehensive is also discussed. In the end, specific techniques are used as bridges across different disciplines. To this end, examples of different systems tackled with the same methods are presented. The appendices include elements of physical theory that are prerequisites in understanding the simulation methods.

About the author

Maria Fyta is a Junior Professor at the University of Stuttgart in the Institute for Computational Physics. Her research is focused on the interface of materials science and biophysical phenomena and belongs to the field of computational physics. Applications of this work can be purely technological, like MEMS/NEMS coatings and spin qubits or biotechnological, like ultra-fast DNA sequencing and biosensing. She received her doctorate from the University of Crete in 2005 and did postdoctoral work at both Harvard University and the Technical University of Munich.



Exploring Physics with Computer Animation and PhysGL

T J Bensky
California Polytechnic State University, USA

iopscience.org/book/978-1-68174-426-1

About the book

This book shows how the web-based PhysGL programming environment (http://physgl.org) can be used to teach and learn elementary mechanics (physics) using simple coding exercises. The book's theme is that the lessons encountered in such a course can be used to generate physics-based animations, providing students with compelling and self-made visuals to aid their learning. Topics presented are parallel to those found in a traditional physics text, making for straightforward integration into a typical lecture-based physics course. Users will appreciate the ease at which compelling OpenGL-based graphics and animations can be produced using PhysGL, as well as its clean, simple language constructs. The author argues that coding should be a standard part of lower-division STEM courses, and provides many anecdotal experiences and observations, that include observed benefits of the coding work.

About the author

Tom Bensky is a physics professor at California Polytechnic State University at San Luis Obispo, CA (USA), known as "Cal Poly". He has had a lifelong interest in computer graphics and enjoys teaching a range of classes from ASTRO-101 to advanced labs. His research interests include precision time-keeping, community outreach with physics, and international education.

Extent 140pp

Collection
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Subject
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Outside the Research Lab

Physics in the arts, architecture and design: Volume 1

Sharon Ann Holgate
Freelance science writer and broadcaster

iopscience.org/book/978-1-68174-470-4

About the book

This book is written for students and other interested readers as a look inside the diverse range of applications for physics outside of the scientific research environment. This first volume covers several different areas of the arts and design ranging from stage lighting to sculpting. The author has interviewed experts in each area to explain how physics and technology impact their work. These are all useful examples of how physics encountered in taught courses relates to the real world. The author is a freelance science writer and broadcaster with credits including presenting on the BBC World Service and BBC Radio 4, presenting video podcasts for a medical research charity, and appearing on a "Boffins Special" of *The Weakest Link*. Her articles have appeared in *Science, Science Careers, New Scientist, The Times Higher Education Supplement, EandT, Flipside, Focus, Physics World, Interactions*, *Materials World, Modern Astronomer*, and *Astronomy Now*, while her first book *The Way Science Works* (a children's popular science book co-authored with Robin Kerrod) was shortlisted for the Royal Society Junior Books Prize.

About the author

Sharon Ann Holgate received her doctorate in experimental physics from the University of Sussex and is a Chartered Scientist and Chartered Physicist. She has worked for 18 years as a freelance science writer and broadcaster with credits including BBC World Service and BBC Radio 4. Her articles have appeared in an extensive list of magazines and she is co-author of the children's book *The Way Science Works*. She was the IOP Young Professional Physicist of the Year in 2006.

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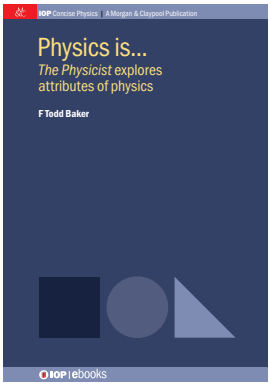

Extent 105pp

Collection
Concise Physics

Subject
General physics

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Physics is...

The Physicist explores attributes of physics

F Todd Baker
University of Georgia, USA

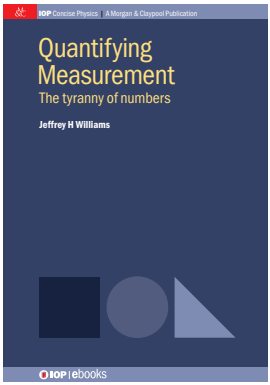
iopscience.org/book/978-1-68174-446-9

About the book

He's back! "The Physicist" returns with a whole new set of questions and answers that explore the attributes of physics (practical, beautiful, surprising, cool, frivolous). The answers are responses to people looking for answers to fascinating (and often uninformed) questions. It covers topics such as sports, electromagnetism, gravitational theory, special relativity, superheroes, videogames, and science fiction. As with the first two books, there is a chapter of questions from people who think that "The Physicist" is a psychic, and from those who think they have solutions.

About the author

F Todd Baker ("The Physicist"), former professor and nuclear physics researcher at the University of Georgia. He received his AB and MA degrees from Miami University and his PhD from the University of Michigan. He has published more than 70 articles in refereed journals and made numerous presentations and conferences and workshops during his 32 years of research. His series of books, *Ask the Physicist* are compilations of the best questions and answers from his long-running website with the same name.



Extent 132pp

Collection
Concise Physics

Subject
General physics

ISBN 9781681744346 (electronic)

ISBN 9781681746449 (print)

Quantifying Measurement

The tyranny of numbers

Jeffrey H Williams
Formerly at Bureau International des Poids et Mesures (BIPM), France

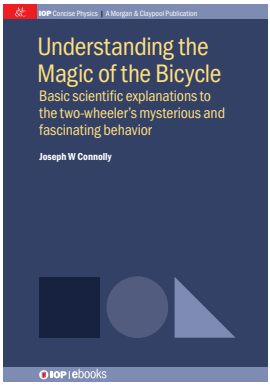
iopscience.org/book/978-1-68174-434-6

About the book

Measurements and experiments are made each and every day, in fields as disparate as particle physics, chemistry, economics and medicine, but have you ever wondered why it is that a particular experiment has been designed to be the way it is? Indeed, how do you design an experiment to measure something whose value is unknown, and what should your considerations be on deciding whether an experiment has yielded the sought after, or indeed any useful result? These are old questions, and they are the reason behind this volume. We will explore the origins of the methods of data analysis that are today routinely applied to all measurements, but which were unknown before the mid-19th century. Anyone who is interested in the relationship between the precision and accuracy of measurements will find this volume useful. Whether you are a physicist, a chemist, a social scientist, or a student studying one of these subjects, you will discover that the basis of measurement is the struggle to identify the needle of useful data hidden in the haystack of obscuring background noise.

About the author

Jeffrey H Williams was formerly the head of publications at the Bureau International des Poids et Mesures (BIPM), Sèvres. He received his PhD in chemical physics from Cambridge University in 1981 and then served as a research scientist in the universities of Cambridge, Oxford, Harvard and Illinois before working as a physicist at the Institute Laue-Langevin, France. He left research in 1992 and moved to the world of science publishing by becoming the European editor for the physical sciences for the AAAS's Science. He has already published two Concise Physics ebooks: *Defining and Measuring Nature: The make of all things* and *Order from Force: A natural history of the vacuum*.



Understanding the Magic of the Bicycle

Basic scientific explanations to the two-wheeler's mysterious and fascinating behavior

Joseph W Connolly
University of Scranton, USA

iopscience.org/book/978-1-68174-442-1

Extent 226pp

Collection
Concise Physics

Subject
General physics

ISBN 9781681744421 (electronic)

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About the book

The bicycle is a common, yet unique mechanical contraption in our world. In spite of this, the bike's physical and mechanical principles are understood by a select few. You do not have to be a genius to join this small group of people who understand the physics of cycling. This is your guide to fundamental principles (such as Newton's laws) and the book provides intuitive, basic explanations for the bicycle's behaviour. Each concept is introduced and illustrated with simple, everyday examples.

Although cycling is viewed by most as a fun activity and almost everyone acquires the basic skills at a young age, few understand the laws of nature that give magic to the ride. This is a closer look at some of these fun, exhilarating, and magical aspects of cycling. In the reading, you will also understand other physical principles such as motion, force, energy, power, heat, and temperature.

About the author

Joseph Connolly is a Professor of Physics and Electrical Engineering at the University of Scranton in Pennsylvania. He earned his bachelor's degree from the University of Scranton, his master's degree from the University of Illinois and his PhD from Pennsylvania State University. He joined the University of Scranton in 1983.

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