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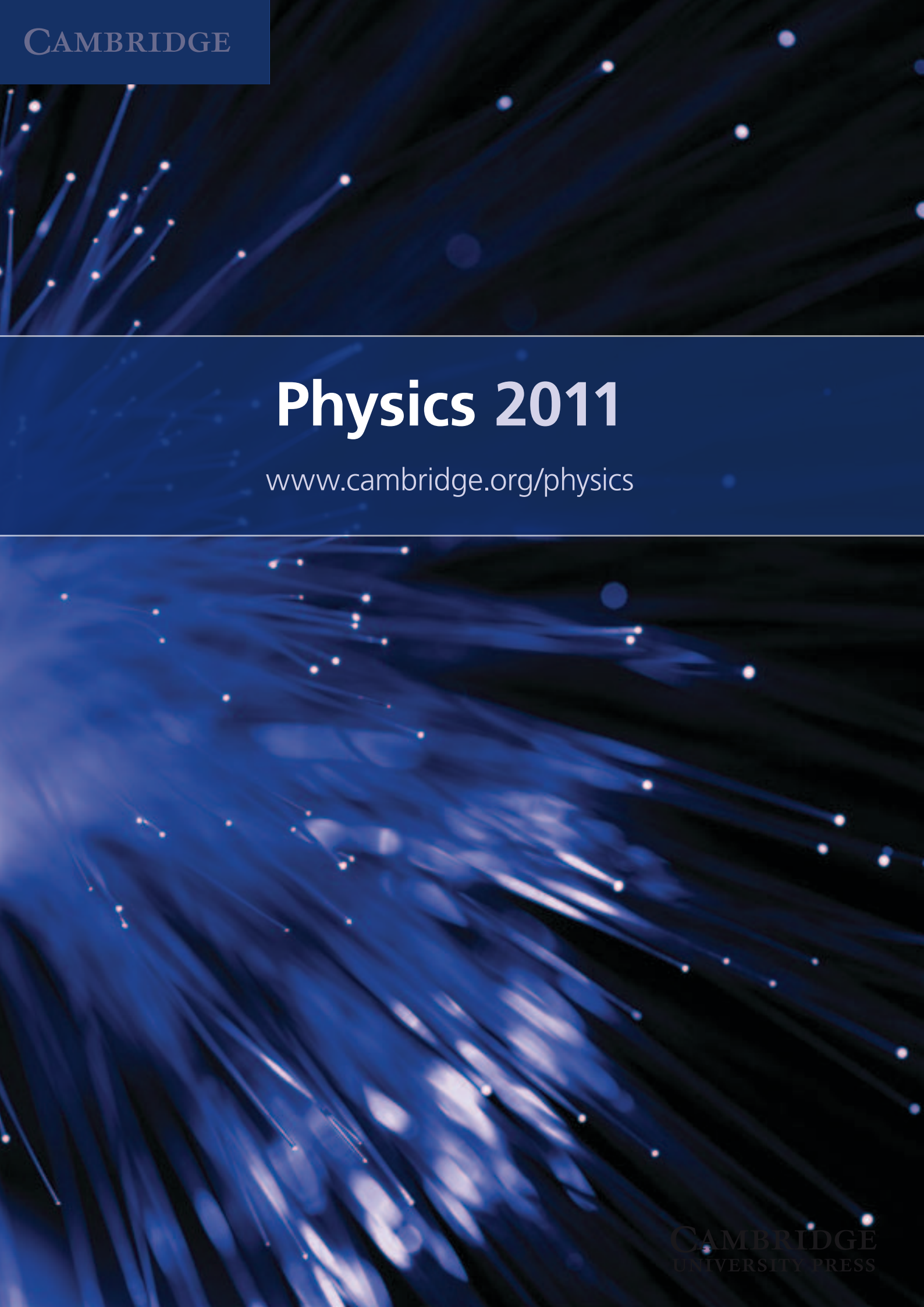

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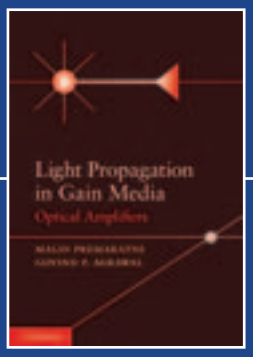

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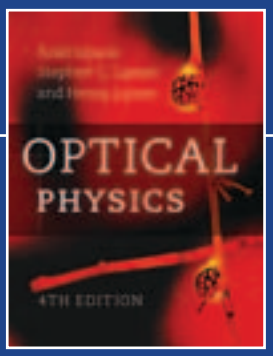

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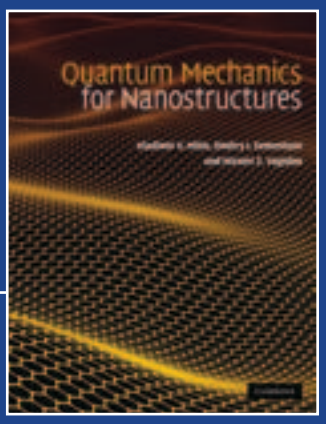

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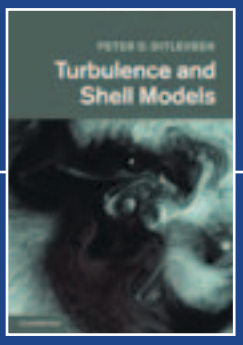

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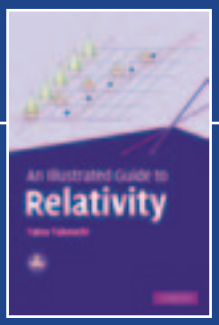

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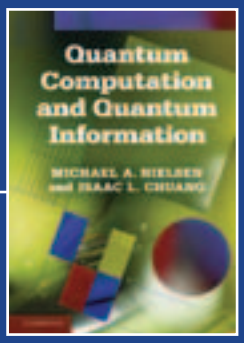

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Optics, optoelectronics and photonics

Ceramic Lasers

Akio Ikesue
World-Lab. Co. Ltd.
Yan Lin Aung
World-Lab. Co. Ltd.
and Voicu Lupei
National Institute of Laser, Plasma and Radiation Physics

Co-authored by one of the pioneers of this field, the book describes the fabrication technology and theoretical characterization of ceramic material properties. It describes novel types of solid lasers and other optics using ceramic materials, making it an invaluable guide for physicists, materials scientists and engineers working on laser ceramics.

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Structured Surfaces as Optical Metamaterials

Edited by Alexei A. Maradudin
University of California, Irvine

Covering techniques and applications, this book explores structured surfaces in the context of optical metamaterials. Topics include design and fabrication, unusual optical properties, and recent experimental observations. It is ideal for researchers and professionals working in metamaterials and plasmonics, as well as those just entering this exciting new field.

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Publication April 2011
www.cambridge.org/9780521119610

TEXTBOOK

Introduction to Nonlinear Optics

Geoffrey New
Imperial College of Science, Technology and Medicine, London

Providing a gentle introduction to the principles of the subject, this textbook is ideal for graduate students starting their research in this exciting area. More advanced topics are confined to specialist chapters so that readers can focus on basic principles before tackling these more difficult aspects of the subject.

Contents: 1. Introduction; 2. Frequency mixing; 3. Crystal optics; 4. Nonlinear optics in crystals; 5. Third-order nonlinear processes; 6. Dispersion and optical pulses; 7. Nonlinear optics with pulses; 8. Some quantum mechanics; 9. Resonant effects; 10. High harmonic generation; Appendices; Answers to problems; Book list; References; Index.

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Light Propagation in Gain Media

Optical Amplifiers

Malin Premaratne
Monash University, Victoria
and Govind P. Agrawal
University of Rochester, New York

A comprehensive treatment of the fundamental concepts, theory and techniques of modern optical amplifier technology, this book is ideal for graduate students and researchers in physics, optics, bio-optics and communications. It covers all major optical amplification schemes in conventional materials, and optical gain in metamaterials.

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TEXTBOOK

Mathematical Methods for Optical Physics and Engineering

Gregory J. Gbur
University of North Carolina, Charlotte

The first textbook on mathematical methods focusing on techniques for optical science and engineering. Ideal for upper division undergraduates and graduates. Strong emphasis is placed on connecting mathematical concepts to optical systems. Essay problems based on research publications and numerous exercises strengthen the connection between the theory and its applications.

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TEXTBOOK

Optical Physics

Fourth edition

Ariel Lipson
BrightView Systems Ltd, Israel
Stephen G. Lipson
Technion – Israel Institute of Technology, Haifa
and Henry Lipson
University of Manchester Institute of Science and Technology

This fourth edition of a well-established textbook is ideal for undergraduate and advanced courses on modern optics. Numerous practical examples are given, many from student laboratory experiments and lecture demonstrations. Illustrated with 400 figures, text is supplemented by advanced topics and up-to-date applications. Additional resources are available at www.cambridge.org/lipson.

'… a well established and essential text for both undergraduate and graduate physicists … father and son writing in concert have written a scholarly, authoritative and clearly written account of the principles and application of wave theory.'
Edward Atkins, *Physics Education*

Contents: 1. History of ideas; 2. Waves; 3. Geometrical optics; 4. Fourier theory; 5. Electromagnetic waves; 6. Polarization and anisotropic media; 7. The scalar theory of diffraction; 8. Fraunhofer diffraction and interference; 9. Interferometry; 10. Optical waveguides and modulated media; 11. Coherence; 12. Image formation; 13. The classical theory of dispersion; 14. Quantum optics and lasers; Appendices; Index.

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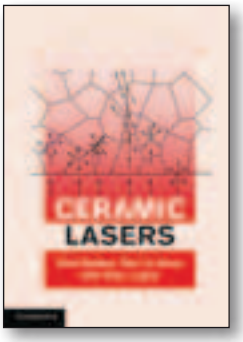
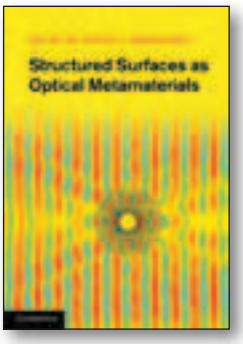
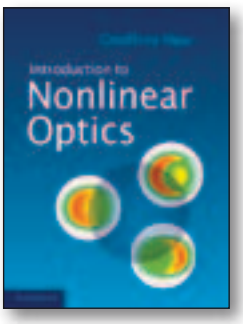
Fundamentals of Micro-Optics

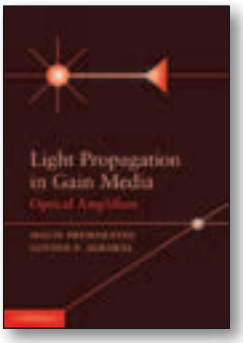
Hans Zappe
University of Freiburg, Germany

Covering all the key topics, from optical fundamentals to advanced applications, this book provides a complete guide to micro-optics. Extensive worked examples are included, plus real-world case studies and a wide range of end-of-chapter exercises, making this ideal for









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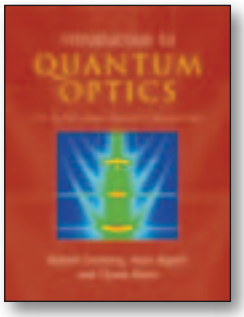

Introduction to Quantum Optics

From the Semi-classical Approach to Quantized Light

Gilbert Grynberg
Ecole Normale Supérieure, Paris

Alain Aspect
Institut d'Optique, Palaiseau

and Claude Fabre
Université de Paris VI (Pierre et Marie Curie)

Foreword by Claude Cohen-Tannoudji

Covering a number of important subjects in quantum optics, this textbook is an excellent introduction for advanced undergraduate and beginning graduate students, and will familiarize readers with the most recent advances in the field.

'The advantage of this book is to give both [the semi-classical and the full quantum] approaches, starting with the first, illustrated by several simple examples, and introducing progressively the second, clearly showing why it is essential for understanding certain phenomena … I believe that this challenge to present and to illustrate both approaches in a single book has been taken up successfully … I have the highest admiration for [the authors'] enthusiasm, their scientific rigor, their ability to give simple and precise physical explanations, and their quest to illuminate clearly the difficult points of the subject without oversimplification.'
Claude Cohen-Tannoudji, from the Foreword

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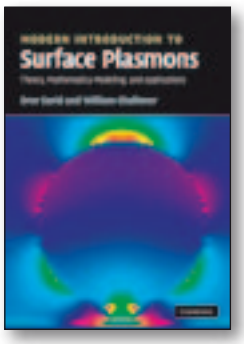

Modern Introduction to Surface Plasmons

Theory, Mathematica Modeling, and Applications

Dror Sarid
University of Arizona

and William Challener
Seagate Technology

Introducing graduate students in physics, optics, materials science and electrical engineering to surface plasmons, this book also covers guided modes at planar interfaces of metamaterials with negative refractive index. Online resources include Mathematica code to generate figures from the book and extended discussion of select topics.

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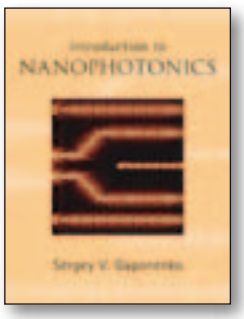

TEXTBOOK

Introduction to Nanophotonics

Sergey V. Gaponenko
National Academy of Sciences of Belarus

Describing the basic phenomena, principles, experimental advances and potential impact of nanophotonics, this graduate-level textbook is ideal for students in physics, optical and electronic engineering and materials science. Mathematics is kept to a minimum and theoretical issues are reduced to a conceptual level. Each chapter ends in problems.

'Sergey Gaponenko has produced a breathtaking and timely book that is just perfect for graduate-level students, or for the senior person wanting to know more about the field. The book has just the right tone and covers the material with an experimental focus hitherto not seen.'
Jonathan P. Dowling, Louisiana State University

Contents: Preface; 1. Introduction; **Part I.** Electrons and Electromagnetic Waves in Nanostructures: 2. Basic properties of waves and quantum particles; 3. Wave optics versus wave mechanics I; 4. Electrons in periodic structures and quantum confinement effects; 5. Semiconductor nanocrystals (quantum dots); 6. Nanoplasmonics I: metal nanoparticles; 7. Light in periodic structures: photonic crystals; 8. Light in non-periodic structures; 9. Photonic circuitry; 10. Tunneling of light; 11. Nanoplasmonics II: metal-dielectric nanostructures; 12. Wave optics versus wave mechanics II; **Part II.** Light–Matter Interaction in Nanostructures: 13. Light–matter interaction: introductory; 14. Density of states effects on optical processes; 15. Light–matter interaction beyond perturbational approach; 16. Plasmonic enhancement of secondary radiation; References; Index.

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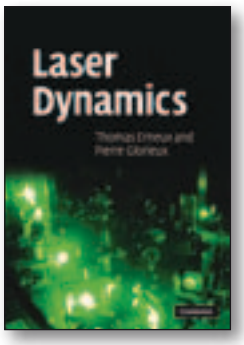

Laser Dynamics

Thomas Erneux
Université Libre de Bruxelles

and Pierre Glorieux
Laboratoire d'Astronomie, Université Lille 1 Sciences et Technologies

Bridging the gap between laser physics and applied mathematics, this book offers a new perspective on laser dynamics for graduate students and researchers. It moves from the application of basic tools to specific set-ups of practical interest, so readers can learn basic mathematical techniques and explore different laser systems.

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Supercontinuum Generation in Optical Fibers

Edited by J. M. Dudley
Université de Franche-Comté

and J. R. Taylor
Imperial College of Science, Technology and Medicine, London

Describing the theory, operational regimes and areas of applications, this unique book is an indispensable guide for researchers and graduate students. With contributions from major figures and pioneering groups, the book provides comprehensive computer codes so readers can confidently predict and model supercontinuum generation characteristics under realistic conditions.

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Condensed matter physics, nanoscience and mesoscopic physics

Quantum Phase Transitions

Second edition

Subir Sachdev
Harvard University, Massachusetts

Describing the properties of quantum materials near critical points with long-range many-body quantum entanglement, this second edition is ideal for graduate students and

researchers in condensed matter physics and particle and string theory. It contains a new introductory section on quantum phase transitions and several new chapters covering recent advances.

Review of the first edition:
'Taken as a whole, this book is something of a theoretical masterpiece. With its tight organization, the book leads the determined (and theoretically inclined) reader on a tour encompassing some of the most challenging yet beautiful topics in contemporary theoretical physics … Virtually every chapter contains a theoretical 'gem' … The equations are manipulated with flair and elegance that are testimony to Sachdev's talent as one of the world's premier theorists.'
Physics Today

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Statistical Physics of Liquids at Freezing and Beyond

Shankar Prasad Das
Jawaharlal Nehru University

Exploring important theories for understanding freezing and the liquid-glass transition, this book is useful for graduate students and researchers in soft-condensed matter physics, chemical physics and materials science. It details recent ideas and key developments, providing an up-to-date view of current understanding.

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Concepts and Methods of 2D Infrared Spectroscopy

Peter Hamm
Universität Zürich
and Martin Zanni
University of Wisconsin, Madison

Introducing the essential concepts of 2D IR spectroscopy, this book is an excellent starting point for graduate students and researchers new to this exciting field. It develops an intuitive understanding so readers will be able to accurately interpret 2D IR spectra and design their own spectrometer.

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Carbon Nanotube and Graphene Device Physics

H.-S. Philip Wong
Stanford University, California
and Deji Akinwande
University of Texas, Austin

Explaining the properties and performance of practical nanotube devices and applications, this is the first introductory textbook on the subject. Fundamental concepts are introduced for those without an advanced scientific background, whilst end-of-chapter problems aid and test understanding. Topics covered include nanotube transistors, interconnects, and the basic physics of graphene.

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Nanoscale MOS Transistors

Semi-Classical Transport and Applications

David Esseni
Università degli Studi di Udine, Italy
Pierpaolo Palestri
Università degli Studi di Udine, Italy
and Luca Selmi
Università degli Studi di Udine, Italy

Provides the theoretical background and physical insight needed to understand new and future developments in the modeling and design of n- and p-MOS nanoscale transistors. Written from an engineering standpoint, it covers all the latest topics and assumes minimal background in solid state physics and quantum mechanics.

'In this comprehensive text, physicists and electrical engineers will find a thorough treatment of semiclassical carrier transport in the context of nanoscale MOSFETs. With only a very basic background in mathematics, physics, and electronic devices, the authors lead readers to a state-of-the-art understanding of the advanced transport physics and simulation methods used to describe modern transistors.'
Mark Lundstrom, Purdue University

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Basic Aspects of the Quantum Theory of Solids

Order and Elementary Excitations

Daniel I. Khomskii
Universität zu Köln

Aimed at graduate students and researchers, this book covers the key aspects of the modern quantum theory of solids, including up-to-date ideas such as quantum fluctuations and strong electron correlations. It presents the main concepts and describes the essential theoretical methods required when working with these systems.

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Experimental and Computational Techniques in Soft Condensed Matter Physics

Edited by Jeffrey Olafsen
Baylor University, Texas

Featuring contributions from leading researchers in the field, this book uniquely discusses both the contemporary experimental and computational manifestations of soft condensed matter physics. It will equip graduate students and experienced researchers for collaborative and interdisciplinary research efforts relating to a range of modern problems in nonlinear and non-equilibrium systems.

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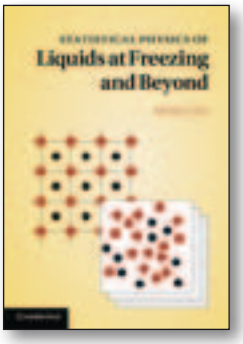
Magnetic Materials

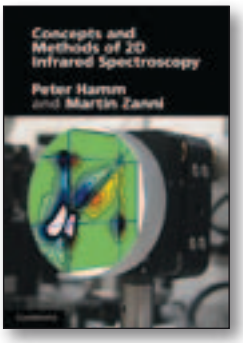
Fundamentals and Applications

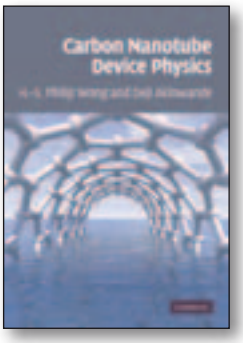
Second edition
Nicola A. Spaldin
University of California, Santa Barbara

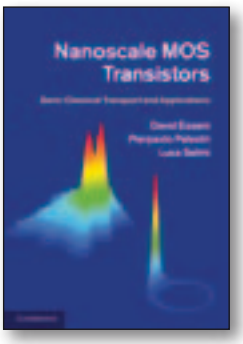
With entirely new chapters and updated example problems, the second edition of this popular text continues to provide an ideal introduction to the basics of magnetism and magnetic materials and their applications in modern device technologies. Incorporating recent developments in the field, this book will interest students and researchers alike.

From the first edition:
'… the book is a useful and compact addition to the bookshelf of anyone









wishing to get a good up-to-date account of magnetic materials at the start of the 21st century.'
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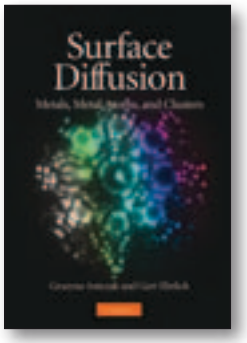

Surface Diffusion

Metals, Metal Atoms, and Clusters

Grazyna Antczak
University of Wrocław, Poland; Leibniz Universität Hannover, Germany

and Gert Ehrlich
University of Illinois, Urbana-Champaign

Covering theoretical, experimental and computational techniques, this book provides the first atomistic study of surface diffusion across metal surfaces. Starting with fundamental theory, the reader is introduced to the principles of atomic movement, before being guided through specific examples of diffusion on one- and two-dimensional surfaces and within special environments.

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High-Temperature Levitated Materials

David L. Price
Centre National de la Recherche Scientifique (CNRS), Paris

Describing several methods of levitation, this book summarizes the state-of-the-art of levitation techniques, and explores the concepts behind the experiments and associated theoretical ideas. Aimed at researchers in physics, physical chemistry and materials science, the book will also interest professionals working in high-temperature materials processing and the aerospace industry.

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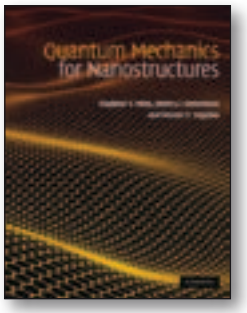

TEXTBOOK

Quantum Mechanics for Nanostructures

Vladimir V. Mitin
State University of New York, Buffalo

Dmitry I. Sementsov
Ulyanovsk State University, Russia

and Nizami Z. Vagidov
State University of New York, Buffalo

Introducing quantum mechanics and the world of nanostructures, this textbook will enable engineers to apply the theories to numerous nanostructure problems. It covers the fundamentals of quantum mechanics and applies these to nanoscale objects and materials, and nanodevices. Several examples throughout the text help students to understand the material.

Contents: 1. Nanoworld and quantum physics; 2. Wave-particle duality and its manifestation in radiation and particle's behavior; 3. Layered nanostructures as the simplest systems to study electron behavior in one-dimensional potential; 4. Additional examples of quantized motion; 5. Approximate methods of finding quantum states; 6. Quantum states in atoms and molecules; 7. Quantization in nanostructures; 8. Nanostructures and their applications; Appendices; Index.

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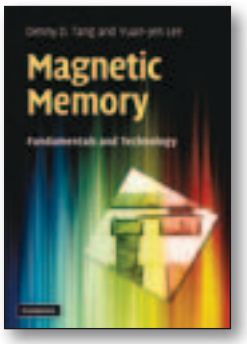

Magnetic Memory

Fundamentals and Technology

Denny D. Tang
MagIC Technologies, Inc

and Yuan-Jen Lee
MagIC Technologies, Inc

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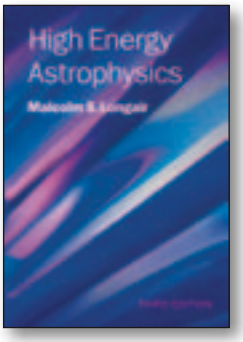

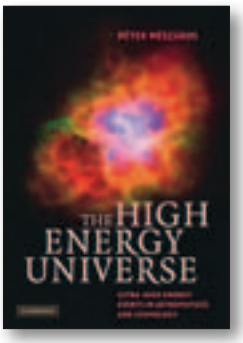

Theoretical physics and mathematical physics

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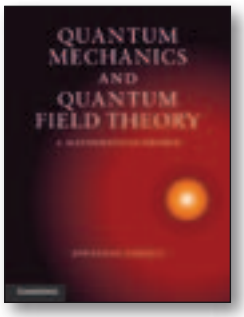

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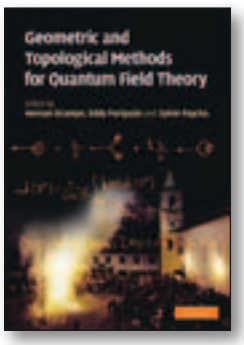

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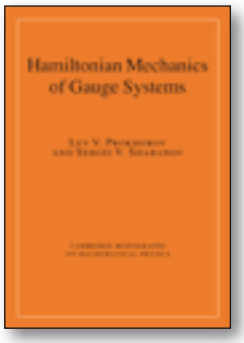

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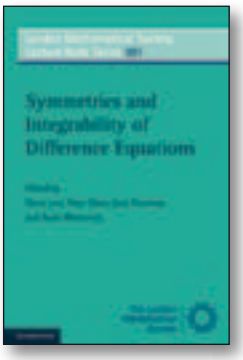

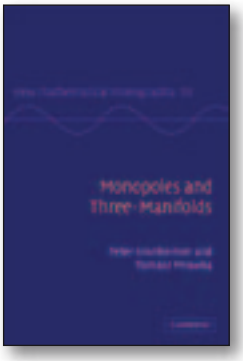

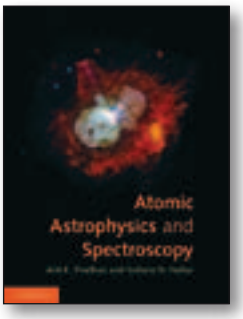

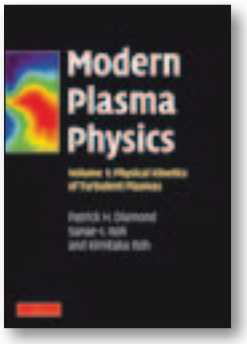

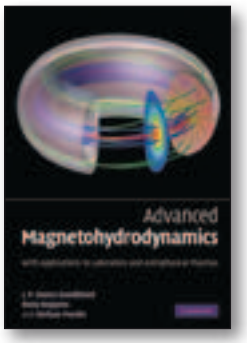

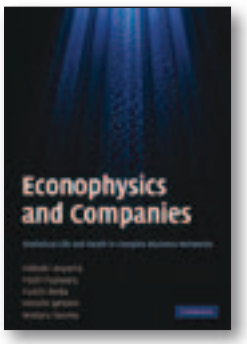

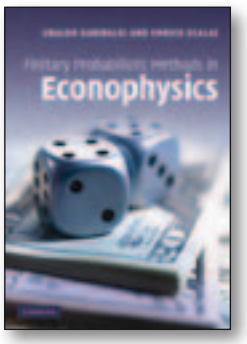

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TEXTBOOK

Observational Cosmology

Stephen Serjeant
The Open University, Milton Keynes

A comprehensive and up-to-date treatment of observational cosmology, this advanced undergraduate textbook enables students to use quantitative physical methods to understand the Universe. It contains full-colour figures, worked examples, exercises with solutions, and clearly identifiable key facts and equations. Suggestions for further reading provide jumping-off points for further study.

Contents: 1. Space and time; 2. The cosmic microwave background; 3. The local Universe; 4. The distant optical Universe; 6. The distant multiwavelength Universe; 6. Black holes; 7. Gravitational lensing; 8. The intervening Universe; Epilogue; Appendices; Solutions; Index.

2010 263 x 210 mm 324pp 60 colour illus. 50 exercises
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Advanced Mechanics and General Relativity

Joel Franklin
Reed College, Oregon

Aimed at advanced undergraduates, this textbook presents the particle dynamics relevant to general relativity, and the field dynamics necessary to understand the theory. Nearly 150 exercises and numerous examples enable students to test their understanding of the subject. A tensor manipulation package and solutions manual are available at www.cambridge.org/9780521762458.

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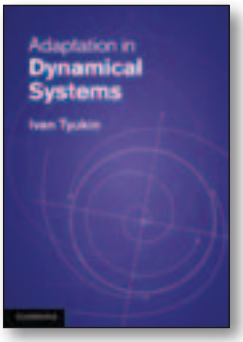
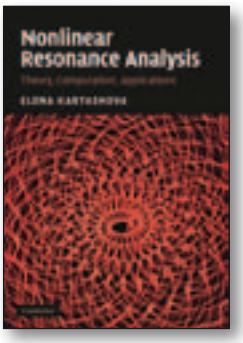
Dark Energy

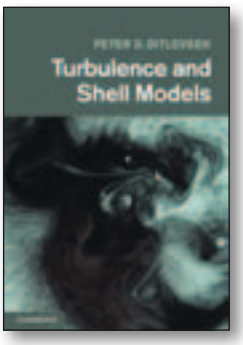
Theory and Observations

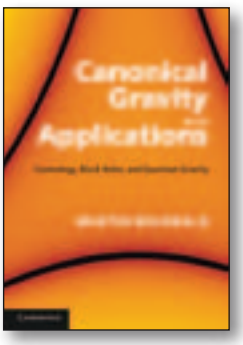
Luca Amendola
Osservatorio Astronomico di Roma, Monte Porzio
and Shinji Tsujikawa
Tokyo University of Science

Introducing the theoretical ideas, observational methods and results, this textbook is a thorough introduction to the exciting field of dark energy. Ideally suited to graduate courses on dark energy it contains problems with full









solutions. Any calculations are worked through step-by-step.

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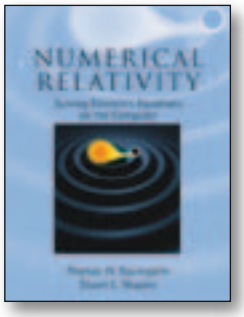

Numerical Relativity

Solving Einstein's Equations on the Computer

Thomas W. Baumgarte
Bowdoin College, Maine
and Stuart L. Shapiro
University of Illinois, Urbana-Champaign

Aimed at students and researchers entering the field, this pedagogical introduction to numerical relativity will also interest scientists seeking a broad survey of its challenges and achievements. The book contains 300 exercises, numerous illustrations (many in color), summary boxes, and applications to help readers master the subject.

'Over the last five years, there have been impressive advances in numerical relativity. It has now become a central area in the fast growing field of gravitational wave physics. These tools have played an important role also in the theory of critical phenomena associated with gravitational collapse, loop quantum cosmology and the discussion of quantum black holes and black branes. The book by Baumgarte and Shapiro provides an excellent introduction to the subject covering both, mathematical aspects and numerical techniques. The authors are world leaders in numerical relativity and their contributions have shaped neutron star simulations, the new frontier of this field. This book will soon become the standard advanced text for younger researchers entering the field and will also serve as the authoritative reference for senior researchers in numerical relativity and neighboring fields.'
Abhay Ashtekhar, Director, Institute for Gravitation and the Cosmos, Pennsylvania State University

2010 246 x 189 mm 720pp
97 b/w illus. 68 colour illus. 300 exercises
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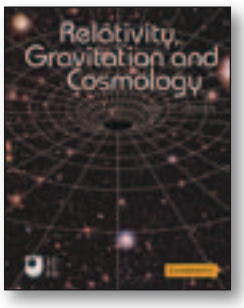

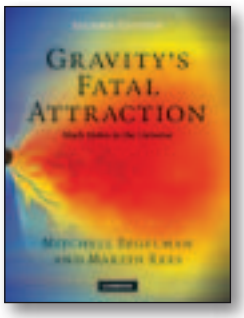

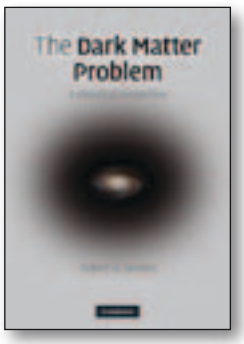

TEXTBOOK

Relativity, Gravitation and Cosmology

Robert J. A. Lambourne
The Open University, Milton Keynes

Aimed at advanced undergraduates, this self-contained textbook covers the key ideas of special and general relativity and their applications. In full colour, it contains numerous worked examples and exercises with solutions. Key points and equations are highlighted, and each chapter ends with a summary list of important concepts and results.

'The author has done a great job of producing a text suitable for upper level undergrads and even first year graduate students. The graphics are very good and I particularly appreciate the concise chapter summaries and the exercises with solutions. Students will love this text. I will definitely use it in my upper division classes.'
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www.cambridge.org/9780521761192

TEXTBOOK

Gravity's Fatal Attraction

Black Holes in the Universe

Second edition

Mitchell Begelman
University of Colorado, Boulder
and Martin Rees
University of Cambridge

Richly illustrated in colour, this book is suitable for introductory undergraduate courses, amateur astronomers, and all readers interested in astronomy and physics. It shows how black holes were discovered, and discusses current understanding of their role in cosmic evolution. This second edition covers new discoveries made in the past decade.

Review from the first edition: 'Martin Rees and Mitchell Begelman are probably the world's leading authorities in the astrophysics of black holes.'
Stephen W. Hawking

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The Dark Matter Problem

A Historical Perspective

Robert H. Sanders
Kapteyn Astronomical Institute, Groningen, The Netherlands

Describing the development of dark matter theory, this book shows why it is now a central feature of extragalactic astronomy and cosmology. This fascinating overview will interest cosmologists, astronomers and particle physicists. Mathematics is kept to a minimum, so the book can be understood by non-specialists.

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Dark Energy

Observational and Theoretical Approaches

Edited by Pilar Ruiz-Lapuente
Universitat de Barcelona

Covering the topic from its origin, through recent developments to its future perspectives, this book is a complete and comprehensive introduction to dark energy. It is ideal for physics graduate students who have just entered the field and researchers seeking an authoritative reference on the topic.

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Classical Measurements in Curved Space-Times

Fernando de Felice
Università degli Studi di Padova, Italy
and Donato Bini
Consiglio Nazionale delle Ricerche (CNR), Rome

Ideal for readers with a mathematical background and a basic knowledge of relativity, this book explores the informative power of the theory of relativity, highlighting its uses in space physics, astrophysics and cosmology. It will help readers understand the physics

behind the mathematical formalism of the theory of relativity.

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Quantum physics, quantum information and quantum computation

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Nimrod Moiseyev
Technion – Israel Institute of Technology, Haifa

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Coming of Age With Quantum Information

Notes on a Paulian Idea

Christopher A. Fuchs
The Perimeter Institute for Theoretical Physics

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TEXTBOOK

Quantum Computation and Quantum Information

10th Anniversary Edition

Michael Nielsen
Freelance Writer

and Isaac Chuang
Massachusetts Institute of Technology

A decade after it was first published, this book remains the best textbook in this exciting field. This 10th anniversary edition includes an introduction from the authors setting the work in context. Containing a wealth of figures and exercises, it is ideal for courses on the subject.

'Ten years after its initial publication, 'Mike and Ike' (as it's affectionately called) remains the quantum computing textbook to which all others are compared. No other book in the field matches its scope: from experimental implementation to complexity classes, from the philosophical justifications for the Church–Turing Thesis to the nitty-gritty of bra/ket manipulation. A dog-eared copy sits on my desk; the section on trace distance and fidelity alone has been worth many times the price of the book to me.'
Scott Aaronson, Massachusetts Institute of Technology

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200 b/w illus. 10 tables 598 exercises
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Introduction to Optical Quantum Information Processing

Pieter Kok
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and Brendon W. Lovett
University of Oxford

Ideal for graduate students beginning research in optical quantum information processing, this textbook describes the techniques that are likely to be used in implementing optical quantum information processors. It presents the most important techniques of the field using worked examples and over 120 exercises.

'The discussion of cluster state protocols and conditional optical gates is the clearest I have seen. The text includes embedded exercises for the reader, carefully constructed to illustrate important principles. … The authors make every effort to connect the abstract theory with current experimental practice. … As optics will necessarily form a part of future quantum information processing networks, this book is required reading for anyone wishing to stay abreast of the ongoing effort to make quantum computing a reality.'
Gerard J. Milburn, Centre for Quantum Computer Technology, University of Queensland

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TEXTBOOK

Quantum Processes Systems, and Information

Benjamin Schumacher
Kenyon College, Ohio

and Michael Westmoreland
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A new and exciting approach to the basics of quantum theory, this undergraduate textbook contains extensive discussions of conceptual puzzles and over 800 exercises and problems. In addition to the standard topics covered in other textbooks, it covers communication and measurement, quantum entanglement, entropy and thermodynamics, and quantum information processing.

'This is a fantastic book, with one of the authors no less than the very inventor of the word and idea of a qubit. When I opened the book for the first time, I found I couldn't stop reading through it and working out some of the problems. … There's no book out there I would recommend more for learning the mechanics of this quantum world.'
Chris Fuchs, Perimeter Institute for Theoretical Physics

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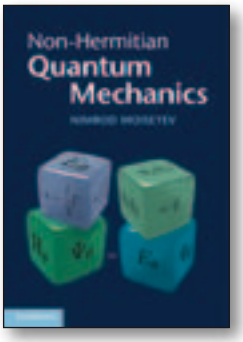

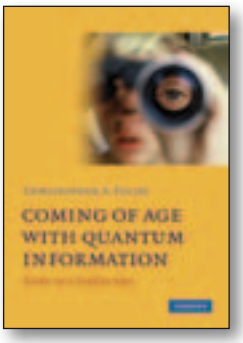

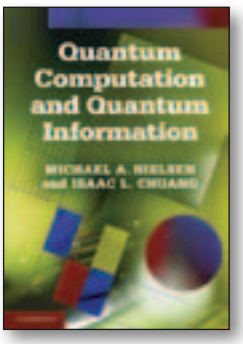

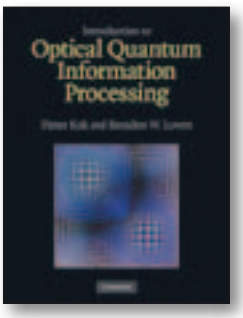

states in 1-D; 16. Bound states in 3-D; 17. Perturbation theory; 18. Quantum information processing; 19. Classical and quantum entropy; 20. Error correction; Appendixes; Index.

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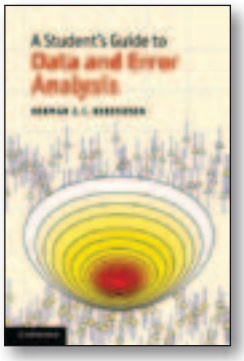

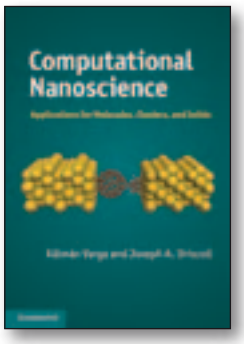

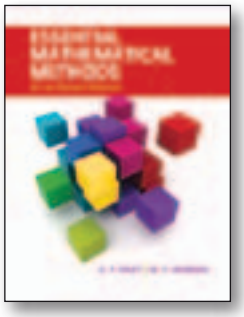

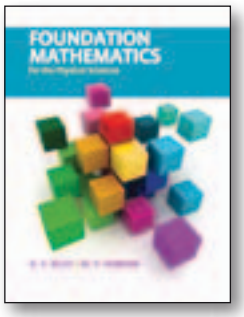

Mathematical methods and computational tools

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Daniel Fleisch
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TEXTBOOK

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Herman J. C. Berendsen
University of Groningen, Netherlands

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Computational Nanoscience

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Kálmán Varga
Vanderbilt University, Tennessee
and Joseph A. Driscoll
Vanderbilt University, Tennessee

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TEXTBOOK

Essential Mathematical Methods for the Physical Sciences

K. F. Riley
University of Cambridge
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University of Cambridge

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TEXTBOOK

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Publication December 2010
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Publication December 2010
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K. F. Riley
University of Cambridge
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Geoffrey Grimmett
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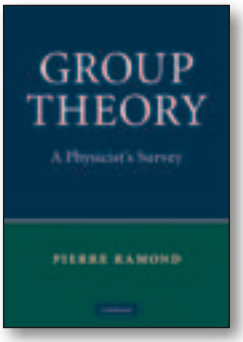
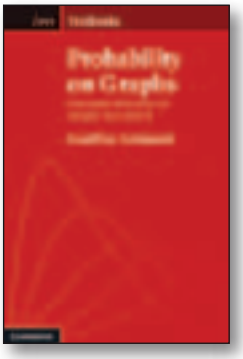
Statistical physics





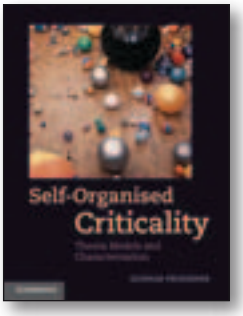
Self-Organised Criticality

Theory, Models and Characterisation

Gunnar Pruessner
Imperial College of Science, Technology and Medicine, London

Providing an overview of numerical and analytical methods, from foundations to applications, this book is an easy access point to important results and sophisticated methods. Written for graduate students and practising researchers in physics, mathematics, biology, sociology, finance, medicine and engineering, it gives a practical, hands-on approach.

2010 246 x 189 mm 450pp
85 b/w illus. 22 tables
978-0-521-85335-4 Hardback c. £45.00
Publication December 2010
www.cambridge.org/9780521853354

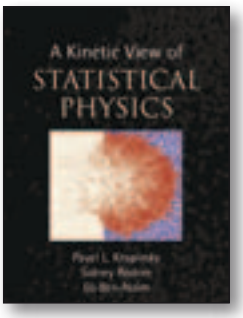


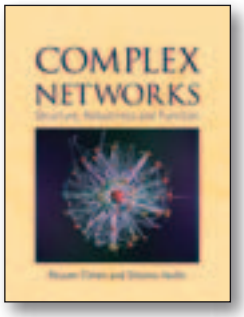
A Kinetic View of Statistical Physics

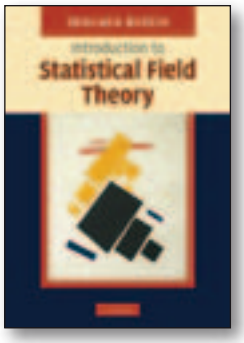
Pavel L. Krapivsky
Boston University
Sidney Redner
Boston University
and Eli Ben-Naim
Los Alamos National Laboratory

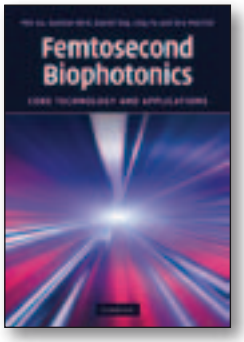
Aimed at graduate students, this book explores some of the core phenomena in non-equilibrium statistical physics. It focuses on the development and application of theoretical methods to help students develop problem-solving skills, and contains 200 exercises. Solutions to some exercises can be found at www.cambridge.org/9780521851039.

Advance praise:
'Non-equilibrium statistical mechanics has so many applications and is strewn with so many different tricks and treats that the only way to teach the subject is through examples. Krapivsky, Redner, and Ben-Naim have written a beautiful book that elegantly covers several of these examples, some classic, others at









the boundaries of research. Their target readership is physicists and applied mathematicians, but includes computer scientists, biologists and engineers. Methinks that good students in economics would be well advised to read some chapters of this book, for I am convinced that several breakthroughs in their field will hinge upon concepts and methods from non-equilibrium statistical mechanics.'
J. P. Bouchaud, Chairman of Capital Fund Management (Paris) and Statistical Mechanics Professor at Ecole Polytechnique

2010 246 x 189 mm 496pp
125 b/w illus. 200 exercises
978-0-521-85103-9 Hardback c. £45.00
www.cambridge.org/9780521851039

Complex Networks

Structure, Robustness and Function

Reuven Cohen
Weizmann Institute of Science, Israel
and Shlomo Havlin
Bar-Ilan University, Israel

Examining important results and analytical techniques, this graduate-level textbook is a step-by-step presentation of the structure and function of complex networks. It explains both the theoretical methods used and the experimental and analytical results obtained. End-of-chapter review questions help students monitor their understanding of the materials presented.

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56 b/w illus. 65 exercises
978-0-521-84156-6 Hardback £35.00
eBook available
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Introduction to Statistical Field Theory

Edouard Brézin
Ecole Normale Supérieure, Paris

Written for advanced undergraduate and beginning graduate students, this textbook provides a concise introduction to statistical field theory. It deals directly with the loop expansion of the free energy, or background field method, avoiding long developments on field theory techniques.

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Biological physics

TEXTBOOK

Mechanics of the Cell

Second edition

David Boal
Simon Fraser University, British Columbia

Updated and expanded second edition in full colour. Introductory sections have been revised to increase accessibility to the target audiences, which range from biologists to mechanical engineers. New chapters have been added on the mathematics of ensembles, complex filaments, cell growth and division, and control and organisation.

2011 246 x 189 mm 560pp
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978-0-521-13069-1 Paperback c. £45.00
Publication November 2011
www.cambridge.org/9780521113762

Complex Webs

Anticipating the Improbable

Bruce J. West
Army Research Office
and Paolo Grigolini
University of North Texas

Presenting the common principles, algorithms, and tools governing network behaviour, dynamics, and complexity, this book synthesises modern mathematical developments with the broad range of network applications of interest to the engineer and system scientist. It is richly illustrated with real-world examples from physiology, bioengineering, biophysics, and informational and social networks.

2010 247 x 174 mm 424pp
110 b/w illus. 6 tables 27 exercises
978-0-521-11366-3 Hardback c. £45.00
Publication December 2010
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Femtosecond Biophotonics

Core Technology and Applications

Min Gu
Swinburne University of Technology, Victoria
Damian Bird
Universal Biosensors Pty Ltd
Daniel Day
Swinburne University of Technology, Victoria
Ling Fu
Huazhong University of Science and Technology
and Dru Morrish
Swinburne University of Technology, Victoria

Covering key techniques for optical microscopy and micro-fabrication, this book provides the first detailed treatment of femtosecond laser-based biophotonics. After a review of the techniques for nonlinear and multiphoton imaging, applications for laser-based manipulation of micro-particles are introduced. The final chapter focuses on the burgeoning field of femtosecond micro-engineering.

2010 247 x 174 mm 248pp
159 b/w illus. 6 tables
978-0-521-88240-8 Hardback £75.00
eBook available
www.cambridge.org/9780521882408

Networks in Cell Biology

Edited by Mark Buchanan
Guido Caldarelli
Consiglio Nazionale delle Ricerche (CNR), Rome
Paolo De Los Rios
École Polytechnique Fédérale, Lausanne
Francesco Rao
University of Freiburg
and Michele Vendruscolo
University of Cambridge

With contributions from leaders in both network theory and modern cell biology, this comprehensive introduction is the first book on the subject. It is a key introductory text for graduate students and researchers in physics, biology and biochemistry, presenting ideas and techniques outside the reader's own area of specialization.

'Network science has experienced a spectacular explosion in the past decade, influencing a wide range of fields, from computer science to sociology. Yet, nowhere is the impact of the new theoretical framework as promising as it is in cell biology – many of the difficult open questions cannot be understood without a network based approach. *Networks in Cell Biology* offers an excellent introduction to this frontier, at the same time capturing the current state of research. With contributions from the best in the field, it is a valuable addition to the shelf of anyone interested in this exciting area.'
Albert-László Barabási, Northeastern University and Harvard Medical School

2010 247 x 174 mm 280pp 73 b/w illus.
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Molecular Forces and Self Assembly

In Colloid, Nano Sciences and Biology

Barry W. Ninham
Australian National University, Canberra
and Pierandrea Lo Nostro
Università degli Studi di Firenze, Italy

Challenging the cherished notions of colloidal theory, the authors explain the development of these classical theories, questioning assumptions, unearthing flaws and presenting new results and ideas throughout. Numerous, diverse phenomena are explained, from surfactants to biological applications, all richly illustrated with examples.

'Full of wisdom gained from a wealth of experience. … a good deal of charm weaves its way through the fabric of the presentation.'
Gerald Pollack, Bioengineering, University of Washington

Cambridge Molecular Science

2010 247 x 174 mm 362pp
97 b/w illus. 15 tables
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eBook available
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TEXTBOOK

Introduction to Medical Imaging

Physics, Engineering and Clinical Applications

Nadine Barrie Smith
Pennsylvania State University
and Andrew Webb
Leiden University Medical Center

Covering the basics of X-rays, CT, PET, nuclear medicine, ultrasound, and MRI, this textbook is for a one-semester senior undergraduate/graduate course in medical imaging. Together with the state-of-the-art concepts and theory, it also provides relevant clinical applications, solved and open-ended example problems, and future prospects for the field.

Contents: 1. General image characteristics, data acquisition and image reconstruction; 2. X-ray planar radiology and computed tomography; 3. Nuclear medicine: planar scintigraphy, SPECT and PET/CT; 4. Ultrasound imaging; 5. Magnetic resonance imaging.

Cambridge Texts in Biomedical Engineering

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217 b/w illus. 10 tables 137 exercises
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History, philosophy and foundations of physics

From Current Algebra to Quantum Chromodynamics

A Case for Structural Realism

Tian Yu Cao
Boston University

Addressing a range of complex physical, philosophical and historiographical issues in detail, this book examines the conceptual steps that were crucial to the rise of quantum chromodynamics. It will interest graduate students and researchers in physics and in the history and philosophy of science.

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Michael Redhead, Professor Emeritus, University of Cambridge, FBA

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978-0-521-88933-9 Hardback £50.00
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Visions of Discovery

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University of California, Berkeley
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William D. Phillips
Joint Quantum Institute
and Charles L. Harper, Jr
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In honour of the work of Charles H. Townes, world-leading researchers, including Nobel Laureates, explore the most basic questions of science, philosophy, and the nature of existence. This fascinating book is ideal for anyone seeking answers to deep questions about the universe and human life.

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Information and the Nature of Reality

From Physics to Metaphysics

Edited by Paul Davies
Arizona State University
and Niels Henrik Gregersen
University of Copenhagen

Many scientists regard mass and energy as the primary currency of nature. In recent years, however, the concept of information has gained importance. Why? In this book, eminent scientists, philosophers and theologians chart various aspects of information, from quantum information to biological and digital information, in order to understand how nature works. Beginning with an historical treatment of the topic, the book also examines physical and biological approaches to information, and its philosophical, theological and ethical implications.

'This is the anthology we have been waiting for … seminal papers deal with matter through the history of Greek thought, seventeenth-century materialism and twentieth-century dematerialism, the need for a new scientific world view in the light of the quantum nature of the universe, and the storage and transmission of information in biological systems with the new knowledge of their genomes and development … Philosophers, theologians and scientists all have their say, wrestling with the theme of God as the ultimate informational and structuring principle in the universe.'
Professor Sir Brian Heap, President, European Academies Science Advisory Board, German Academy of Sciences

Contributors: Paul Davies, Niels Henrik Gregersen, Ernan McMullin, Philip Clayton, Seth Lloyd, Henry Pierce Stapp, John Maynard Smith, Terrence W. Deacon, Bernd-Olaf Küppers, Jesper Hoffmeyer, Holmes Rolston, Arthur Peacocke, Keith Ward, John F. Haught, Michael Welker

2010 228 x 152 mm 398pp 5 b/w illus.
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Einstein's Unification

Jeroen van Dongen
Universiteit Utrecht, The Netherlands

Shedding new light on Einstein's later work, this book explores Einstein's belief that he could find a unified theory of all of nature's forces by repeating the methods he used when formulating general relativity. This book will interest physicists, historians and philosophers of science.

2010 247 x 174 mm 224pp 21 b/w illus.
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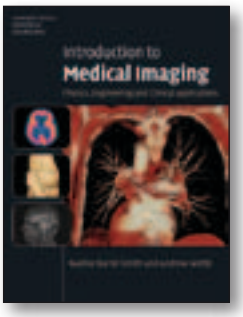

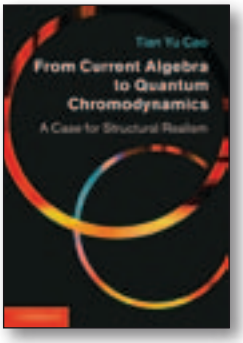

Philosophy of Quantum Information and Entanglement

Edited by Alisa Bokulich
Boston University
and Gregg Jaeger
Boston University

Bringing together fourteen world-leading physicists and philosophers of physics, this interdisciplinary volume addresses the most important developments and debates in this exciting area of research. Offering a broad spectrum of approaches to resolving deep foundational challenges, this book is ideal for historians, philosophers of science and physicists.

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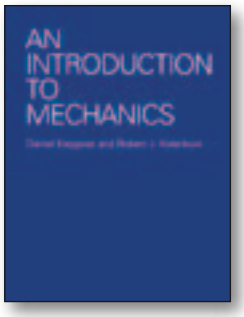

Electronics for physicists

TEXTBOOK

Basic Electronics for Scientists and Engineers

Dennis L. Eggleston
Occidental College, Los Angeles

Ideal for a one-semester course, this concise textbook covers basic electronics for undergraduate students in science and engineering. Readers are shown how to work with electronic circuits and apply the techniques they have learnt. Laboratory exercises and solutions to the exercises (password-protected for instructors) are available online.

Contents: Preface; 1. Basic concepts and resistor circuits; 2. AC circuits; 3. Band theory and diode circuits; 4. Bipolar junction transistors; 5. Field-effect transistors; 6. Operational amplifiers; 7. Oscillators; 8. Digital circuits and devices; Appendices; Index.

2011 246 x 189 mm 250pp
305 b/w illus. 83 exercises
978-0-521-76970-9 Hardback c. £70.00
978-0-521-15430-7 Paperback c. £35.00
Publication March 2011
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The Art of Electronics

Third edition

Paul Horowitz
and Winfield Hill

The Art of Electronics has been regarded as the bible of practical electronics since its first publication in 1980. The much-anticipated third edition includes thorough coverage of components, new chapters on programmable logic devices, microcontrollers and embedded microprocessors, and guided tours of components and circuits showing how and when to use them.

2011 254 x 203 mm 1000 b/w illus.
978-0-521-80926-9 Hardback c. £59.00
Publication June 2011
www.cambridge.org/9780521809269

General and classical physics

Reliability in Scientific Research

Improving the Dependability of Measurements, Calculations, Equipment, and Software

I. R. Walker
University of Cambridge

Covering many techniques widely used in research, this book will help researchers in the physical sciences and engineering solve troublesome, and potentially very time consuming, problems in their work. The book deals with technical difficulties that often arise unexpectedly during the use of various common experimental methods, as well as with human error. It provides preventive measures and solutions for such problems, thereby saving valuable time for researchers. Some of the topics covered are: sudden leaks in vacuum systems, electromagnetic interference in electronic instruments, vibrations in sensitive equipment, and bugs in computer software. The book also discusses mistakes in mathematical calculations, and pitfalls in designing and carrying out experiments. Each chapter contains a summary of its key points, to give a quick overview of important potential problems and their solutions in a given area.

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Publication December 2010
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TEXTBOOK

Research Methods for Science

Michael P. Marder
University of Texas, Austin

A unique introduction to the design, analysis, and presentation of scientific projects, this is an essential textbook for undergraduate majors in science and mathematics. It discusses experimental design, statistics, mathematical modelling, and preparing scientific papers and presentations. An extensive instructor's manual containing sample lessons and student papers is available online.

Contents: 1. Curiosity and research; 2. Overview of experimental analysis and design; 3. Statistics; 4. Mathematical models; 5. Scientific information; Appendices; Index.

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68 b/w illus. 34 tables 28 exercises
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Publication December 2010
www.cambridge.org/9780521145848

An Introduction to Mechanics

Daniel Kleppner
Massachusetts Institute of Technology
and Robert J. Kolenkow

Intended for undergraduate students, this is a classic introductory textbook on the principles of Newtonian mechanics. It contains numerous worked examples and challenging problems to help students understand how the principles can be applied to a wide range of physical situations. Password-protected solutions are available for instructors at www.cambridge.org/9780521198219.

'Kleppner and Kolenkow's *An Introduction to Mechanics* is a classic textbook as useful today as when it was first published in 1973. It covers classical mechanics and energy through planetary orbits and oscillators as well as special relativity helping well-prepared freshmen to develop the conceptual understanding and mathematical confidence to tackle the analytical dynamics and quantum mechanics that is to come. Of particular note is the treatment of the difficult subject of rigid body dynamics. The worked examples and problems thoughtfully confront and resolve many of the confusions that students typically encounter.'
Roger Blandford, Stanford University

2010 246 x 189 mm 568pp
675 b/w illus. 3 tables 241 exercises
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TEXTBOOK

Astrophysics for Physicists

Arnab Rai Choudhuri
Indian Institute of Science, Bangalore

Designed for teaching astrophysics to physics students at advanced undergraduate or beginning graduate level, this textbook develops astrophysics from the basics without requiring any previous study in

astronomy or astrophysics. Topics not usually covered in physics courses, such as general relativity and plasma physics, are developed from first principles.

'At last! An astrophysics textbook for physics majors that does not shy away from fluids, plasmas, and general relativity. With transparent physical reasoning and beautifully clear writing throughout, this book should become the standard for advanced undergraduate courses, and recommended reading for beginning graduate students. An outstanding complement to Choudhuri's previous masterwork, *The Physics of Fluids and Plasmas*.'

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