

2025

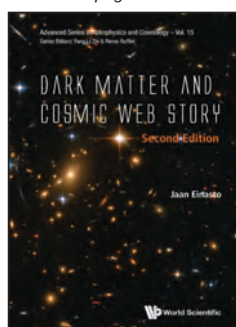
PHYSICS



Highlights

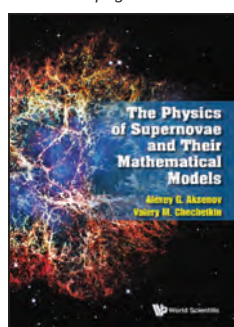
Physics Catalogue 2025

page 4



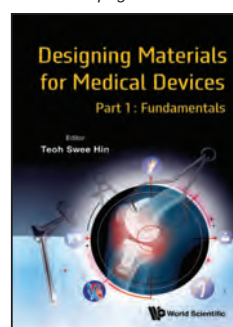
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page 6



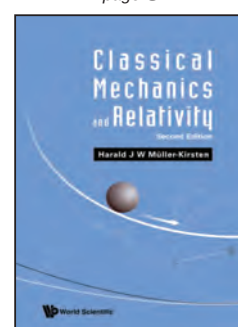
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page 7



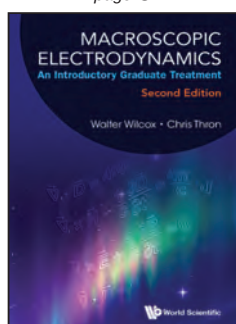
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page 8



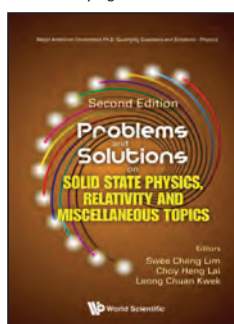
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page 9



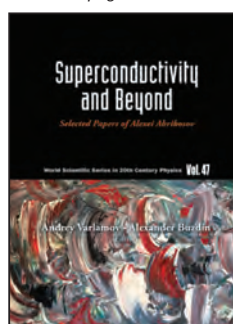
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page 10



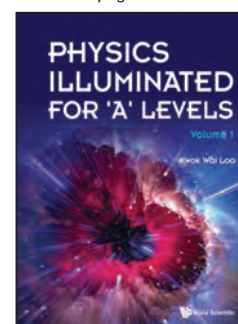
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page 10



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page 11



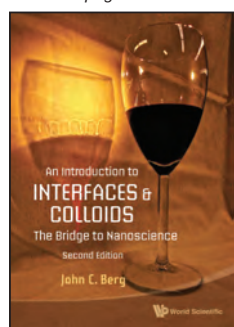
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page 12



by **Salvador Gil**
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page 13



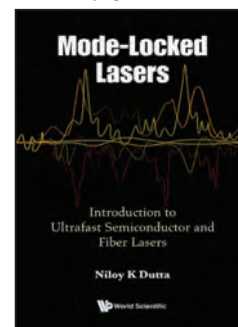
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page 13



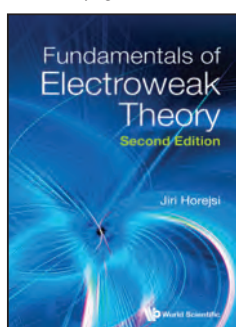
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page 14



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page 15



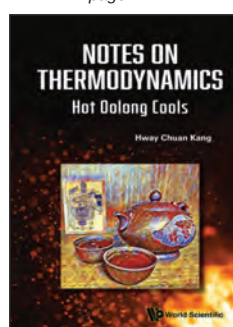
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page 16



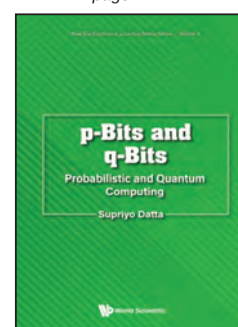
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page 17



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page 17



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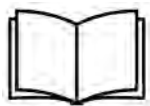
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4	FEATURED BOOKS
5	APPLIED AND TECHNICAL PHYSICS
5	ASTRONOMY, ASTROPHYSICS AND COSMOLOGY (INCLUDING GEOPHYSICS)
7	ATOMIC AND MOLECULAR PHYSICS
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7	CLASSICAL MECHANICS, CONTINUUM PHYSICS AND ACOUSTICS
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11	GENERAL PHYSICS (ALL ASPECTS)
12	GENERAL PHYSICS (POPULAR READING)
13	INTERDISCIPLINARY PHYSICS
13	NUCLEAR PHYSICS
14	OPTICS AND LASER PHYSICS
14	PARTICLE PHYSICS / HIGH ENERGY PHYSICS / QUANTUM FIELDS
16	QUANTUM MECHANICS AND QUANTUM INFORMATION
17	RELATIVITY AND GRAVITATION
17	STATISTICAL PHYSICS, COMPLEXITY AND NONLINEAR DYNAMICAL SYSTEMS (INCLUDING HEAT AND THERMODYNAMICS)
18	JOURNALS
22	TITLE INDEX



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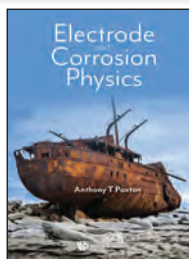
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Dark Matter and Cosmic

Web Story (2nd Edition)

by Jaan Einasto (Tartu Observatory, Estonia)

412pp May 2024
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Spin Glass Theory and Far Beyond

Replica Symmetry Breaking After 40 Years

edited by Patrick Charbonneau (Duke University, USA), Enzo Marinari (Sapienza University of Rome, Italy), Marc Mézard (Bocconi University, Italy), Giorgio Parisi (Sapienza University of Rome, Italy), Federico Ricci-Tersenghi (Sapienza University of Rome, Italy), Gabriele Sicuro (King's College London, UK) & Francesco Zamponi (École Normale Supérieure, France)

740pp Aug 2023
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978-981-127-391-9 US\$198 £180
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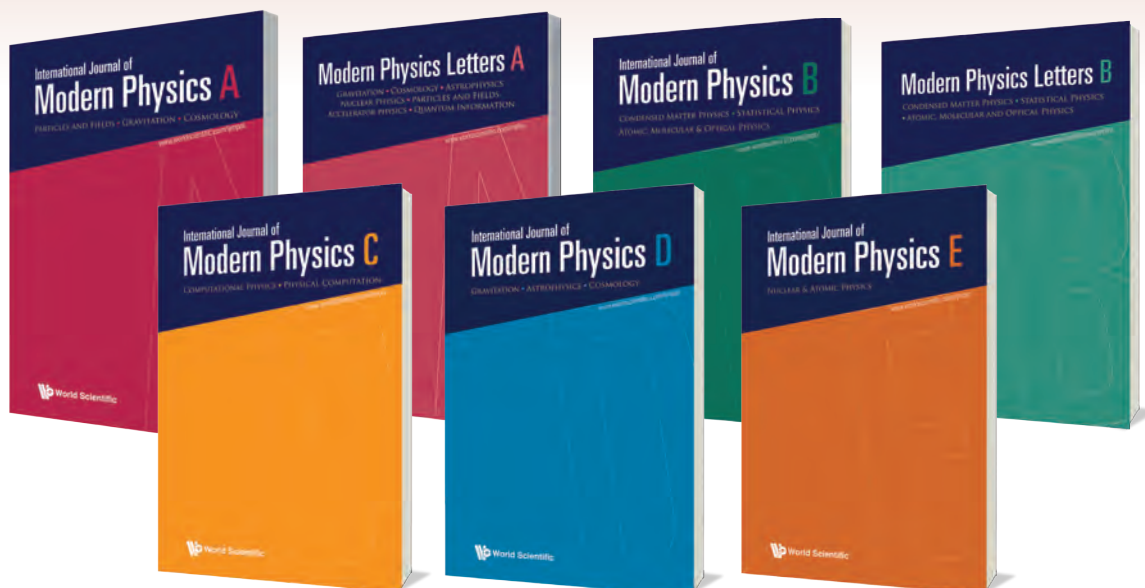
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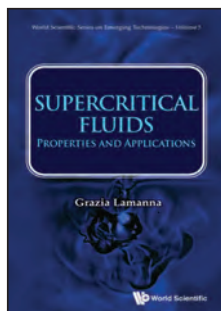
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Avram Bar-Cohen Memorial Series

Supercritical Fluids

Properties and Applications

by **Grazia Lamanna** (*University of Stuttgart, Germany*)

This unique compendium revises the most recent thermodynamic theories of supercritical fluids, focusing on the dynamic crossover and the role of thermodynamic properties in controlling this crossover.



The volume also critically discusses different transition criteria to predict the onset of single-phase (diffusive) mixing and applies them to transcritical droplets and jets. The book overviews the different types of disintegration regimes and the conditions under which phase separation made be observed, even for supercritical injection conditions.

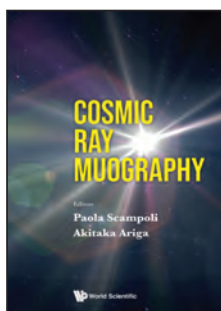
This useful reference text benefits professionals, researchers, academics and graduate students in the fields of aerospace engineering, applied physics, chemical engineering and energy studies.

300pp	Oct 2024	
978-981-127-075-8	US\$108	£100
978-981-127-076-5(ebook)	US\$173	£160

Cosmic Ray Muography

edited by **Paola Scamporrì** (*University of Napoli Federico II, Italy & University of Bern, Switzerland*) & **Akitaka Ariga** (*Chiba University, Japan & University of Bern, Switzerland*)

This book tries to cover all aspects of Muography, with the different chapters pointing to the general physics principles, to the technological and image reconstruction challenges and to the principal applications in several fields, such as archaeology and geology but also civil and industrial applications. It not only targets scientists working in the field but also non-specialists, who might enjoy the reading as a tutorial.



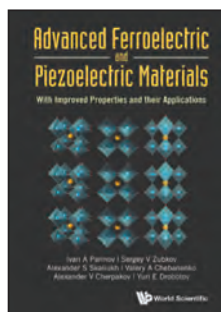
308pp	Apr 2023	
978-981-126-490-0	US\$108	£100
978-981-126-491-7(ebook)	US\$173	£160

Advanced Ferroelectric and Piezoelectric Materials

With Improved Properties and their Applications

by **Ivan A Parinov** (*Southern Federal University, Russia*), **Sergey V Zubkov** (*Southern Federal University, Russia*), **Alexander S Skaliukh** (*Southern Federal University, Russia*), **Valery A Chebanenko** (*Southern Scientific Center of the Russian Academy of Sciences, Russia*), **Alexander V Cherpakov** (*Southern Federal University, Russia*) & **Yuri E Drobotov** (*Southern Federal University, Russia*)

Discover the latest advances in ferroelectric and piezoelectric material sciences with this comprehensive monograph, divided into six chapters, each offering unique insights into the field. As a diverse addition to the literature, it is a relevant resource for researchers, engineers, and students seeking to expand their knowledge of cutting-edge developments in this exciting field.



312pp	Apr 2024	
978-981-128-424-3	US\$118	£110
978-981-128-425-0(ebook)	US\$189	£175

ASTRONOMY, ASTROPHYSICS AND COSMOLOGY (INCLUDING GEOPHYSICS)**The Big Questions of Science**

by **Antonino Del Popolo** (*The University of Catania, Italy*)

This book aims to introduce and address the questions that are often asked and answer with the knowledge that science provides us. It is aimed at general public with a high school degree or higher, and would also appeal to lecturers as an introduction to courses in physics, and cosmology.

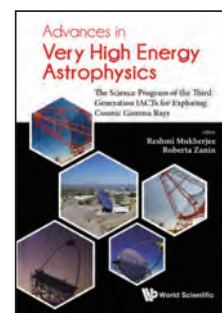
150pp	Nov 2024	
978-981-129-407-5	US\$58	£55
978-981-129-408-2(ebook)	US\$98	£90

Advances in Very High Energy Astrophysics

The Science Program of the Third Generation IACTs for Exploring Cosmic Gamma Rays

edited by **Reshmi Mukherjee** (*Columbia University, USA*) & **Roberta Zanin** (*Cherenkov Telescope Array Observatory gGmbH, Italy*)

This book reviews the progress in the field since the advent of the second generation IACTs around 2004. Going through the scientific highlights obtained by the three current instruments of this kind, H.E.S.S., MAGIC and VERITAS, operating now for more than 15 years, this book presents a state-of-the-art knowledge in four areas of modern astrophysics and cosmology, namely the origin of the cosmic rays, the physics of compact objects and their resulting relativistic outflows, gamma-ray cosmology, and the search for dark matter. Along with a detailed review of the outstanding scientific outcomes, a summary of the key technological developments that yielded the recognized success of the technique is also provided.



This book is written for early-career academics in the fields of astrophysics, high energy physics and cosmology. At the same time, it can serve as a source of reference for the expert in the field.

492pp	Oct 2024	
978-981-3275-71-3	US\$178	£165
978-981-3275-72-0(ebook)	US\$285	£260

Spacetime Geometry of Relativity

Extending Pythagorean Theorem

by **Takashi Kenjo** (*NIDEC Motor Engineering Research Laboratory, Japan*) & **Shigeru Sano** (*NIDEC Motor Engineering Research Laboratory, Japan*)

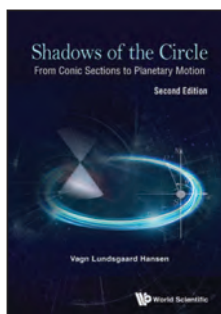
In this book, we try to comprehend the universe with a fundamental formula known as the Pythagorean theorem, used as a vehicle to review the essence of Euclidean geometry and non-Euclidean geometry, then move on to Newtonian mechanics, and review the historical development of electromagnetism, setting the stage for special relativity. Next, we describe Einstein's efforts to generalize his theory to include gravitation, which led to a geometric theory of spacetime: the gravitational field equations. Also presented are the numerical graphical results of the planetary orbits and light trajectories using the Python code that we created. Then the reader is taken on an excursion to the physics of the microcosm, describing how special relativity was instrumental in the development of quantum theory, and how several Japanese physicists contributed to atomic and particle physics. Finally, we end the book by introducing the work of Roger Penrose on black holes, which is closely related to Schwarzschild's solution, and the existence of intrinsic singularity at the center of black holes.

500pp	Sep 2024	
978-981-128-575-2	US\$148	£135
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Shadows of the Circle

From Conic Sections to Planetary Motion
2nd Edition
by **Vagn Lundsgaard Hansen**
(Technical University of Denmark, Denmark)

This book takes the reader on a journey in the mathematical universe from conic sections to mathematical modelling of planetary systems. It is addressed to undergraduate and graduate students as well as researchers interested in the geometry of conic sections, including the historical background and mathematical methods used. It features selected important results, and proofs that not only proves but also 'explains' the results.



224pp Jun 2024
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978-981-126-096-4(ebook) US\$109 £100

The Enchantment of Urania

25 Centuries of Exploration of the Sky
by **Massimo Capaccioli** (University of Naples Federico II, Italy)

The book narrates scientific stories in a captivating way, connected to each other by the thread of the general history in order to give a continuous fresco of the evolution of science in the context of the evolution of the human civilization. It is presented without resorting to any formulas so that it can be accessible to a wide audience of curious people, including high school and university students and in general all those who normally keep themselves informed of scientific things. A rich bibliography has also been added in the appendix for those wishing to learn more on one or more topics.

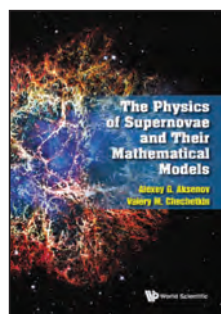


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The Physics of Supernovae and Their Mathematical Models

by **Alexey G Aksenov** (Russian Academy of Sciences, Russia) & **Valery M Chechetkin** (Russian Academy of Sciences, Russia)

This book provides a modern view on the theory of both supernovae types. It contains not only numerical receipts but also gives the basis for developing new numerical methods. It illustrates an important principle: all new ideas in computational physics come from theoretical and mathematical physics.

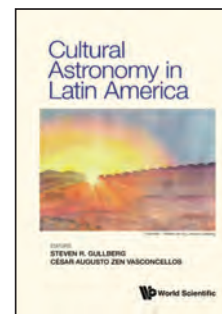


296pp Mar 2024
978-981-128-509-7 US\$108 £100
978-981-128-510-3(ebook) US\$173 £160

Cultural Astronomy in Latin America

edited by **Steven R Gullberg** (University of Oklahoma, USA) & **César Augusto Zen Vasconcellos** (Universidade Federal do Rio Grande do Sul (UFRGS), Brazil & International Center for Relativistic Astrophysics Network (ICRANet), Italy)

This book provides a unique view of Astronomy in Culture, Archaeoastronomy and Ethnoastronomy involving ancient civilizations in Latin America, emphasizing scientific and cultural knowledge combined with historical, cognitive, archaeological and anthropological aspects. The richness of its thematic approach emphasizes the scientific and cultural knowledge of past civilizations and their relationship with historical, cognitive, archaeological and anthropological aspects.



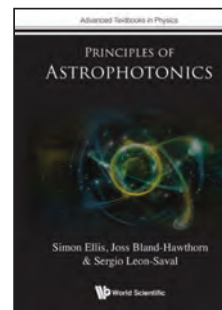
424pp Mar 2024
978-981-128-192-1 US\$148 £135
978-981-128-193-8(ebook) US\$237 £220

Advanced Textbooks in Physics

Principles of Astrophotonics

by **Simon Ellis** (Macquarie University, Australia), **Joss Bland-Hawthorn** (The University of Sydney, Australia) & **Sergio Leon-Saval** (The University of Sydney, Australia)

This is the first book focussed on astrophotonics, written by three experts in the field. It bridges the gap between standards textbooks on traditional astronomical instruments and more advanced treatises on photonics. In addition, it describes the state of the art in the field, describing current instruments, those under development, and directions for future research.



284pp Apr 2023
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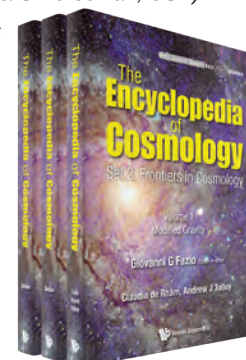
Volume 1: Modified Gravity
Volume 2: Neutrino Physics and Astrophysics
Volume 3: Black Holes

by **Claudia de Rham** (Imperial College London, UK) & **Andrew J Tolley** (Imperial College London, UK)

Edited by: **Floyd W Stecker** (NASA/Goddard Space Flight Center, USA & University of California, Los Angeles, USA) & **Zoltan Haiman** (Columbia University, USA)

Editor-in-chief: **Giovanni G Fazio** (Harvard & Smithsonian, USA)

The second set of *The Encyclopedia of Cosmology*, in three volumes, continues this major, long-lasting, seminal reference at the graduate student level laid out by the most prominent researchers in the general field of cosmology. Together, these volumes will be a comprehensive review of the most important current topics in cosmology, discussing the important concepts and current status in each field, covering both theory and observation.



1440pp Dec 2023
978-981-128-970-5(Set) US\$1180 £1085

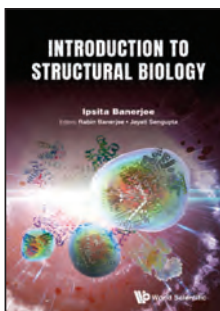
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**ATOMIC AND MOLECULAR PHYSICS****Introduction to Structural Biology**A Notebook
by **Ipsita Banerjee**Edited by: **Rabin Banerjee** (*S N Bose National Centre for Basic Sciences, India*)
& **Jayati Sengupta** (*Indian Institute of Chemical Biology, Kolkata, India*)

This book describes the basic techniques required in learning structural biology. Apart from the classical and standard approaches like X-ray crystallography and SAXS (small angle X-ray scattering), it has quite an extensive chapter on the most recent approach; namely, cryo Electron Microscopy.



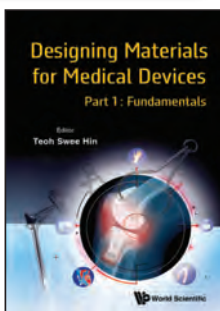
250pp	Jan 2025	
978-981-129-652-9	US\$98	£90
978-981-129-653-6(ebook)	US\$157	£145

BIOPHYSICS, BIOLOGICAL AND MEDICAL PHYSICS**Designing Materials for Medical Devices**

Fundamentals in Engineering Materials for Medical Devices

edited by **Swee Hin Teoh** (*Nanyang Technological University, Singapore & Hunan University, China*)

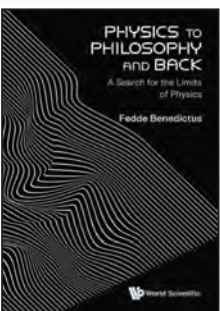
This book aims to provide a basic understanding on the engineering and processing aspects of biomaterials used in medical applications. Of paramount importance is the tripartite relationship between material properties, processing methods and design. As the target audiences cover a wide interdisciplinary field, each chapter is written with a detailed background so that audience of another discipline will be able to understand. For the more knowledgeable reader, a detailed list of references is included.



250pp	Feb 2025	
978-981-129-588-1	US\$108	£100
978-981-129-589-8(ebook)	US\$173	£160

CLASSICAL MECHANICS, CONTINUUM PHYSICS AND ACOUSTICS**Physics to Philosophy and Back**A Search for the Limits of Physics
by **Fedde Benedictus** (*Utrecht University, the Netherlands*)

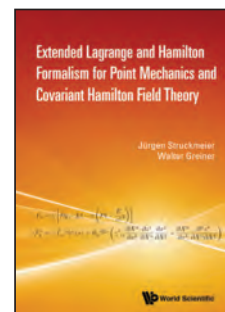
Endorsed by Nobel Laureate Gerard 't Hooft, this book focuses on some of the philosophical problems underlying all theories in physics, such as the nature of time. Filled with personal anecdotes and amusing examples, it provides the perfect introduction to the topic for readers with a non-scientific background. It also enables the reader to come to their own informed conclusion about the relation between physics and the reality in which we live.



200pp	Oct 2024	
978-981-129-283-5(pbk)	US\$48	£45
978-981-129-269-9	US\$88	£80
978-981-129-270-5(ebook)	US\$141	£130

Extended Lagrange and Hamilton Formalism for Point Mechanics and Covariant Hamilton Field Theoryby **Jürgen Struckmeier** (*Gesellschaft für Schwerionenforschung, Germany*) & **Walter Greiner** (*Frankfurt Institute for Advanced Studies, Germany*)

This book presents the extended Lagrange and Hamilton formalisms of point mechanics and field theory in the usual tensor language of standard textbooks on classical dynamics. The authors demonstrate how the canonical transformation formalism enables us to systematically devise gauge theories. With the *extended* canonical transformation formalism that allows to map the space-time geometry, it is possible to formulate a generalized theory of gauge transformations. For a system that is *form-invariant* under both a local gauge transformation of the fields and under local variations of the space-time geometry, we will find a formulation of General Relativity to emerge naturally from basic principles rather than being postulated.



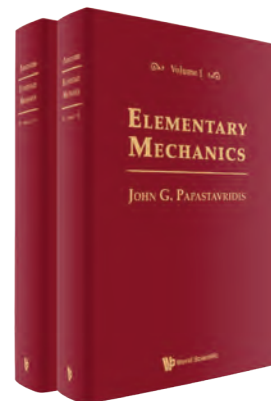
300pp	Apr 2025	
978-981-4578-41-7	US\$132	£120
978-981-4578-42-4(ebook)	US\$211	£195

Elementary Mechanics

(In 2 Volumes)

by **John G Papastavridis**
(*Georgia Institute of Technology, USA*)

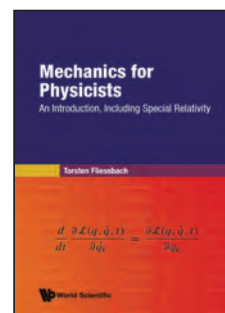
This is a comprehensive and state-of-the-art compendium of classical or Newtonian (non relativistic and non quantum) mechanics from an advanced and unified viewpoint. It continues, renovates, and expands the grand tradition laid by such educational 20th century "elementary mechanics" classics. The text is complemented, clarified, and enriched by many remarks, completely solved nontrivial examples, and problems, all of the latter with their answers and many with hints. It will be of interest to senior undergraduate and graduate students and teachers in and out of the academia, in the areas of engineering (aero & astro, civil, mechanical, controls), theoretical and applied mechanics, physics, applied mathematics, science history and others, for class reference and self study. Nothing equivalent or comparable to it has ever appeared, in any language, in the mechanics literature.



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Mechanics for PhysicistsAn Introduction, including Special Relativity
by **Torsten Fließbach** (*University of Siegen, Germany*)

This textbook introduces the field of mechanics, commonly offered at universities in Germany as part of structured courses in theoretical physics. Within the framework of elementary Newtonian mechanics, the basic concepts — such as trajectory curves, mass point, equations of motion, reference frames — are introduced. The focus is placed on the Lagrangian formalism and its most important applications. The Hamilton formalism is then introduced in a compact way and continuum mechanics is presented through illustrative examples, such as string vibrations, beam bending, elementary hydrodynamics, sound waves, and more. The book also deals in detail with special relativity, and is supplemented with an appendix that examines the relation between the Newtonian force and the Minkowski force.

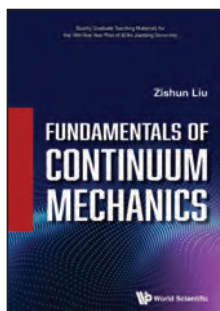


500pp	Jun 2024	
978-981-128-457-1	US\$158	£145
978-981-128-458-8(ebook)	US\$253	£230

Fundamentals of Continuum Mechanics

by **Zishun Liu** (Xi'an Jiaotong University, China)

This textbook offers a concise yet rigorous treatment of continuum mechanics at the introductory level. It differs from traditional textbooks by combining tensor analysis with mechanical analysis and teaching the former's basics within a single chapter. Readers of this book are not required to have learned tensor analysis in the context of engineering mathematics beforehand. It provides illustrative examples and problem sets that enable students and readers to test their understanding of the subject matter and utilize the tools developed in the formulation of engineering problems.



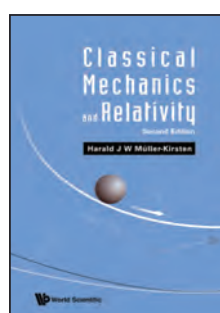
388pp **Mar 2024**
978-981-128-378-9 **US\$128** **£120**
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Classical Mechanics and Relativity

2nd Edition

by **Harald J W Müller-Kirsten**
 (University of Kaiserslautern, Germany)

The text covers the entire domain of basic classical mechanics and relativity theory (special and general) and has been revised mainly for the purpose of adding exercises without worked solutions that were missing in the first edition. It aims to cover the entire spectrum of theoretical mechanics from Newton to Einstein. The reader can observe how in the course of time, deeper and deeper insights were achieved with the development of the basic equations of Newton to those of Euler and Lagrange, and to the geodesic equations of space-time and Einstein's relativity. To include diverse problems, a small section on this topic has been added.



588pp **Feb 2024**
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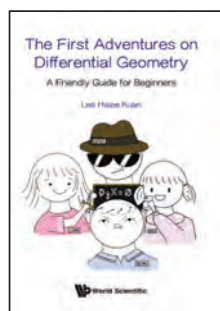
COMPUTATIONAL, MATHEMATICAL AND THEORETICAL PHYSICS

The First Adventures on Differential Geometry

A Friendly Guide for Beginners

by **Hwee Kuan Lee** (A*STAR, Singapore)

This book serves as a friendly stepping stone for readers who wish to start learning differential geometry. It lays down the most essential foundations, ensuring that readers feel prepared to tackle more advanced concepts in the future. Differential geometry is often perceived or presented as a myriad of seemingly disjointed ideas to beginners. The exercises throughout the book are crafted to develop a deep understanding of the subject, with detailed solutions provided to guide readers through each step. It is classroom-tested, proving its effectiveness as an introductory and illuminating textbook.



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Newton's Principia for the Modern Student

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This book presents all the wonderful physics in the *Principia* in a manner that a modern reader can recognize and understand using physics and mathematics as we understand them in the 21st century. It provides a complete set of original calculations and explanations for every proposition in the *Principia* fills this void.

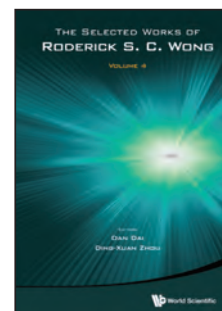
500pp **Nov 2024**
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The Selected Works of Roderick S C Wong

Volume 4

edited by **Dan Dai** (City University of Hong Kong, Hong Kong) & **Ding-Xuan Zhou** (The University of Sydney, Australia)

This book represents a distinguished collection of research papers authored by the esteemed Professor Roderick Wong, a globally recognized mathematician, and a pioneer in the field of applied mathematics. It not only reflects his immense expertise and profound insights but also serves as a tribute to his remarkable achievements. It is an invaluable resource for researchers and graduate students seeking to explore the frontiers of applied analysis, providing them with a rare opportunity to explore the intellectual legacy of a true luminary in the field.

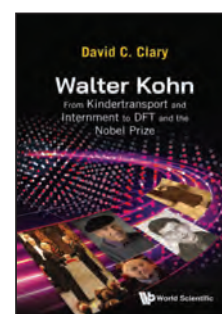


550pp **Oct 2024**
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Walter Kohn

From Kindertransport and Internment to DFT and the Nobel Prize
 by **David C Clary** (University of Oxford, UK)

This book is the first ever biography of Kohn, who led a remarkable life and scientific career, not least the fact that his DFT theory has emerged as the underlying computational method for molecular simulation used throughout the physical and life sciences. Taking us on a compelling journey, Sir David Clary traces Kohn's early life in Vienna and his dramatic escape from the Nazis on the Kindertransport to England in 1939, followed by Kohn's internment as an "enemy alien" and his transportation to Canada in 1940. His subsequent scientific career is discussed in detail, including his remarkable sabbatical in France when he discovered DFT, and his enduring efforts on peace initiatives and reduction of nuclear proliferation. An extraordinary story of a theoretical physicist winning the Nobel Prize in Chemistry, *Walter Kohn* is a sparkling chronicle of one of the great scientists of the 20th century who forever changed the way contemporary science is done.



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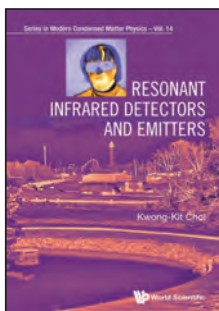
Series in Modern Condensed Matter
Physics - Vol 14

Resonant Infrared Detectors and Emitters

by **Kwong-Kit Choi** (Banpil Photonics, USA)

This book is a sequel of *The Physics of Quantum Well Infrared Photodetectors* (1997), which covered the basic physics of QWIPs. The reader will know key performance metrics in infrared detection, in-depth knowledge of QWIP material and structural designs, array production, its application, and practical knowledge of electromagnetic modeling. In addition, the book will describe using micro- and nano-structures to enhance the emission properties of active and passive optical emitters, similar to detectors. The application of rigorous electromagnetic modeling to optical emitters is new to the optoelectronic community. The resonator-pixel emitter structure with its modeling method will no doubt be able to attract substantial academic and industrial attention in years to come.

536pp Jun 2024
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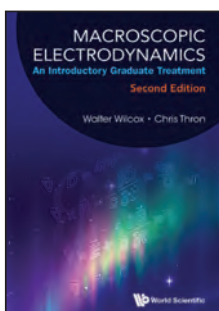
Macroscopic Electrodynamics

An Introductory Graduate Treatment
2nd Edition

by **Walter Wilcox** (Baylor University, USA) &
Chris Thron (Texas A&M University, USA)

This is a comprehensive two-semester introductory graduate level textbook on classical electrodynamics for use in physics and engineering programs. The material has been thoroughly "field-tested": refined and adapted the content based on the first author's experience in teaching the full graduate course approximately 10 times over the past 20 years. The exercises are well-integrated into the text, and are carefully designed to reinforce concepts and to challenge students at the appropriate level of difficulty. A solutions manual is planned to accompany the text. This is unusual at this level and will appeal to instructors with compressed teaching responsibilities.

968pp Mar 2024
978-981-127-631-6(pbk) US\$98 £90
978-981-127-502-9 US\$198 £180
978-981-127-503-6(ebook) US\$317 £290



Classical Mechanics and Electrodynamics

2nd Edition

by **Jon Magne Leinaas** (University of Oslo, Norway)

The book gives a general introduction to classical theoretical physics, differentiating it from other books focused on either on classical mechanics or classical electrodynamics but not both. The book will in particular be useful as textbook for physics courses with such a broader approach to classical physics. For a wider group of students, the book may be of interest for self study. The new inclusion on classical field theory, will give students greater understanding on previous parts of the book, such as examining the Lagrangian formulation of Maxwell's equations with Noether's theorem.

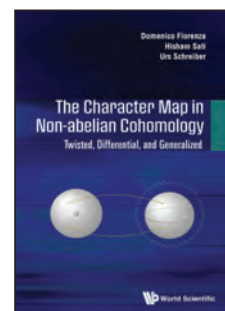
410pp Oct 2024
978-981-129-844-8 US\$138 £125
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The Character Map in Non-abelian Cohomology

Twisted, Differential, and Generalized
by **Domenico Fiorenza** (Sapienza
Università di Roma, Italy), **Hisham Sati**
(New York University Abu Dhabi, UAE) &
Urs Schreiber (New York University Abu
Dhabi, UAE)

This book presents a novel development of fundamental and fascinating aspects of algebraic topology and mathematical physics. It is the first systematic review of the Chern character map on K-theory and its variants, which are important tools in algebraic topology and differential geometry. It provides, for the first time clearly, the mathematical basis for understanding one of the most important and profound topics of the past century: strongly-interacting and hence "non-perturbative" quantum systems. It provides a modernized introduction and review of fundamental classical topics: 1. abstract homotopy theory via model categories; 2. generalized cohomology in its homotopical incarnation; 3. rational homotopy theory seen via homotopy Lie theory, whose fundamental theorem we recast as a (twisted) non-abelian de Rham theorem, which naturally induces the (twisted) non-abelian character map.

248pp Sep 2023
978-981-127-669-9 US\$98 £90
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Nonlinear Field Theories and Unexplained Phenomena in Nature

by **Alexander S Rabinowitch**
(HSE University, Russia)

The book is devoted to several topical questions in modern mathematical and theoretical physics, astrophysics, geophysics, and cosmology that remain unsolved within the framework of the standard approaches.

The nonlinear generalizations of the classical field theories proposed in the book are new and based on fundamental principles of theoretical physics. It is shown that these nonlinear generalizations can play an important role to explain some mysterious phenomena in nature. The book is essential reading for anyone interested in nonlinear field theories and their applications to unsolved problems of contemporary mathematical and theoretical physics, astrophysics and cosmology.

324pp Jul 2023
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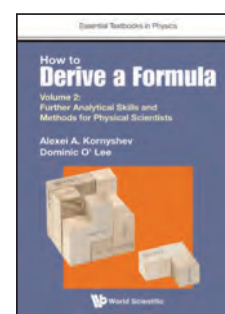
Essential Textbooks in Physics

How to Derive a Formula

Volume 2: Further Analytical Skills and
Methods for Physical Scientists
by **Alexei A Kornyshev** & **Dominic O'Lee**
(Imperial College London, UK)

This two-volume book attempts to engage learners by presenting mathematical methods in as simple terms as possible, with more of an emphasis on skills as opposed to technical knowledge. Based on intuition and common sense rather than mathematical rigour, it teaches students from scratch using pertinent examples, many taken from across the physical sciences to demonstrate the application of the methods taught. It draws on humour and historical facts to provide an interesting new perspective on what a mathematics textbook could be.

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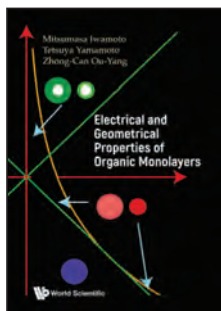
CONDENSED MATTER PHYSICS

Electrical and Geometrical Properties of Organic Monolayers

by **Mitsumasa Iwamoto** (*Tokyo Institute of Technology, Japan*), **Tetsuya Yamamoto** (*Hokkaido University, Japan*) & **Zhong-Can Ou-Yang** (*Chinese Academy of Science, China*)

This book addresses the physical mechanisms that stabilize various shapes of domains in monolayers by using dielectric physics, electrostatics, and the physics of liquid crystals. The approach using mathematical differential geometry method makes this book unique among the literatures of monolayers.

250pp **Jan 2025**
978-981-4602-97-6 **US\$106 £100**
978-981-4602-98-3(ebook) **US\$170 £155**

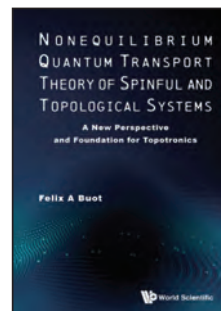


Nonequilibrium Quantum Transport Theory of Spinful and Topological Systems

A New Perspective and Foundation for Topotronics
 by **Felix A Buot** (*University of San Carlos, Cebu, Philippines*)

This book employs nonequilibrium quantum transport, based on the use of mixed Hilbert space representations and real time quantum superfield transport theory, to explain various topological phases of systems with entangled chiral degrees of freedom. It presents an entirely new perspective on topological systems, entanglement-induced localization and delocalization, integer quantum Hall effect (IQHE), fractional quantum Hall effect (FQHE), and its respective spectral zones in the Hofstadter butterfly spectrum. A simple and powerful, intuitive, and wide-ranging perspective on chiral transport dynamics.

596pp **May 2024**
978-981-126-471-9 **US\$168 £155**
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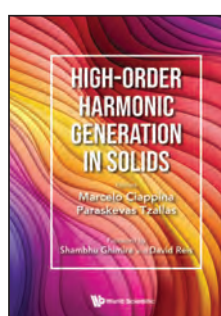


High-Order Harmonic Generation in Solids

edited by **Marcelo Ciappina** (*Guangdong Technion – Israel Institute of Technology (GTIT), China & Technion – Israel Institute of Technology, Israel*) & **Paraskevas Tzallas** (*Foundation for Research and Technology – Hellas (FORTH), Greece & Extreme Light Infrastructure-Attosecond Light Pulse Source (ELI-ALPS), Hungary*)

This is the first book in the world on high-order harmonic generation in solids. In this book, we invite experimental and theoretical experts in the field with the aim to summarize the progress made so far and propose new possibilities and prospects for the generation of high-order harmonics using solid samples. This could bring solid HHG to the next exciting frontier as novel and fully tunable table-top coherent sources.

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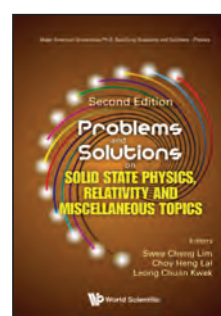
Problems and Solutions on Solid State Physics, Relativity and Miscellaneous Topics

2nd Edition

edited by **Swee Cheng Lim, Choy Heng Lai** (*National University of Singapore, Singapore*) & **Leong Chuan Kwek** (*Nanyang Technological University, Singapore & National University of Singapore, Singapore*)

This volume is a comprehensive compilation of carefully selected questions at the PhD qualifying exam level, including many actual questions from Columbia University, University of Chicago, MIT, State University of New York at Buffalo, Princeton University, University of Wisconsin and the University of California at Berkeley over a twenty-year period. This latest edition has been updated. New problems and solutions have been added, while the original problems are modernized, excluding outdated questions and emphasizing those that rely on calculations. The problems range from fundamental to advanced in a wide range of topics, easily enhancing the student's knowledge through workable exercises. Simple-to-solve problems play a useful role as a first check of the student's level of knowledge whereas difficult problems will challenge the student's capacity on finding solutions.

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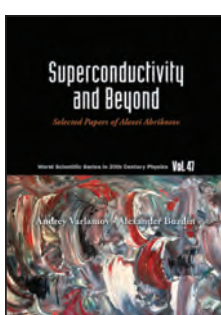
Superconductivity and Beyond

Selected Papers of Alexei Abrikosov
 edited by **Andrey Varlamov** (*Institute of Superconductivity and Innovative Materials of the Italian Research Council (CNR-SPIN), Italy*) & **Alexander Buzdin** (*University of Bordeaux, France*)

This book is a compilation of the best papers of the Nobel Laureate Alexei Abrikosov, presenting a scientific overview of Abrikosov's life work in superconductivity. It also includes some biographical material and recollections of colleagues and friends.

In addition to Abrikosov's famous paper in which he predicted the existence of superconducting vortices, which won him the Nobel Prize, the book also contains many of his other groundbreaking papers on superconductivity, condensed matter theory, and quantum field theory. Reading these articles will help the reader gain an insight into the great physicist's way of thinking and creative thought process. Any level of interested reader, from undergraduates to active research scientists, can benefit.

304pp **Jun 2024**
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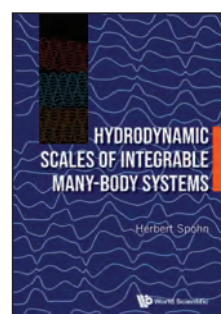


Hydrodynamic Scales of Integrable Many-Body Systems

by **Herbert Spohn** (*Technical University of Munich, Germany*)

This book provides a broad introduction to integrable systems with many degrees of freedom. Within a much larger orbit, discussed are models such as the classical Toda lattice, Calogero fluid, and Ablowitz-Ladik discretized nonlinear Schrödinger equation. On the quantum mechanical side, featured are the Lieb-Liniger delta-Bose gas and the quantum Toda lattice. As a genuinely novel twist, the study deals with random initial data described by generalized Gibbs ensembles with parameters of slow spatial variation.

256pp **Apr 2024**
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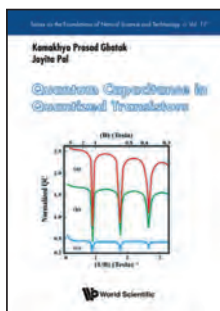
Series on the Foundations of Natural Science and Technology - Vol 17

Quantum Capacitance in Quantized Transistors

by **Kamakhya Prasad Ghatak** (University of Engineering and Management, India) & **Jayita Pal** (Meghnad Saha Institute of Technology, India)

This first-of-its-kind book solely deals with the Quantum Capacitance (QC) in Quantized Transistors and we have considered the quantum capacitances in 2D MOSFETs (QMOSFET) of non-linear optical, ternary, quaternary, III-V compounds, II-VI, IV-VI, stressed Kane type, Ge, Gap, Bismuth telluride, Gallium Antimonide and their 1D NWFETs (NWFET) counter parts. It contains hundred open research problems which form the integral part of the text and are useful for both PhD aspirants and researchers.

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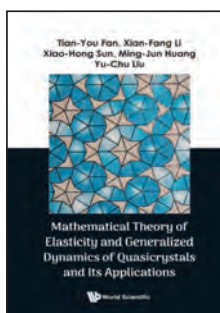


Mathematical Theory of Elasticity and Generalized Dynamics of Quasicrystals and Its Applications

by **Tian-You Fan** (Beijing Institute of Technology, China), **Xian-Fang Li** (Central South University, China), **Xiao-Hong Sun** (Zheng Zhou University, China), **Ming-Jun Huang** (South China University of Technology, China) & **Yu-Chu Liu** (South China University of Technology, China)

This book gives a detailed description on mathematical theory of elasticity and generalized dynamics of solid quasicrystals and its applications. It is the first and only monograph in the scope of quasicrystals since first published in 1999 in China and worldwide. It combines the mechanical and physical behavior of quasicrystals and mathematical physics, which may help graduate students and researchers in the fields of new materials, condensed matter physics, applied mathematics and engineering science.

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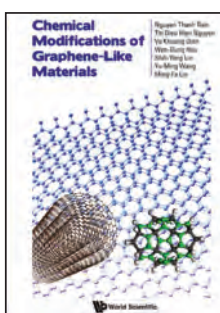


Chemical Modifications of Graphene-Like Materials

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This book covers many graphene-related systems, such as, 1D – 3D related systems, layered graphenes, and other 2D materials. It presents a delicate first-principles calculations, experimental examinations for essential properties. It includes comprehensive theoretical results for fundamental and applied sciences, provides reliable and complete results in diversified many-body properties, and proposes potential applications for graphene-based electronic, optical, and plasmonic devices.

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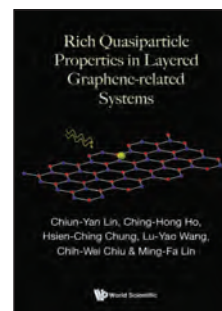


Rich Quasiparticle Properties in Layered Graphene-related Systems

by **Chiun-Yan Lin** (National Cheng Kung University, Taiwan), **Ching-Hong Ho** (National Cheng Kung University, Taiwan), **Hsien-Ching Chung** (National Cheng Kung University, Taiwan), **Lu-Yao Wang** (National Cheng Kung University, Taiwan), **Chih-Wei Chiu** (National Cheng Kung University, Taiwan) & **Ming-Fa Lin** (National Cheng Kung University, Taiwan)

This comprehensive book delves into the fascinating world of quasiparticle properties of graphene-related materials. It covers a wide range of research topics, including long-range Coulomb interactions, dynamic charge density waves, Friedel oscillations and plasmon excitations, as well as optical reflection and transmission spectra of thin films. The calculated results are consistent with the present experimental observations, establishing it as a valuable resource for individuals interested in the quasiparticle properties of novel materials.

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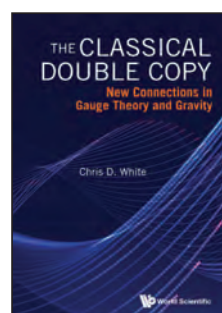


The Classical Double Copy

New Connections in Gauge Theory and Gravity
by **Chris D White** (Queen Mary University of London, UK)

This book reviews our current theories of fundamental physics, before describing in detail how the double copy was discovered, how it can be applied to different types of object in gauge or gravity theory, and what its current and future applications are. No prior knowledge of quantum field theory or string theory is assumed, such that the book will be of interest to a broad audience of physicists and mathematicians.

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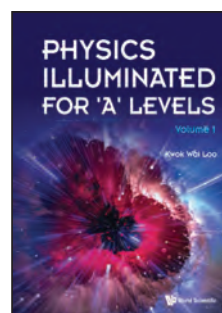
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This book addresses the challenges of grasping fundamental theories of physics by using three overlapping conceptual lenses of representation, conservation laws and system interaction to focus and illuminate the complexity and simplicity of the physical quantities in our universe. It also includes exercises and solutions that will be useful to readers.

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One Hundred Physics Visualizations Using MATLAB

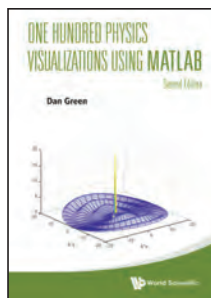
2nd Edition

by **Daniel Green** (*Fermi National Accelerator Laboratory, USA*)

This volume is now more than a decade old, and much has transpired since then. The MATLAB tools have evolved from scripts, to Apps and at present to Live code. The Live package is preferred because it combines text and equations with MATLAB code all in a single site. The results of that code, formerly shown separately, also appear in line and in this way the user can vary the parameters of the specific problem and explore immediately how the solutions vary in response. For this reason, the Live scheme is used exclusively in this edition.

The physics landscape has also evolved in the last decade. The Nobel prize in 2006 rewarded the discovery of small perturbation in temperature, at the parts per million level of the extreme isotropy of the Cosmic Microwave Background (CMB). The basic isotropy is now thought to indicate a period of rapid expansion of the Universe, called "inflation". With those discoveries, there has been more emphasis on astrophysics and cosmology, which contributes to advances in physics over the last decade. These changes have been reflected in the problems which are explored in this volume.

400pp	Sep 2024	
978-981-129-561-4	US\$148	£135
978-981-129-562-1(ebook)	US\$237	£220



Low-Cost Physics Experiments Using New Technologies

by **Salvador Gil** (*Universidad Nacional de San Martín, Argentina*)

This book presents a set of low-cost physics experiments, making use of the new technologies available (data collection and analysis systems by computers, Internet, video, commercial electronics, smartphones, etc.), while highlighting the methodological aspects of physics and science in general. The experiments would enable students to answer the questions: How do we know this? Why do we believe in that? These questions illustrate the nature of scientific thinking process. It can be used as an innovative STEM learning tools.

1104pp	Jun 2024	
978-981-127-775-7	US\$228	£210
978-981-127-776-4(ebook)	US\$365	£335

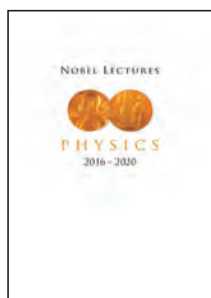


Nobel Lectures in Physics (2016 – 2020)

edited by **Lars Bergström** (*Stockholm University, Sweden*)

This volume is a collection of the Nobel lectures delivered by the Nobel laureates, together with their biographies and the presentation speeches by Nobel Committee members for the period 2016 – 2020. The criterion for the Physics award is to the discoverer of a physical phenomenon that changed our views, or to the inventor of a new physical process that gave enormous benefits to either science at large or to the public. The biographies are interesting to read and the Nobel lectures provide detailed explanations of the phenomena for which the laureates were awarded the Nobel Prize.

556pp	Jun 2024	
978-981-126-054-4	US\$158	£145
978-981-126-055-1(ebook)	US\$253	£230

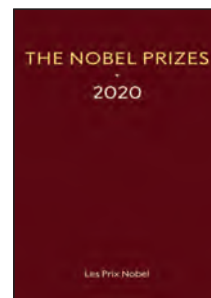


The Nobel Prizes 2020

edited by **Karl Grandin** (*The Royal Swedish Academy of Sciences, Stockholm, Sweden*)

The Nobel Prizes is the official yearbook of the Nobel Foundation. This edition provides extensive information about the 2020 laureates: their Nobel Prize lectures and their autobiographies, as well as presentation speeches and background about the Nobel festivities. *Published on behalf of the Nobel Foundation.*

404pp	Apr 2024	
978-981-129-026-8(pbk)	US\$58	£55
978-981-129-010-7	US\$148	£135
978-981-129-011-4(ebook)	US\$237	£220



Local Mathematics for Local Physics

From Number Scaling to Gauge Theory and Cosmology

by **Paul Benioff**

Edited by: **Marek Czachor** (*Gdańsk University of Technology, Poland*)

Foreword by: **Seth Lloyd** (*Massachusetts Institute of Technology, USA*)

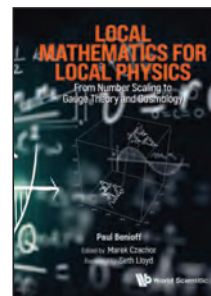
The author first introduces the concept of the value field and uses it to reformulate the basic framework of number theory, calculus, and vector spaces and bundles. The book moves on to find applications to classical field theory, quantum mechanics and gauge theory. The last two chapters address the relationship between theory and experiment, and the possible physical consequences of both the existence and non-existence of the value field. The book is open-ended, and the list of open questions is certainly longer than the set of proposed answers.

Paul Benioff, a pioneer in the field of quantum computing and the author of the first quantum-mechanical description of the Turing machine, devoted the last few years of his life to developing a universal description in which mathematics and physics would be on equal footing. He died on March 29, 2022, his work nearly finished. The final editing was undertaken by Marek Czachor who, in the editorial afterword, attempts to place the author's work in the context of a shift in the scientific paradigm looming on the horizon.

Key Features

- A scientific testament left behind by an outstanding and recognized scientist
- A pioneering work on an original concept that has no equivalent on the market

296pp	Feb 2024	
978-1-80061-496-3	US\$98	£90
978-1-80061-497-0(ebook)	US\$157	£145



GENERAL PHYSICS (POPULAR READING)

The Living Record of Scientific History

Conversations with CN Yang

by **Lizhen Ji** (*University of Michigan, USA*) & **Liping Wang**

Professor Chen-Ning Yang is best known for his achievements in Physics. From his unique perspective, this book reveals the development of world mathematics and physics and the mutual influence between mathematics and physics in the past 100 years.

400pp	Oct 2024	
978-981-128-493-9	US\$58	£55
978-981-128-494-6(ebook)	US\$98	£90

The Wonders of Science

by **Nathan Aviezer** (*Bar-Ilan University, Israel*)

This book aims to reveal the exciting discoveries about the physical world to everyone who is interested in science. No previous scientific knowledge is required to understand this book, and there are no equations or scientific jargon here. The numerous scientific topics are described in a clear and accessible presentation that can be enjoyed and appreciated by all. Moreover, it includes some of the blunders made by leading scientists, including Nobel Prize winners.

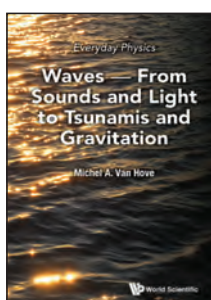


236pp **Aug 2024**
978-981-129-198-2 **US\$88** **£80**
978-981-129-199-9(ebook) **US\$141** **£130**

Everyday Physics

Waves — From Sounds and Light to Tsunamis and Gravitation
 by **Michel A Van Hove**, retired
 (*Hong Kong Baptist University, Hong Kong*)

This book aims to popularize physics by emphasizing conceptual ideas of physics and their interconnections, while avoiding mathematics entirely. The approach is to explore intriguing topics of daily relevance by asking and discussing questions: thereby the reader can participate in developing answers, which enables a deeper understanding than is achievable with memorization.



The target readership of this book is very broad: all those with a curious mind about nature and with a desire to understand how nature works, especially laymen, youngsters, secondary-school children and their teachers.

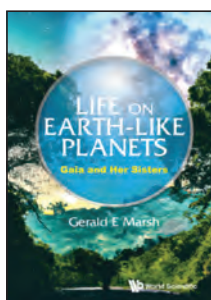
636pp **Feb 2024**
978-981-127-965-2 **US\$158** **£145**
978-981-127-964-5(ebook) **US\$253** **£235**

INTERDISCIPLINARY PHYSICS

Life on Earth-like Planets

Gaia and Her Sisters
 by **Gerald E Marsh**, retired
 (*Argonne National Laboratory, USA*)

Exploring Earth's early conditions during the Hadean era, when oceans dominated and oxygen was scarce, the book illuminates the daunting challenges life faced. Yet, life found its foothold, driven by thermodynamic favorability amidst high tides and shorter days, laying the groundwork for its inevitable emergence. Delving into the fundamental principles of matter and quantum mechanics, the book further highlights life's origin as a product of complex molecular interactions overcoming energy constraints. With insights into the statistical approach to life's origins and the fallacies in estimating life's probability on other planets, the book redefines life as a natural process governed by universal laws.



As an underlying theme of this book, life's evolution towards complexity is portrayed as a harmonious extension of non-living processes, challenging the limited conventional view of thermodynamics. Readers will come to appreciate that Earth is a testament to life's resilience and the intricate tapestry woven by biochemical forces across the cosmos.

200pp **Jan 2025**
978-981-129-507-2 **US\$88** **£80**
978-981-129-508-9(ebook) **US\$141** **£130**

Science Matters Series - Vol 4

Humanities, Science, Scimat

From Two Cultures to Bettering Humanity
 by **Lui Lam** (*San Jose State University, USA*)

This book is the first of its kind in offering an interdisciplinary and cross-cultural coverage of the humanities and "science", and their relationship, from the perspective of scimat — a novel discipline. It contains the basic knowledge about the humanities and science that everyone should know. The aimed readership is anyone, from high school students and laypeople to the professors, who are interested in what the humanities and science are about, and how we can work together to achieve a better humanity.

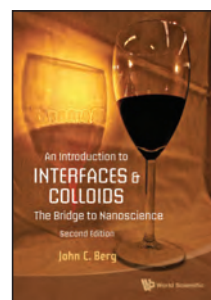


536pp **May 2024**
978-981-128-439-7 **US\$168** **£155**
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An Introduction to Interfaces and Colloids

The Bridge to Nanoscience
 2nd Edition
 by **John C Berg** (*University of Washington, USA*)

This textbook seeks to bring readers with no prior knowledge or experience in interfacial phenomena, colloid science or nanoscience to the point where they can comfortably enter the current scientific and technical literature in the area.



Designed as a pedagogical tool, this textbook recognizes the cross-disciplinary nature of the subject. To facilitate learning, the topics are developed from the beginning with ample cross-referencing. The understanding of concepts is enhanced by clear descriptions of experiments and provisions of figures and illustrations.

884pp **May 2024**
978-981-128-640-7(pbk) **US\$78** **£70**
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978-981-128-573-8(ebook) **US\$317** **£290**

NUCLEAR PHYSICS

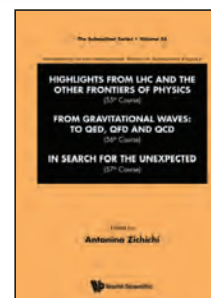
The Subnuclear Series - Vol 55

International School of Subnuclear Physics

Highlights from LHC and the Other Frontiers of Physics (55th Course), From Gravitational Waves: To QED, QFD and QCD (56th Course) & In Search for the Unexpected (57th Course)
 International School of Subnuclear Physics,
 55th, 56th and 57th Courses

Erice-Sicily, Italy, 14 – 23 June 2017,
 14 – 23 June 2018, 21 – 30 June 2019

edited by **Antonino Zichichi** (*European Physical Society, Geneva, Switzerland*)



This book is a collection of the lectures given during the 55th, 56th and 57th courses of the International School of Subnuclear Physics, which was held in Erice in 2017, 2018 and 2019, in June each year. The course covered the most recent advances in theoretical physics and the latest results from current experimental facilities.

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978-981-129-249-1 **US\$188** **£175**

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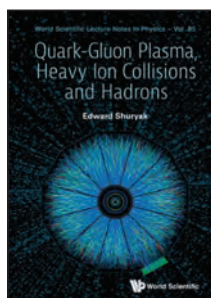
World Scientific Lecture Notes in Physics - Vol 85

Quark-Gluon Plasma, Heavy Ion Collisions and Hadrons

by **Edward Shuryak** (*State University of New York, Stony Brook, USA*)

This is a comprehensive monograph introducing theory of strong interactions, Quantum Chromodynamics, in its most fascinating aspects. It can be useful both for participants in the field, as well as young researches who would like to get exposed to ideas, discoveries and corresponding theoretical toolbox.

632pp **Apr 2024**
978-981-128-234-8 **US\$178** **£165**
978-981-128-235-5(ebook) **US\$285** **£260**



Terahertz Spectroscopy and Its Applications

edited by **Carlito Jr Salonga Ponseca** (*Gulf University for Science and Technology, Kuwait*)

This review volume will present the latest progress on the application of terahertz (THz) spectroscopy in Physics, Chemistry, Material Science and Engineering. It will showcase the ever-expanding use of this frequency region in understanding the development of photonic devices in the THz frequencies as well as advances in the emission and detection of THz pulses. This book is intended for Masters, PhD and post-graduate researchers anticipating a career in linear and non-linear spectroscopy and/or in the development of THz devices and techniques.

350pp **Aug 2024**
978-981-129-328-3 **US\$138** **£125**
978-981-129-329-0(ebook) **US\$221** **£205**



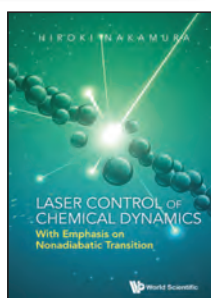
OPTICS AND LASER PHYSICS

Laser Control of Chemical Dynamics

With Emphasis on Nonadiabatic Transition
 by **Hiroki Nakamura** (*National Institutes of Natural Sciences, Japan & Graduate University for Advanced Studies, Japan*)

This book discusses laser control of chemical dynamics with the focus on the achievements of the author's research group. It emphasizes the importance of nonadiabatic transition and usefulness of the Zhu-Nakamura theory in laser control of chemical dynamics.

170pp **Jan 2025**
978-981-129-581-2 **US\$88** **£80**
978-981-129-582-9(ebook) **US\$141** **£130**



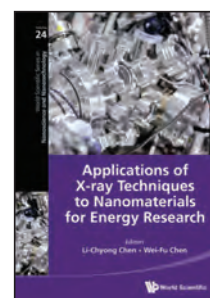
World Scientific Series in Nanoscience and Nanotechnology - Vol 24

Applications of X-ray Techniques to Nanomaterials for Energy Research

edited by **Li-Chyong Chen** (*National Taiwan University, Taiwan*) & **Wei-Fu Chen** (*Lyten Inc, USA*)

This book fills an important research gap in the field of nanomaterials by giving scientists new options to investigate nanomaterials for energy research. It aims to provide researchers with a tool to choose suitable X-ray techniques, carry them out with the right procedure, and analyze the data to give the best reliable results. Technical, detailed yet concise, it is suitable for quick application in the field.

300pp **Feb 2024**
978-981-128-463-2 **US\$108** **£100**
978-981-128-464-9(ebook) **US\$173** **£160**



Mode-Locked Lasers

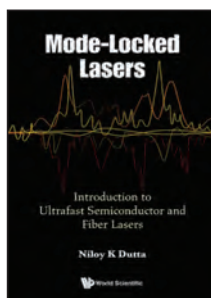
Introduction to Ultrafast Semiconductor and Fiber Lasers

by **Niloy K Dutta** (*University of Connecticut, USA*)

This invaluable book provides a comprehensive treatment of the design and application of Mode Locked Lasers and Short Pulse Generation. With the advances in semiconductor laser and fiber laser technologies in the 1980s to now, these devices have been made compact, refined, and developed for a wide range of applications including further scientific studies.

This book is self-contained and unified in presentation. It can be used as an advanced text by graduate students and by practicing engineers. It is also suitable for non-experts who wish to have an overview of mode-locked lasers and pulse generation. The explanations in the book are detailed enough to capture the interest of the curious reader and complete enough to provide the necessary background to explore the subject further.

324pp **Jun 2024**
978-981-129-016-9 **US\$128** **£120**
978-981-129-017-6(ebook) **US\$205** **£190**



PARTICLE PHYSICS / HIGH ENERGY PHYSICS / QUANTUM FIELDS

An Introduction to Four-dimensional Chern-Simons Theory

by **Meer Ashwinkumar** (*University of Bern, Switzerland*)

The aim of this book is to provide a pedagogical yet comprehensive review of various aspects of four-dimensional Chern-Simons theory, a quantum field theory that has emerged as an organizing principle for various integrable systems, such as integrable spin chains, integrable lattice models, and two-dimensional integrable quantum field theories. Among topics covered are the derivation of the Yang-Baxter equation and its solutions, the Yangian algebra, realizations of two-dimensional integrable field theories and their Lax operators, string-theoretic embeddings of four-dimensional Chern-Simons theory, holographic duals of the theory, as well as dualities of integrable quantum field theories.

200pp **May 2025**
978-981-129-516-4 **US\$88** **£80**
978-981-129-517-1(ebook) **US\$141** **£130**

Analysis on Fock Spaces and Mathematical Theory of Quantum Fields

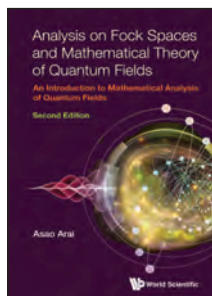
An Introduction to Mathematical Analysis of Quantum Fields
2nd Edition

by **Asao Arai** (*Hokkaido University, Japan*)

This book provides a comprehensive introduction to Fock space theory and its applications to mathematical quantum field theory. It is a good introductory text for graduate students in mathematics or physics who are interested in the mathematical aspects of quantum field theory. It is also well-suited for self-study, providing readers a firm foundation of knowledge and mathematical techniques for more advanced books and current research articles in the field of mathematical analysis on quantum fields. Numerous problems are added to aid readers in developing a deeper understanding of the field.

This book is a good introductory text for graduate students in mathematics or physics who are interested in the mathematical aspects of quantum field theory. It is also well-suited for self-study, providing readers a firm foundation of knowledge and mathematical techniques for more advanced books and current research articles in the field of mathematical analysis on quantum fields. Numerous problems are added to aid readers in developing a deeper understanding of the field.

1000pp	Dec 2024	
978-981-128-842-5	US\$298	£275
978-981-128-844-9(ebook)	US\$477	£440



Harald Fritzsche Memorial Volume

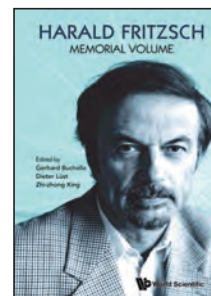
edited by **Gerhard Buchalla** (*Ludwig-Maximilians-University, Germany*),
Dieter Lüst (*Ludwig-Maximilians-University, Germany*) & **Zhi-zhong Xing** (*Institute of High Energy Physics, Beijing, China*)

This book is a tribute to Harald Fritzsche (1943 – 2022), who has made outstanding contributions to the development of modern particle physics.

He was a pioneer of QCD, the gauge theory of strong interactions, and contributed significantly to Grand Unified Theories and to the physics of quark and lepton flavors.

The present book collects reminiscences of Harald Fritzsche and scientific articles, written by friends, colleagues, collaborators and former students. The contributed articles span a wide range of topics, reflecting Harald's broad interests in physics, from QCD and its applications at high and low energies, the flavor puzzle, flavor symmetries and textures, to gravity, constants of Nature and fundamental symmetries and their violation. The authors of these articles include, among others, Siegfried Bethke, Johannes Blümlein, Stanley J Brodsky, Gerard 't Hooft, Heinrich Leutwyler, Hans Peter Nilles, Serguey T Petcov, Kok Khoo Phua and Willibald Plessas.

350pp	Aug 2024	
978-981-129-226-2	US\$128	£120
978-981-129-227-9(ebook)	US\$205	£190

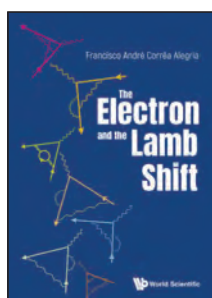


The Electron and the Lamb Shift

by **Francisco André Corrêa Alegria**
(*University of Lisbon, Portugal & Instituto de Telecomunicações, Portugal*)

This book presents a detailed analytical description of the derivation of the Lamb shift in the Hydrogen atom using quantum field theory. This shift in energy levels, relative to what is predicted in traditional particle physics theory, is due to the phenomena of vacuum fluctuations and vacuum polarization which are accounted for in the quantum field theory as applied in particle physics. The derivation reported is done using perturbation theory and extends up to 4th order. This derivation has been carried out to higher orders by scientists all over the world throughout several decades and agrees exceptionally well with experimental data demonstrating the physical reality of vacuum fluctuations. This book also includes a historical overview of the understanding of the atom and its interaction with electromagnetic radiation as it was in the first half of the 20th century, when the calculation of the Lamb shift was first attempted.

436pp	Aug 2024	
978-981-12-9611-6	US\$158	£145
978-981-12-9612-3(ebook)	US\$253	£230



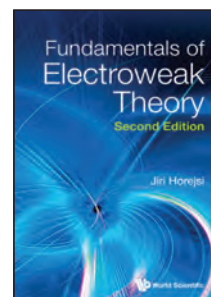
Fundamentals of Electroweak Theory

2nd Edition

by **Jiri Horejsi** (*Charles University, Czech Republic*)

This book is an update of its first edition published more than 20 years ago, reflecting the discovery of the Higgs boson in 2012. It follows basically the historical path, providing many details not quite often covered by most of the other textbooks and monographs. It possesses the ample use of the technical criterion of tree unitarity, which gives a relatively simple insight into the problem of perturbative renormalizability of the electroweak theory. A value-added feature of the text is perhaps that it is thorough and easy to read, which is due to the long-term pedagogical activity of the author in this field.

380pp	Jul 2024	
978-981-129-166-1	US\$128	£120
978-981-129-167-8(ebook)	US\$205	£190

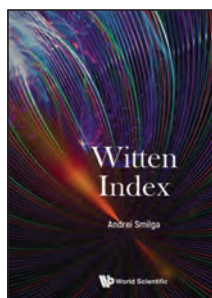


Witten Index

by **Andrei Smilga** (*University of Nantes, France*)

This monography is devoted to vacuum structure of supersymmetric quantum mechanical and field theories. It assembles nearly all available information about the vacuum structure of different supersymmetric theories, which can otherwise be found only in many different original articles and some reviews devoted to this or that aspect of the problem. Moreover, it's a monography where all these results were brought together and inspected in a pedagogical way from the single angle did not exist before.

320pp	Sep 2024	
978-981-129-317-7	US\$128	£120
978-981-129-318-4(ebook)	US\$205	£190



Advanced Series on Directions in High Energy Physics - Vol 31

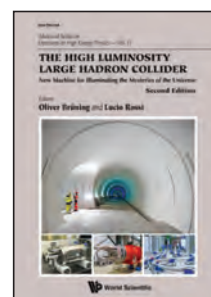
The High Luminosity Large Hadron Collider

New Machine for Illuminating the Mysteries of the Universe
2nd Edition

edited by **Oliver Brüning** (*CERN, Switzerland*) & **Lucio Rossi** (*University of Milano, Italy & INFN, Italy*)

This book introduces the physics and technology of the High-Luminosity Large Hadron Collider (LHC), highlighting the most recent modifications that shaped the final configuration, which is now in the advanced stages of its construction. It is a self-consistent series of papers, which addresses all technology and design issues. It is an essential reference for physicists and engineers in the field of hadron colliders and LHC related issues and can also be read by postgraduate students.

656pp	Mar 2024	
978-981-127-894-5	US\$178	£165

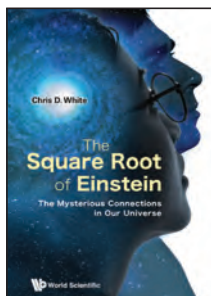


The Square Root of Einstein

The Mysterious Connections in Our Universe

by **Chris D White** (*Queen Mary University of London, UK*)

This is a popular science book on very new and exciting research results, that have garnered significant global attention. It provides a motivational chapter on why physics has a diversity problem, and what can be done about it. It explains all our current theories of the universe — plus our new results — in accessible terms. Lastly, it provides a final chapter on how to pursue a scientific career, giving the kind of advice that is missing in all popular science books aimed at high school students.



228pp	Apr 2024		
978-1-80061-552-6(pbk)	US\$28	£25	
978-1-80061-542-7	US\$68	£65	
978-1-80061-543-4(ebook)	US\$109	£100	

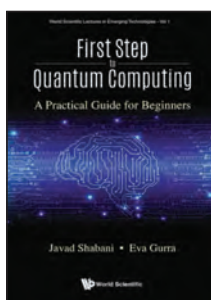
QUANTUM MECHANICS AND QUANTUM INFORMATION

World Scientific Lectures in Emerging Technologies - Vol 1

First Step to Quantum Computing

A Practical Guide for Beginners
by **Javad Shabani** (*New York University, USA*) & **Eva Gurra** (*New York University, USA*)

Quantum information is a young and evolving field. This compendium introduces quantum information in a comprehensive self-contained guide without assuming a wealth of knowledge prior to reading.



The volume highlights intuition on counterintuitive topics such as quantum mechanics, basic mathematical tools and calculations involving linear algebra, and applies these concepts to quantum information with guided problems and coding exercises. It largely benefits mid-level undergraduates and perhaps motivated high schoolers.

150pp	Dec 2024		
978-981-125-412-3(pbk)	US\$38	£35	
978-981-125-319-5	US\$78	£70	
978-981-125-320-1(ebook)	US\$125	£115	

Tiny Quantum, Giant Revolution

by **Ching-ray Chang** (*National Taiwan University, Taiwan*) & **Meng-Chien Wang** (*National Taiwan University, Taiwan*)

This book outlines the importance of the “Second Quantum Revolution,” introduces quantum computers, quantum communications, and quantum sensors, and then provides a framework for the emergence of the quantum Internet of Things. What basic quantum literacy should modern citizens have in this era? The “Second Quantum Revolution,” where quantum knowledge and engineering technology are once again combined, will provide faster, more effective, and more sensitive quantum facilities to accelerate cross-field exploration, and will also make human life more comfortable and convenient than ever before.



280pp	Aug 2024		
978-981-128-740-4(pbk)	US\$38	£35	
978-981-128-700-8	US\$98	£90	
978-981-128-701-5(ebook)	US\$157	£145	

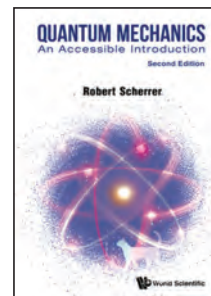
Quantum Mechanics

An Accessible Introduction

2nd Edition

by **Robert Scherrer** (*Vanderbilt University, USA*)

This book provides a comprehensive introduction to quantum mechanics from the ground up. It is designed to be completely self-contained and assumes very little knowledge or mathematical background on the part of students as it takes them through the major topics of quantum mechanics.



Designed to be appropriate for students across a wide range of abilities and backgrounds, this book will be particularly helpful for students who might lack some of the mathematical background typically assumed in an undergraduate quantum mechanics course. It includes three “math interludes” covering such topics as complex numbers, linear operators, vector spaces, and matrix manipulation. It also discusses some interesting modern applications of quantum mechanics: magnetic resonance imaging and quantum computing, and it concludes with an introduction to relativistic quantum theory.

This second edition includes expanded and improved coverage of the Heisenberg uncertainty principle, the use of ladder operators to solve the harmonic oscillator, as well as the treatment of the Lamb shift.

384pp	Apr 2024		
978-981-128-729-9(pbk)	US\$58	£55	
978-981-128-665-0	US\$138	£125	
978-981-128-673-5(ebook)	US\$221	£205	

Lectures on Quantum Mechanics

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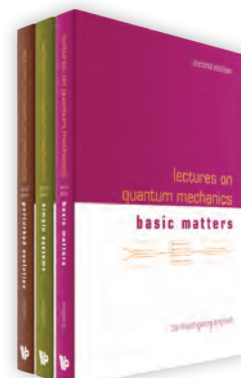
Volume 2: Simple Systems

Volume 3: Perturbed Evolution

2nd Edition

by **Berthold-Georg Englert** (*Beijing Institute of Technology, China & National University of Singapore, Singapore*)

These volumes offer a modern point of view on Quantum Mechanics and a nonstandard approach by a renowned researcher and teacher. It is based on battle-tested lecture notes, and ideal for the self-studying reader, as intermediate steps are not skipped over in the detailed presentation.



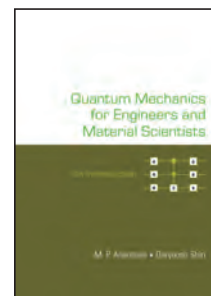
700pp	Apr 2024		
978-981-128-951-4(Set)(pbk)	US\$108	£100	
978-981-128-952-1(Set)	US\$199	£185	

Quantum Mechanics for Engineers and Material Scientists

An Introduction

by **M P Anantram** (*University of Washington, Seattle, USA*) & **Daryoush Shiri** (*Chalmers University of Technology, Sweden*)

This introductory book is aimed at students of engineering and material science who want to learn the necessary toolboxes of practical quantum mechanics. Traditionally lengthy derivations in QM are avoided and by presenting the bigger picture, the next steps for the derivations can be introduced. Analogies to familiar concepts in engineering and science e.g. nanomaterials and circuits/microwaves are used. Carefully chosen order of topics provide a big picture of kinds of skills and toolboxes needed.



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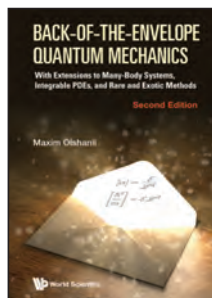
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2nd Edition

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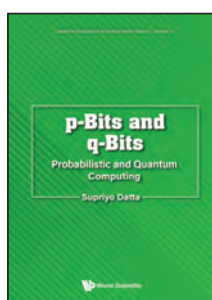
New Era Electronics: A Lecture Notes Series - Vol 3

p-Bits and q-Bits

Probabilistic and Quantum Computing
by **Supriyo Datta** (*Purdue University, USA*)

This book is the third volume in the New Era Electronics lecture notes series; a compilation of volumes defining the important concepts tied to the electronics transition happening in the 21st century. It is unique both in its content connecting three advanced topics, and in requiring no advanced prerequisites beyond linear algebra and differential equations. It is accessible to broader audiences across its described topics, including students in physics, engineering and computing, as well as professionals working actively in the technical fields looking for a primer to quantum computational methods.

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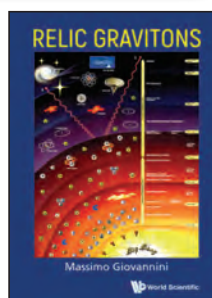
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by **Massimo Giovannini**
(*INFN, Milan-Bicocca, Italy*)

Relic Gravitons delves into the cosmic backgrounds of stochastic gravitational waves, exploring their potential as a unique source of information on the early physical conditions of the Universe close to the Planck epoch. Drawing on various lecture notes, articles, and reviews since the early 1990s, the monograph presents a topical account of the subject. The aim is to offer students and practitioners a useful tool for understanding the most recent developments of a lively field that is now thriving also thanks to forthcoming observational data.

While the detection of diffuse backgrounds of gravitational radiation might improve current bounds on the supplementary polarizations of gravitational waves, the author explores across the sixteen chapters of the monograph the sensitivity of cosmic gravitons to the new physics beyond the standard lore of fundamental interactions. It is argued that the discovery of relic gravitons may trigger a paradigm shift whose implications are yet to be fully understood.

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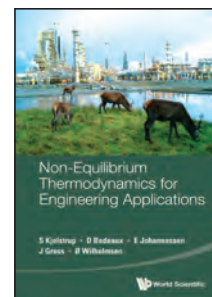
STATISTICAL PHYSICS, COMPLEXITY AND NONLINEAR DYNAMICAL SYSTEMS (INCLUDING HEAT AND THERMODYNAMICS)

Non-Equilibrium Thermodynamics for Engineering Applications

by **Signe Kjelstrup** (*Norwegian University of Science and Technology, Norway*), **Dick Bedeaux** (*Norwegian University of Science and Technology, Norway*), **Eivind Johannessen** (*Equinor, Norway*), **Joachim Gross** (*University of Stuttgart, Germany*) & **Øivind Wilhelmsen** (*Norwegian University of Science and Technology, Norway*)

This book presents the theory of non-equilibrium thermodynamics in a pedagogical and practical way that targets engineering applications. In it, tools to take advantage of the second as well as the first law of thermodynamics are provided. Designed with engineers in mind, it may be used as a textbook for undergraduate and graduate university curricula containing thermodynamics or energy conversion issues at large, chemical and mechanical engineering, applied chemistry and applied physics.

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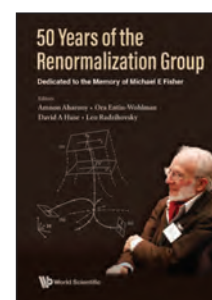


50 Years of the Renormalization Group

Dedicated to the Memory of Michael E Fisher
edited by **Amnon Aharony** (*Tel Aviv University, Israel*), **Ora Entin-Wohlman** (*Tel Aviv University, Israel*), **David A Huse** (*Princeton University, USA*) & **Leo Radzihovsky** (*University of Colorado, USA*)

The contributions in the book are devoted to the memory of Michael E Fisher, and hence include many personal memories from people whose work was influenced by him. Also, the book is a collection of articles from leaders in the field of phase transitions and critical phenomena, to celebrate 50 years of the renormalization group and the 1972 paper by Wilson and Fisher. Many of the articles review, in tutorial form, the progress in the fields of phase transitions and the renormalization group.

912pp	Aug 2024	
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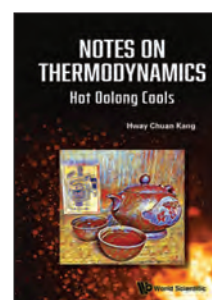


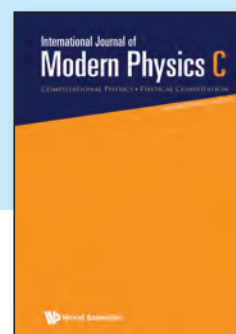
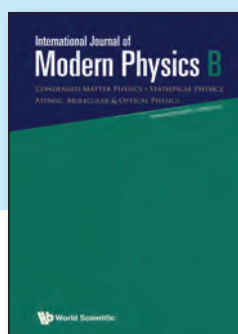
Notes on Thermodynamics

Hot Oolong Cools
by **Hway Chuan Kang** (*National University of Singapore, Singapore*)

This title is a supplement to lectures and tutorials in a Thermodynamics course and also serves as a guide to more comprehensive texts. The principles are illustrated throughout using many examples that are, hopefully, relevant to the broad concerns and interests of students today rather than just focusing on the technical details. It adopts an informal and readable style without compromising the rigour in this book, and serves as an accessible guide for the thoughtful lay person trying to learn Thermodynamics on their own.

492pp	Jul 2024	
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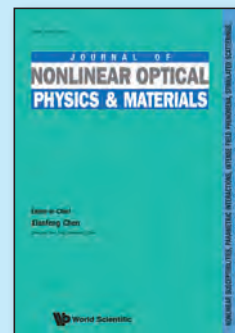
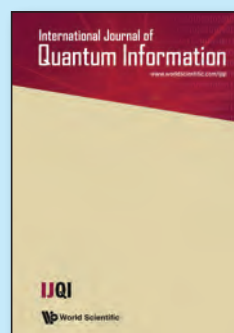
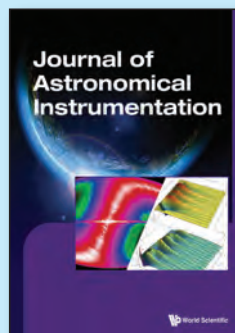
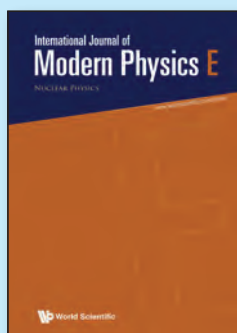
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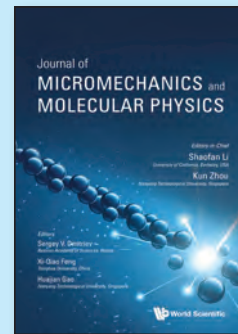
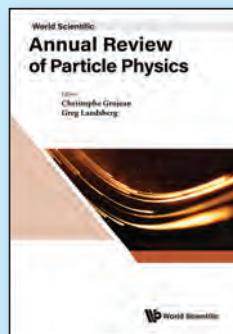
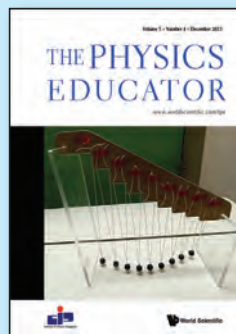
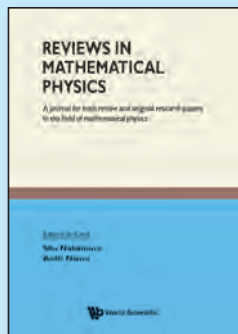
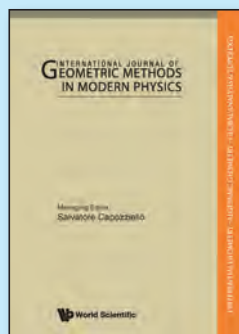
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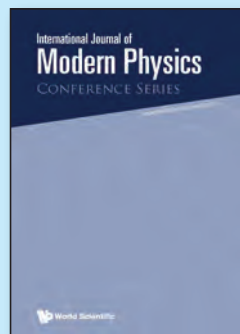
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✓	Title	Page
	50 YEARS OF THE RENORMALIZATION GROUP: DEDICATED TO THE MEMORY OF MICHAEL E FISHER	17
	ADVANCED FERROELECTRIC AND PIEZOELECTRIC MATERIALS: WITH IMPROVED PROPERTIES AND THEIR APPLICATIONS	5
	ADVANCES IN VERY HIGH ENERGY ASTROPHYSICS: THE SCIENCE PROGRAM OF THE THIRD GENERATION IACTS FOR EXPLORING COSMIC GAMMA RAYS	5
	ANALYSIS ON FOCK SPACES AND MATHEMATICAL THEORY OF QUANTUM FIELDS: AN INTRODUCTION TO MATHEMATICAL ANALYSIS OF QUANTUM FIELDS (SECOND EDITION)	15
	APPLICATIONS OF X-RAY TECHNIQUES TO NANOMATERIALS FOR ENERGY RESEARCH	14
	BACK-OF-THE-ENVELOPE QUANTUM MECHANICS: WITH EXTENSIONS TO MANY-BODY SYSTEMS, INTEGRABLE PDES, AND RARE AND EXOTIC METHODS (SECOND EDITION)	17
	BIG QUESTIONS OF SCIENCE, THE	5
	CHARACTER MAP IN NON-ABELIAN COHOMOLOGY, THE: TWISTED, DIFFERENTIAL, AND GENERALIZED	9
	CHEMICAL MODIFICATIONS OF GRAPHENE-LIKE MATERIALS	11
	CLASSICAL DOUBLE COPY, THE: NEW CONNECTIONS IN GAUGE THEORY AND GRAVITY	11
	CLASSICAL MECHANICS AND ELECTRODYNAMICS (SECOND EDITION)	9
	CLASSICAL MECHANICS AND RELATIVITY (SECOND EDITION)	8
	COSMIC RAY MUOGRAPHY	5
	CULTURAL ASTRONOMY IN LATIN AMERICA	6
	DARK MATTER AND COSMIC WEB STORY (SECOND EDITION)	4
	DESIGNING MATERIALS FOR MEDICAL DEVICES - PART I: FUNDAMENTALS	7
	ELECTRICAL AND GEOMETRICAL PROPERTIES OF ORGANIC MONOLAYERS	10
	ELECTRODE AND CORROSION PHYSICS	4
	ELECTRON AND THE LAMB SHIFT, THE	15
	ELEMENTARY MECHANICS (IN 2 VOLUMES)	7
	ENCHANTMENT OF URANIA, THE: 25 CENTURIES OF EXPLORATION OF THE SKY	6
	ENCYCLOPEDIA OF COSMOLOGY, THE - SET 2: FRONTIERS IN COSMOLOGY (IN 3 VOLUMES)	6
	EVERYDAY PHYSICS: WAVES - FROM SOUNDS AND LIGHT TO TSUNAMIS AND GRAVITATION	13
	EXTENDED LAGRANGE AND HAMILTON FORMALISM FOR POINT MECHANICS AND COVARIANT HAMILTON FIELD THEORY	7
	FIRST ADVENTURES ON DIFFERENTIAL GEOMETRY, THE: A FRIENDLY GUIDE FOR BEGINNERS	8
	FIRST STEP TO QUANTUM COMPUTING: A PRACTICAL GUIDE FOR BEGINNERS	16
	FUNDAMENTALS OF CONTINUUM MECHANICS	8
	FUNDAMENTALS OF ELECTROWEAK THEORY (SECOND EDITION)	15
	HARALD FRITZSCH MEMORIAL VOLUME	15
	HIGH LUMINOSITY LARGE HADRON COLLIDER, THE: NEW MACHINE FOR ILLUMINATING THE MYSTERIES OF THE UNIVERSE (SECOND EDITION)	15
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	HOW TO DERIVE A FORMULA - VOLUME 2: FURTHER ANALYTICAL SKILLS AND METHODS FOR PHYSICAL SCIENTISTS	9
	HUMANITIES, SCIENCE, SCIMAT: FROM TWO CULTURES TO BETTERING HUMANITY	13
	HYDRODYNAMIC SCALES OF INTEGRABLE MANY-BODY SYSTEMS	10
	INTERNATIONAL SCHOOL OF SUBNUCLEAR PHYSICS - HIGHLIGHTS FROM LHC AND THE OTHER FRONTIERS OF PHYSICS (55TH COURSE), FROM GRAVITATIONAL WAVES: TO QED, QFD AND QCD (56TH COURSE) & IN SEARCH FOR THE UNEXPECTED (57TH COURSE)	13
	INTRODUCTION TO FOUR-DIMENSIONAL CHERN-SIMONS THEORY, AN	14
	INTRODUCTION TO INTERFACES AND COLLOIDS, AN: THE BRIDGE TO NANOSCIENCE (SECOND EDITION)	13
	INTRODUCTION TO STRUCTURAL BIOLOGY TECHNIQUES: A NOTEBOOK	7

✓	Title	Page
	LASER CONTROL OF CHEMICAL DYNAMICS: WITH EMPHASIS ON NONADIABATIC TRANSITION	14
	LECTURES ON QUANTUM MECHANICS (SECOND EDITION) (IN 3 COMPANION VOLUMES)	16
	LIFE ON EARTH-LIKE PLANETS: GAIA AND HER SISTERS	13
	LIVING RECORD OF SCIENTIFIC HISTORY, THE: CONVERSATIONS WITH C N YANG	12
	LOCAL MATHEMATICS FOR LOCAL PHYSICS: FROM NUMBER SCALING TO GAUGE THEORY AND COSMOLOGY	12
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	NEWTON'S PRINCIPIA FOR THE MODERN STUDENT	8
	NOBEL LECTURES IN PHYSICS (2016-2020)	12
	NOBEL PRIZES 2020, THE	12
	NON-EQUILIBRIUM THERMODYNAMICS FOR ENGINEERING APPLICATIONS	17
	NONEQUILIBRIUM QUANTUM TRANSPORT THEORY OF SPINFUL AND TOPOLOGICAL SYSTEMS: A NEW PERSPECTIVE AND FOUNDATION FOR TOPOTRONICS	10
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	QUANTUM MECHANICS: AN ACCESSIBLE INTRODUCTION (SECOND EDITION)	16
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	RELIC GRAVITONS	17
	RESONANT INFRARED DETECTORS AND EMITTERS	9
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	SQUARE ROOT OF EINSTEIN, THE: THE MYSTERIOUS CONNECTIONS IN OUR UNIVERSE	16
	SUPERCONDUCTIVITY AND BEYOND: SELECTED PAPERS OF ALEXEI ABRIKOSOV	10
	SUPERCRITICAL FLUIDS: PROPERTIES AND APPLICATIONS	5
	TERAHERTZ SPECTROSCOPY AND ITS APPLICATIONS	14
	TINY QUANTUM, GIANT REVOLUTION	16
	WALTER KOHN: FROM KINDERTRANSPORT AND INTERNMENT TO DFT AND THE NOBEL PRIZE	8
	WITTEN INDEX	15
	WONDERS OF SCIENCE, THE	13

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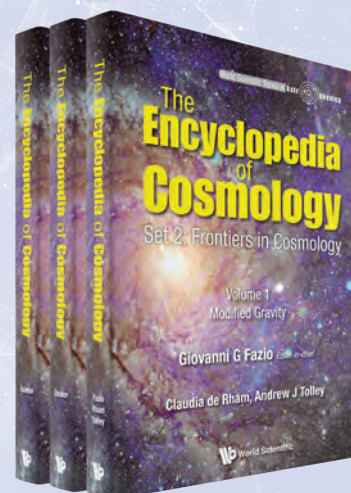
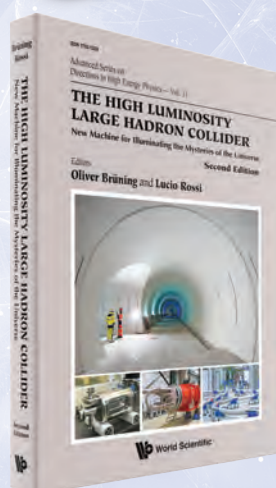
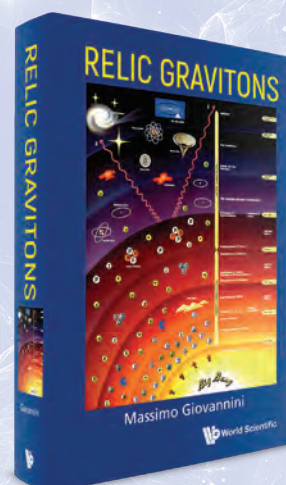
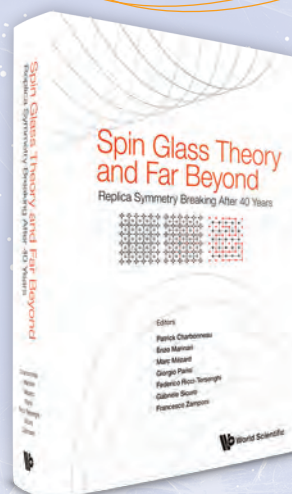
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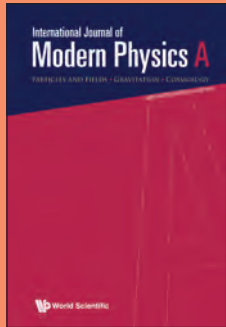
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page 18



page 18



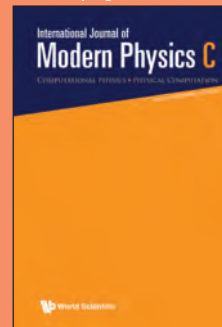
page 18



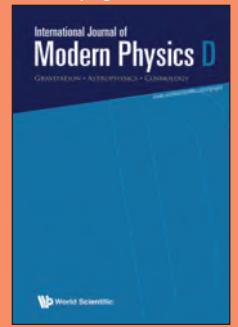
page 18



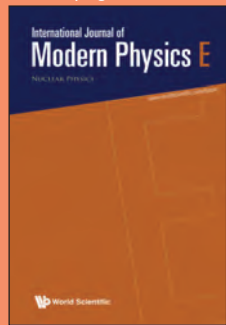
page 18



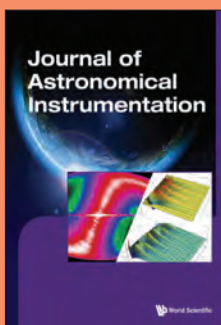
page 19



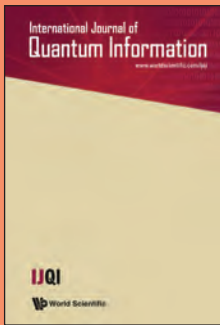
page 19



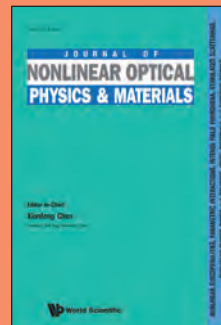
page 19



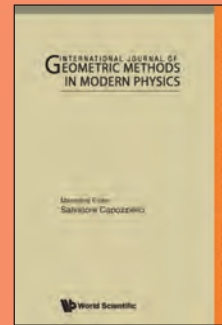
page 19



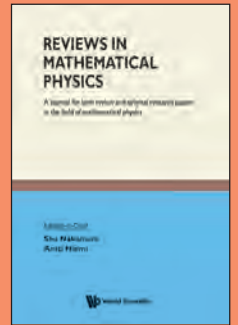
page 19



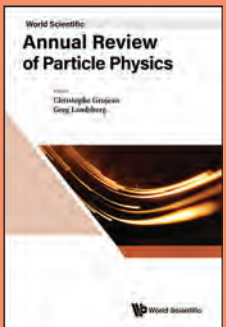
page 20



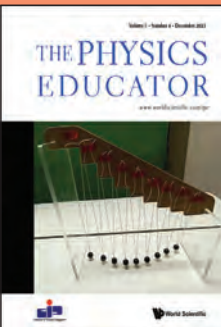
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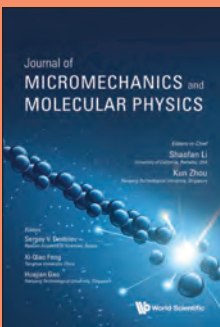
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page 20



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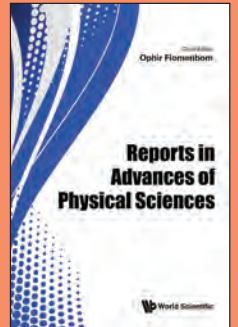
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