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Highlights

Physics Catalogue 2022

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Physics and Astronomy

C O N T E N T S

APPLIED AND TECHNICAL PHYSICS

Physics and Design of Superconducting Detectors

Millimetre and Submillimetre Wavelengths

by **Ghassan Yassin** *(University of Oxford, UK)*

Key Features:

- The book discusses both the physics and technology of modern superconducting detectors in view of their employment in millimetre and submillimetre receivers that require high performance such as astronomical telescopes
- The book is based on the works of the author who has more than 25 years of research experience and wrote numerous publications describing the physics of these detectors in both theoretical and the experimental areas
- More areas in physics and technology start to use superconducting detectors, e.g. in quantum computing and space science

400pp	**Nov 2022**	
978-981-3279-06-3	**US$148**	**£130**

World Scientific Series on Emerging Technologies: Avram Bar-Cohen Memorial Series

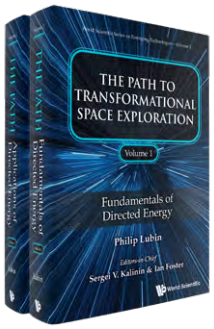
The Path to Transformational Space Exploration

(In 2 Volumes)

Volume 1: Fundamentals of Directed Energy

Volume 2: Applications of Directed Energy

by **Philip Lubin** *(University of California, Santa Barbara, USA)*



This book lays out the fundamental physics and mathematics required to radically alter our capabilities in propulsion to enable extreme high-speed space flight both in our solar system and beyond. The case is made that the only currently viable solution to enable this transformation, including relativistic flight for the first interstellar robotic missions, is using large-scale directed energy. Traditional methods of propulsion are not capable of achieving the speed required for these missions, including fast crewed missions to Mars as well as the many robotic missions desired both in our solar system and to the nearest stars. In a series of over 60 technical papers, the fundamentals of directed energy propulsion are outlined and synthesized in this book, allowing a detailed understanding of the many challenges ahead and a roadmap for human exploration far beyond our solar system. While the road ahead is long and challenging, it provides the path to radically alter humanity's future.

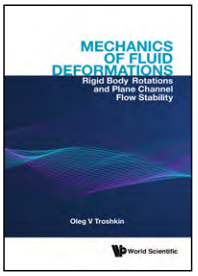
Readership: Academia and astronomy, astrophysics, physics and space science industry; advanced undergraduates.

650pp	**Mar 2022**	
978-981-124-903-7(Set)	**US$228**	**£200**

Mechanics of Fluid Deformations

Rigid Body Rotations and Plane Channel Flow Stability

by **Oleg V Troshkin** *(Russian Academy of Sciences, Russia)*



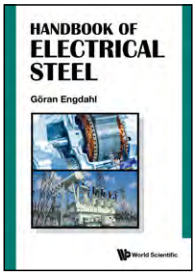
This book covers a new approach to analyzing hydrodynamic stability. With the use of standard remedies of functional analysis, theory of boundary value problems and infinitesimal Lie algebras, a stability theory is formed for plane channel flows of either viscous or ideal incompressible fluid. It is shown in the book that large vortex mushrooms of an ideal incompressible fluid in a vertical strip behind a water hammer proves to be 2D (plane-parallel) nonlinear (for arbitrary disturbances of initial velocities) and long wave stable.

Readership: Researchers interested in fluid stability, vortices in oceans, rivers, ducts.

284pp	**Apr 2021**	
978-981-123-051-6	**US$98**	**£85**

Handbook of Electrical Steel

by **Göran Engdahl** *(The KTH royal Institute of Technology, Sweden)*



This book contains all information regarding magnetism and magnetic materials that an electrical engineer needs to know to be able to understand and design magnetic devices. All chapters are written in a textbook fashion such that they can be read independently. The author begins by introducing basic electromagnetism, basic quantum mechanics, ferromagnetism and magnetic materials. The discussion then moves on to magnetic material characterization, modelling of magnetic materials, and magnetic design. In addition to major modeling techniques of magnetic materials, the book covers relevant performance criteria of electrical steels so that the appropriate type can be selected for desired applications. The final chapter offers a list of current electrical steel and magnetic material suppliers.

Readership: Electrical engineers and researchers who use magnetic materials to design electronic and electric power systems; students in electrical engineering.

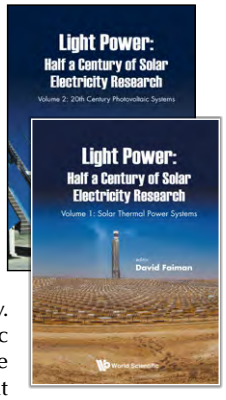
580pp	**Nov 2021**	
978-981-122-691-5	**US$178**	**£155**

Light Power: Half a Century of Solar Electricity Research

Volume 1: Solar Thermal Power Systems

Volume 2: 20th Century Photovoltaic Systems

edited by **David Faiman** *(Ben-Gurion University of the Negev, Israel)*



The 3-volume series documents half a century's development of solar power generating systems surrounding the energy crisis of 1973. Volume 1 covers solar-thermal systems. Volume 2 covers photovoltaic systems in the 20th century. The upcoming Volume 3 will cover photovoltaic developments from the start of the 21st century. The content is based on lectures given over the years at the Sede Boqer Symposia on Solar Electric Power Production, and contains many technical details that are hard to find in textbooks.

Readership: Historians, researchers, students, professionals interested and in the photovoltaic, alternative energy source industry.

Volume 1: Solar Thermal Power Systems

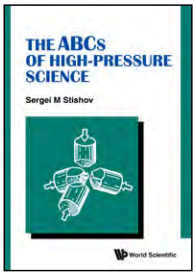
312pp	**Oct 2019**	
978-1-78634-756-5	**US$118**	**£105**

Volume 2: 20th Century Photovoltaic Systems

300pp	**Aug 2021**	
978-981-123-131-5	**US$98**	**£85**

The ABCs of High-Pressure Science

by **Sergei M Stishov** *(The P N Lebedev Physical Institute of the Russian Academy of Sciences, Russia)*



Written by the Science Supervisor at the Institute of High Pressure Physics, this book introduces the terms and concepts widely adopted in the field of high pressure science, be it about physics, geology, chemistry, or technology. It is organized in the form of short chapters or notes in alphabetical order, so a search of the necessary information is not difficult. The target audiences are graduate students and young scientists. Nevertheless, well-established scientists can also find useful information here.

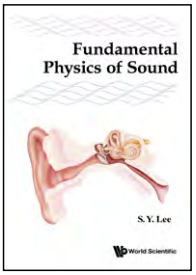
Readership: Students, scientists and engineers in geophysics, condensed matter physics, and material science who are interested in high pressure science and technology.

156pp	**Apr 2021**	
978-1-78634-955-2	**US$48**	**£40**

Textbook

Fundamental Physics of Sound

by **S Y Lee** *(Indiana University, USA)*



This is a textbook on the basic sciences of sound. Starting with simple harmonic oscillation and wave properties, the book explains the psychoacoustics of our perception of three attributes of sound: loudness, pitch and timbre. It then introduces the basic physics of some musical instruments and human voice. From the point of view of physics, musical instruments and human speech are similar, as both are composed of a sound source and a resonator. The last part covers electricity and magnetism, room acoustics and various digital technologies in acoustics. This small book is comprehensible, understandable and enjoyable to all eager students.

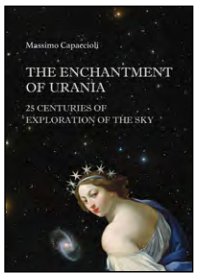
336pp	**Nov 2020**	
978-981-122-259-7	**US$98**	**£85**

ASTRONOMY, ASTROPHYSICS AND COSMOLOGY (INCLUDING GEOPHYSICS)

The Enchantment of Urania

25 Centuries of Exploration of the Sky

by **Massimo Capaccioli** *(University of Naples Federico II, Italy)*



This book narrates the evolution of astronomy in the context of the evolution of the human civilization - a progressive path, inserted in the general history, with some second thoughts and many obstacles. Our current knowledge about the sky has ancient roots. It was built by accumulating discoveries with errors, observations with fantasies, myths, and superstitions with flashes of genius, over a span of millennia, since Homo sapiens, turning his eyes to the immutable and perfect sky, began to ask questions. This saga of men and machines 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.

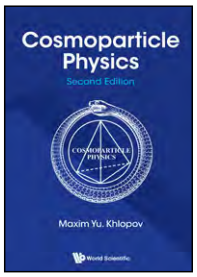
550pp	**Jan 2023**	
978-981-124-777-4	**US$98**	**£85**
978-981-124-927-3(pbk)	**US$48**	**£40**

Textbook

Cosmoparticle Physics

(2nd Edition)

by **Maxim Yu Khlopov** *(Virtual Institute of Astroparticle Physics, France, COSMION, Moscow & Moscow Engineering and Physics Institute)*



This textbook covers the basic principles of cosmoparticle physics as a specific field studying the fundamental relationships between cosmology and particle physics. One of the main topics is the development of physics beyond the Standard model (BSM physics). This second edition is updated with results from the latest research, such as the development of precision cosmology that lead to now standard ΛCDM cosmological scenario, creation of gravitational wave astronomy, controversial results of direct and indirect dark matter searches, as well as absence of positive results of searches for supersymmetric particles at the LHC together with problems of the Weakly Interacting Massive Particle (WIMP) paradigm.

Readership: Students and researchers in cosmology, high energy physics, astroparticle physics and theoretical physics.

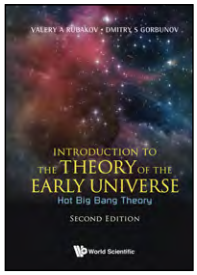
700pp	**Jan 2023**	
978-981-122-200-9	**US$168**	**£150**

Textbook

Introduction to the Theory of the Early Universe

Volume 1: Hot Big Bang Theory
Volume 2: Cosmological Perturbations and Inflationary Theory **(2nd Edition)**

by **Valery A Rubakov** *(Russian Academy of Sciences, Russia & Moscow State University, Russia)* & **Dmitry S Gorbunov** *(Russian Academy of Sciences, Russia)*



Reviews of the First Edition:

"This set of two volumes on the early universe is a truly excellent treatise on the subject. The volumes cover both particle physics and general relativity aspects systematically and in detail. The discussion is self-contained and brings out the tremendous progress that has occurred in the last 2–3 decades. It is especially refreshing to see that the hype, exaggerations and over-emphasis on fashions one often finds in discussions of modern cosmology are not necessary to make the subject lucid and fascinating. The two volumes can be used either as texts for advanced courses in cosmology or as 'handbooks" on the subject by active researchers."

Abhay Ashtekar
Pennsylvania State University

Readership: Students and researchers interested in cosmology and particle physics.

Volume 1: Hot Big Bang Theory

596pp	**Jun 2017**	
978-981-3209-87-9	**US$158**	**£139**
978-981-3209-88-6(pbk)	**US$88**	**£77**

Volume 2: Cosmological Perturbations and Inflationary Theory

550pp	**Feb 2023**	
978-981-3275-62-1	**US$168**	**£150**
978-981-3276-69-7(pbk)	**US$78**	**£70**

Supernova

The Last Flash of the Disappearing Star

by **Marco Zito** *(Sorbonne Université, France & Institute of Research into the Fundamental Laws of the Universe (IRFU), France)*

Close your eyes and imagine the last moments of a massive star, large as the Solar System. As the mass of its core approaches a fatidic value, the enormous fabric collapses. In a fraction of a second the core of the star becomes as dense as an atomic nucleus. And then a mighty outward shock wave forms. The star becoming almost as bright as the whole galaxy. This explosion is a supernova!

This book guides the reader in the discovery of these rare events, the most spectacular that the Universe can offer. Different aspects of these events are illustrated, such as their historical and scientific value and their crucial role in the evolution of the galaxy and the living organisms. It also introduces the reader to the latest research, acknowledging the lack of scientific models that accurately reproduce the explosion.

200pp	**Jan 2023**	
978-981-123-412-5	**US$58**	**£50**
978-981-123-565-8(pbk)	**US$28**	**£25**

Gamma-Rays and the Interstellar Medium

by **Yasuo Fukui** *(Nagoya University, Japan)* & **Gavin Rowell** *(University of Adelaide, Australia)*

This book focuses on the linkages between very high energy (TeV) gamma-ray astronomy and the interstellar medium, as well as the key science questions expected to be answered. Their joint study is essential if we are to understand the nature of gamma-ray emission and hence shed light on where extreme cosmic-rays and electrons are being accelerated in our galaxy. The book also include discussion on TeV neutrinos as they are intimately tied to the production of gamma-rays of similar energy.

200pp	**Dec 2022**	
978-981-3239-81-4	**US$98**	**£85**

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** *(Max Planck Institut für Kernphysik, Germany)*

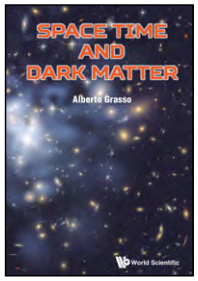
Key Features:

- A timely review of advances in high-energy astrophysics following the observations by the third generation IACTs
- An ideal textbook for senior undergraduates or beginning graduate students. It could be the one-stop-shop for an academic in related fields
- Offers the young researchers a perspective on both the experimental developments as well as the scientific advances in the last ten years, informs them about the new challenges and open questions for future work

Readership: Senior undergrads and academics in the fields of astrophysics, high energy physics and cosmology.

250pp	**Dec 2022**	
978-981-3275-71-3	**US$118**	**£105**

Space Time and Dark Matter



The Hidden Sectors of Particle Physics and Cosmology

by **Alberto Grasso** *(Italian Ministry of Education, Universities and Research, Italy)*

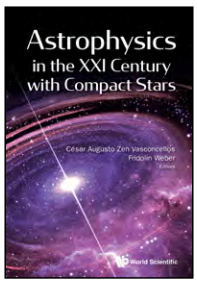
Key Features:

- Focus on dark matter phenomenology and its logic relation with the space-time symmetry's properties
- Present a robust model of the dark matter density distribution in different structures of the Universe, from the galactic to the cosmological scales
- Revisit the close connection of the "macro-" and "micro-" points of view to verify or constrain the particle physics models of the observed excess of astrophysical matter

Readership: Graduate students and researchers in the fields of astronomy, cosmology, and particle physics.

350pp	**Dec 2022**	
978-981-3276-94-9	**US$128**	**£115**

Astrophysics in the XXI Century with Compact Stars



edited by **César Augusto Zen Vasconcellos** *(Universidade Federal do Rio Grande do Sul, Brazil & ICRANet, Italy)* & **Fridolin Weber** *(San Diego State University, USA)*

Gravitational waves produced at the birth of the Universe and by compact stellar objects (supermassive black holes, black hole/neutron star mergers, gamma-ray bursts, white dwarf inspirals) have unveiled a new area of astronomy. Against this background, this book presents the use of compact stars as unique astrophysical laboratories for probing the fabric of space-time and the building blocks of matter and their interactions at physical regimes not attainable in terrestrial laboratories.

Readership: Graduate students and researchers in astrophysics and high energy physics.

300pp	**Nov 2022**	
978-981-122-093-7	**US$118**	**£105**

Advances in Planetary Science

Neutral-Atom Astronomy

Plasma Diagnostics from the Aurora to the Interstellar Medium

by **Ke Chiang Hsieh** *(University of Arizona, USA)* & **Eberhard Möbius** *(University of New Hampshire, USA)*

Particle Astrophysics, including Neutrino and Dark-Matter Astrophysics today, started with the discovery of cosmic rays in 1911. The Space Age enabled in-situ studies of space plasmas traversed by spacecraft. However, remote observation of space plasmas became possible only after the discovery of energetic neutral atom (ENAs) in space in 1950.

This book is a primer for those who wish to learn more about ENAs. It covers the evolution of the field, starting from the first encounters with ENAs in the Earth's magnetosphere, to Neutral-Atom Astronomy of the edge of the heliosphere and the interstellar medium. Related detection techniques are introduced, such as how ion mass spectrographs evolved into ENA imagers, how to extract information from ENA data, and a variety of diagnostic applications on the magnetosphere, interplanetary space, and other celestial objects. The authors also offers insights into the future of Neutral-Atom Astronomy.

295pp	**Jun 2022**	
978-981-3279-19-3	**US$98**	**£80**

Cosmic Roots

The Conflict Between Science and Religion and How it Led to the Secular Age

by **Ira Mark Egdall** *(University of Miami, USA & Nova Southeastern University, USA & Florida International University, USA)*

Cosmic Roots traces the five-thousand-year conflict between science and religion — and how it has shaped our modern secular worldview.

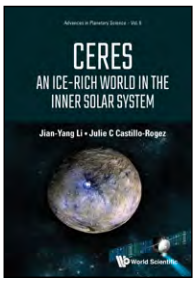
Told with rare clarity and striking insight, this fascinating and thought-provoking book focuses on the history of cosmology and astronomy. For it was discoveries within these great disciplines which first led to the conflict between science and religion. It

also traces the roots of Western religion, based on historical events and archeological evidence. The cumulative effect of the scientific discoveries presented in *Cosmic Roots* has, for better or for worse, led to the separation of science and religion we see in Western culture today.

440pp	**May 2022**	
978-981-125-138-2	**US$98**	**£80**
978-981-125-247-1(pbk)	**US$38**	**£30**

Advances in Planetary Science

Ceres



An Ice-Rich World in the Inner Solar System

by **Jian-Yang Li**, **Julie C Castillo-Rogez**

This book reviews the current state of knowledge about Ceres after the extensive scientific exploration by the Dawn mission. Starting from the discovery of Ceres and what we know about this enigmatic world before Dawn's arrival, each chapter focuses on one aspect of Ceres, including its surface composition, its geology, its interior structure, etc. Following this framework, the book addresses the astro-biological significance of Ceres. The last chapter summarizes the new questions opened by the Dawn mission and the next step to exploring the dwarf planet closest to Earth.

194pp	**Feb 2022**	
978-981-123-814-7	**US$88**	**£75**

World Scientific Series in Astrophysics

The WSPC Handbook of Astronomical Instrumentation

(In 5 Volumes)

Volume 1: Radio Astronomical Instrumentation

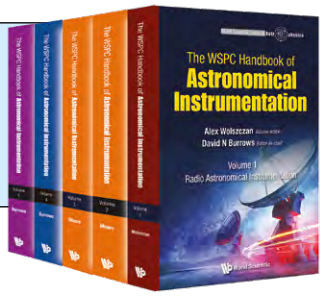
Volume 2: UV, Optical & IR Instrumentation: Part 1

Volume 3: UV, Optical & IR Instrumentation: Part 2

Volume 4: X-ray Astronomical Instrumentation

Volume 5: Gamma-Ray and Multimessenger Astronomical Instrumentation

edited by **David N Burrows** *(The Pennsylvania State University, USA)*



A comprehensive handbook of the state of the art of astronomical instrumentation with a forward view encompassing the next decade

This handbook brings together some of the leading experts in the world to discuss the frontier of astronomical instrumentation across the electromagnetic spectrum and extending into multimessenger astronomy. It assumes a working knowledge of the fundamental theory: optics, semiconductor physics, etc. It is an ideal reference for graduate students with an interest in astronomical instrumentation, as well as practitioners interested in learning about the state of the art in another wavelength band or field closely related to the one in which they currently work.

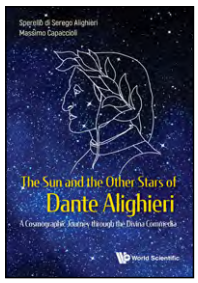
Readership: Graduate students and practioners in the field of astronomical instrumentation.

1500pp	**Jul 2021**	
978-981-4644-31-0(Set)	**US$1850**	**£1536**

The Sun and the Other Stars of Dante Alighieri

A Cosmographic Journey through the Divina Commedia

by **Sperello di Serego Alighieri** *(INAF, Osservatorio Astrofisico di Arcetri, Italy)* & **Massimo Capaccioli** *(UniversitàFederico Secondo, Italy)*



The Divine Comedy by Dante Alighieri is the story of a journey across the Universe as it was known in the Middle Ages. Dante knew astronomy very well and used it in his poem to indicate places, to measure time, to exemplify beauty. We propose a reading through astronomy with a journey starting from the Earth, proceeding to the Moon, the planets, and so on to the edges of the Universe. Be ready to be surprised by the ways in which Dante links ancient astronomy with the modern one, still astonishing after more than 700 years.

Key Features:

- One of the authors is a direct descendant of Dante
- Both authors are professional astronomers and experienced science communicators
- Explore Dante's work in a new perspective

Readership: General reader, particularly those interested in Dante and in astronomy.

200pp	**Feb 2022**	
978-981-124-549-7	**US$58**	**£50**
978-981-124-622-7(pbk)	**US$28**	**£25**

World Scientific Series in Astrophysics

The Encyclopedia of Cosmology

(In 4 Volumes)

Volume 1: Galaxy Formation and Evolution

Volume 2: Numerical Simulations in Cosmology

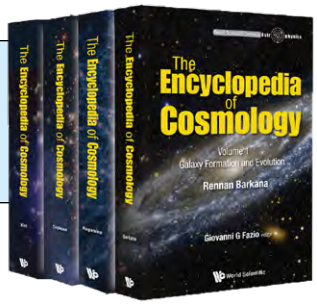
Volume 3: Dark Energy

Volume 4: Dark Matter

Editor-in-chief: **Giovanni G Fazio** *(Harvard Smithsonian Center for Astrophysics, USA)*

by **Rennan Barkana** *(Tel Aviv University, Israel)*, **Shinji Tsujikawa** *(Tokyo University of Science, Japan)* & **Jihn E Kim** *(Seoul National University, South Korea)*

edited by **Kentaro Nagamine** *(Osaka University, Japan & University of Nevada, Las Vegas, USA)*



A thorough review of the most important concepts and current status in the general field of Cosmology, covering both theory and observation

The Encyclopedia of Cosmology, in four volumes, is a major, long-lasting reference at the graduate student level, laid out by the most prominent researchers in the field. One of the attractive features of the encyclopedia is that it is accompanied by supplementary materials including videos and simulations of the numerical computation, which will help the readers to better understand and visualize the concepts discussed.

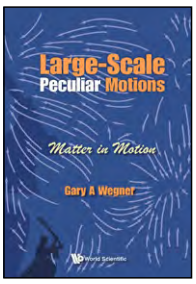
Readership: Graduate students and researchers interested in cosmology and astrophysics.

1404pp	**May 2018**	
978-981-4656-19-1(Set)	**US$1280**	**£1062**

Large-Scale Peculiar Motions

Matter in Motion

by **Gary A Wegner** *(Dartmouth College, USA)*



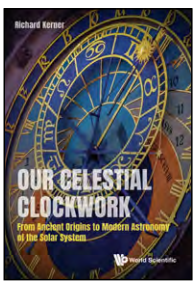
All matter, including galaxies and their constituents, follow orbits and flows driven by the net attraction of near and distant masses. The book presents the development of studies of peculiar motions along with discoveries in large-scale structure, the cosmic microwave background, baryonic oscillations, gravity waves, and their relation to current work on gravitation and dark matter. It gives a detailed coverage of peculiar motions including the distance scale, observational and bias corrections. Some prospects for future investigations are also discussed.

380pp	**Dec 2021**	
978-981-121-180-5	**US$118**	**£105**

Our Celestial Clockwork

From Ancient Origins to Modern Astronomy of the Solar System

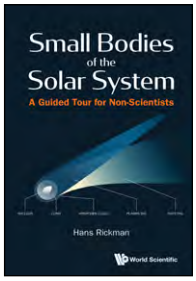
by **Richard Kerner** *(Sorbonne Université, France)*



The book describes the evolution of astronomical knowledge since the dawn of civilisation, and pays tribute to great scientists of the past with short biographies and anecdotes. The author has taken care to explain the past discoveries using mathematical and physical concepts of that time, with modern perspective added only when ancient methodology is too cumbersome. All astronomical findings are followed by simple mathematical exercises using basic knowledge, so that readers can check the assertion by themselves. The language is engaging and accessible to the general reader.

400pp	**Sep 2021**	
978-981-121-459-2	**US$85**	**£75**
978-981-121-531-5(pbk)	**US$38**	**£35**

Small Bodies of the Solar System



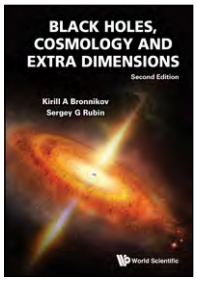
A Guided Tour for Non-Scientists
by **Hans Rickman** *(PAS Space Research Centre, Poland & Uppsala University, Sweden)*

Our solar system harbors an host of smaller, less recognised bodies in the form of comets and "minor" planets. *Small Bodies of the Solar System* paints a detailed picture of the space missions, laboratory experiments and computer experiments behind our current understanding of the comets, minor planets, meteors and meteorites. With a rich selection of pictures, this book combines personal reflection and poetic imagery with a mathematical and physical overview to introduce the reader to these small wonders of our universe.

Readership: General public, particularly those who enjoy watching documentaries and reading popular scientific magazines.

168pp	**Sep 2021**	
978-1-80061-051-4	**US$48**	**£40**
978-1-80061-060-6(pbk)	**US$28**	**£25**

Black Holes, Cosmology and Extra Dimensions



(2nd Edition)
by **Kirill A Bronnikov** *(Russian Research Institute of Metrological Service, Russia)* & **Sergey G Rubin** *(National Research Nuclear University "MEPhI", Russia)*

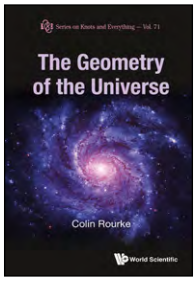
Review of the First Edition:
"... For anyone wishing to push these ideas forward and in particular for graduate students, having completed courses on standard material and looking out for possible research topics or just seeking an overview for directions going beyond the conventional, this book can be recommended."
Contemporary Physics

Assuming basic knowledge of special and general relativity, this book guides the reader to problems under consideration in modern research, concerning black holes, wormholes, cosmology, and extra dimensions. Much of the content was previously presented only in journal publications and is new for book contents. The second edition includes two new chapters on clusters of primordial black holes and multidimensional gravity. The other chapters are also updated to include new discoveries like the detection of gravitational waves.

592pp	**Jul 2021**	
978-981-123-814-7	**US$148**	**£130**

Series on Knots and Everything - Volume 71

The Geometry of the Universe



by **Colin Rourke** *(University of Warwick, UK)*

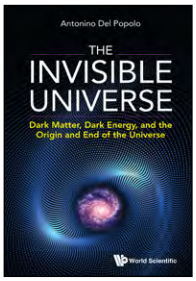
Key Features:

- Presents a completely new geometrical way of understanding the universe, without either dark matter or a big bang
- Avoids unresolved problems in current theories
- Describes the full theory thrice. The first iteration is written completely in layman's language, and the last part has full technical details for professional readers

Readership: Graduates in science or mathematics, general readership with interest in cosmology and the universe, advanced textbook suitable for postgraduate course.

276pp	**Jun 2021**	
978-981-123-386-9	**US$88**	**£75**

The Invisible Universe



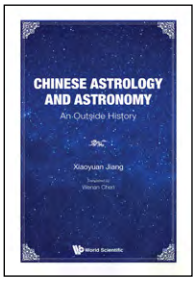
A Journey from Microcosm to Macrocosm and Return
by **Antonino Del Popolo** *(Università degli Studi di Catania, Italy)*

The text describes the story and the protagonists who showed the need for the existence of the "missing matter", and puzzles they had to solve to understand that dark matter was not ordinary matter. It recounts the hunt for dark matter, carried out with instruments operating in space and built in the bowels of the Earth. It also describes dark energy, which manifests itself in the accelerated expansion of the universe, and explains what its existence implies for the future and the end of our cosmos. The illustrations and the detailed explanation provide a deeper understanding of the subject.

Readership: Science students, professionals and general public interested in the field of astronomy.

288pp	**May 2021**	
978-981-122-943-5	**US$78**	**£70**

Chinese Astrology and Astronomy



An Outside History
by **Xiaoyuan Jiang** *(Shanghai Jiao Tong University, China)*
translated by **Wenan Chen** *(Ningbo University, China)*

This book discusses the ancient Chinese's needs and reasons for engaging in astronomy, called "Tianxue" in ancient China. It analyses the cosmological views of ancient Chinese based on ancient astronomical phenomena and manuals. The author also expounds the nature and functions of astronomy to ancient Chinese, as well as its difference from the modern astronomy, exploring new issues in a bold but logical fashion, and offering arguments that challenge even the views of authority.

332pp	**Jan 2021**	
978-981-122-345-7	**US$128**	**£115**

Cosmic Pinwheels

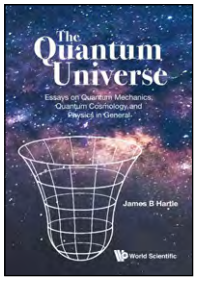
Spiral Galaxies and the Universe
by **Ronald James Buta** *(University of Alabama, USA)*

"It is strongly biased towards the author's speciality of galaxy morphology, and particularly to bars and rings. To be fair, these are often given fairly short shrift in other textbooks, so this is a useful source of detail on such topics from an expert. In addition, references to original technical papers are given throughout which makes the book a handy introduction to the literature (which students may well find useful)."
The Observatory Magazine

This book introduces lay readers and physics students alike to the world of spiral galaxies, how spirals were discovered, what they represent from a physical point of view, and what people have learned from the study of spirals. It is profusely illustrated and not only a discourse on the spirals, but is also a personal reminiscence based on the author's studies of spiral galaxies over the past 45 years.

488pp	**Nov 2020**	
978-981-121-668-8	**US$108**	**£95**
978-981-121-747-0(pbk)	**US$58**	**£50**

The Quantum Universe

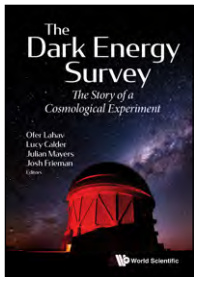


Essays on Quantum Mechanics, Quantum Cosmology and Physics in General
by **James B Hartle** *(University of California at Santa Barbara, USA)*

As physics has progressed, its fundamental theories have become more distant from everyday experience, posing challenges for understanding, the most notable example being quantum mechanics. To address such challenges, the author explains in 29 essays the pressing questions in quantum mechanics, quantum cosmology and physics in general. Examples include: How do we apply quantum mechanics to the whole universe when all observers are inside? What do we mean by past, present, and future in a four-dimensional universe? The essays vary in length, style, and level but should be accessible to most physicists.

400pp	**Jan 2021**	
978-981-121-639-8	**US$108**	**£95**

The Dark Energy Survey



The Story of a Cosmological Experiment
edited by **Ofer Lahav** *(University College London, UK)*, **Lucy Calder** *(University College London, UK)*, **Julian Mayers** *(University of Sussex, UK)* & **Josh Frieman** *(Fermi National Accelerator Laboratory, USA & University of Chicago, USA)*

"This book summarizes all there is to know about the Dark Energy Survey (DES), the primary objective of which is to understand the nature and potential evolution of dark energy. With observations spanning 2012 to 2019, the survey photometrically characterized many millions of objects in the sky. … The book offers, however, a much wider view of the survey, including its inception, planning and running, science beyond cosmology, and even anthropological, philosophical and artistic reflections on the DES."

Nature Astronomy

"This is a fascinating read for anyone interested in how big science is undertaken. The book focuses more on the survey itself rather than dark energy as a phenomenon. It encapsulates the ambitions, disappointments, struggles and eventual success of an international scientific endeavour."

Richard Ellis
University College London

444pp	**Sep 2020**	
978-1-78634-835-7	**US$128**	**£115**

MORE RECOMMENDED TITLES

Introduction to General Relativity and Cosmology
by **Christian G Böhmer** *(University College London, UK)*
9781786341181

A Brief History of Astronomy and Astrophysics
by **Lang K R** *(Tufts University, USA)*
9789813235199

An Introduction to Particle Dark Matter
by **Profumo S** *(UC Santa Cruz & Santa Cruz Institute for Particle Physics, USA)*
9781786340016

Astronomical Spectroscopy
An Introduction to the Atomic and Molecular Physics of Astronomical Spectroscopy **(3rd Edition)**
by **Jonathan Tennyson** *(University College London, UK)*
9781786347077

A Superfluid Universe
by **Huang K** *(MIT)*
9789813148451

An Introduction to Black Holes, Information and the String Theory Revolution
The Holographic Universe
by **Leonard Susskind** *(Stanford University, USA)* & **James Lindesay** *(Howard University, USA)*
9789812561312

BIOPHYSICS, BIOLOGICAL AND MEDICAL PHYSICS

Textbook

World Scientific Lecture Notes in Complex Systems - Vol 13

Lectures on Cellular Biophysics

From Molecules to Tissues
by **Jaume Casademunt** *(University of Barcelona, Spain)* & **Ricard Alert** *(Princeton University, USA)*

Key Features:

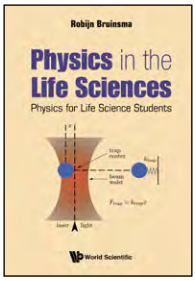
- Develops a physical approach to biological processes that aims at a quantitative understanding of fundamental mechanisms
- Emphasizes on mechanics (rather than biochemistry), from molecular force generation to collective cell migration
- Pedagogical presentation based on a successful Master-level course on cellular biophysics at the University of Barcelona
- Contains an extensive range of problems with solutions

Readership: Graduate students and researchers in biophysics.

400pp	**May 2023**	
978-981-3275-84-3	**US$148**	**£130**

Textbook

Physics in the Life Sciences



Physics for Life Science Students
by **Robijn Bruinsma** *(University of California, Los Angeles, USA)*

This book provides undergraduate life science students taking a general physics class with knowledge of physics that is *directly relevant* to the life sciences. It develops the basic concepts of physics in a manner that they can be directly used to explain the "engineering" of living organisms, from the operation of the skeleton to the interaction between DNA and proteins. Topics such as the physics of statics, elasticity, fluids, and physical chemistry that are rich in life-science applications are emphasized. A clear understanding of this material should provide students with a solid foundation for future biochemistry, molecular biology, and physiology studies.

Readership: Students and instructors of a physics class in a life science setting

400pp	**Dec 2022**	
978-981-3279-11-7	**US$118**	**£105**
978-981-120-130-1(pbk)	**US$58**	**£50**

MORE RECOMMENDED TITLES

The Physics of Living Matter: Space, Time and Information: Proceedings of the 27th Solvay Conference on Physics
edited by **Gross D** *(University of California at Santa Barbara)*, **Sevrin A** *(Vrije Universiteit Brussel, Belgium & International Solvay Institutes, Belgium)* & **Shraiman B** *(University of California at Santa Barbara)*
9789813239241

Biophotonics: Science and Technology
by **Yeh Y** *(University of California, Davis, USA)* & **V V Krishnan** *(California State University, Fresno, USA & University of California, Davis, USA)*
9789813235687

Quantum Aspects of Life
edited by **Derek Abbott** *(University of Adelaide, Australia)*, **Paul C W Davies** *(Arizona State University, USA)* & **Arun K Pati** *(Institute of Physics, Orissa, India)*
9781848162679

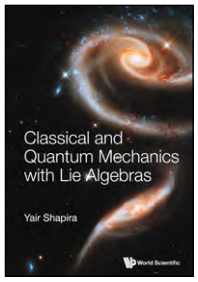
Lectures on Statistical Physics and Protein Folding
by **Kerson Huang** *(Massachusetts Institute of Technology)*
9789812561503

CLASSICAL MECHANICS

Textbook

Classical and Quantum Mechanics with Lie Algebras

by **Yair Shapira** *(Technion - Israel Institute of Technology, Israel)*



How to see physics in its full picture? This book offers a new approach: start from math, in its simple and elegant tools: discrete math, geometry, and algebra, avoiding heavy analysis that might obscure the true picture. This book introduces just enough calculus, linear algebra, and discrete math, and immediately uses them to develop the theory in physics. Thanks to simple math, both classical and modern physics follow and make a complete vivid picture of physics. This approach will take the reader to master a few fundamental topics in physics in an active and integral way: from Newtonian mechanics, through relativity, towards quantum mechanics.

Readership: Undergraduate and graduate students in Mathematics, Physics, and Chemistry.

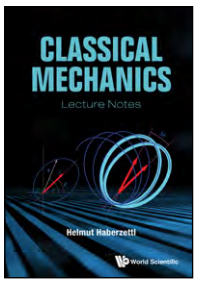
712pp	**Aug 2021**	
978-981-124-005-8	**US$178**	**£155**
978-981-124-145-1(pbk)	**US$78**	**£70**

Textbook

Classical Mechanics

Lecture Notes

by **Helmut Haberzettl** *(The George Washington University, USA)*



This textbook provides lecture materials of a comprehensive course in *Classical Mechanics* developed by the author over many years with input from students and colleagues alike. The richly illustrated book covers all major aspects of mechanics starting from the traditional Newtonian perspective, over Lagrangian mechanics, variational principles and Hamiltonian mechanics, rigid-body, and continuum mechanics, all the way to deterministic chaos and point-particle mechanics in special relativity. Derivation steps are worked out in detail, illustrated by examples, with ample explanations.

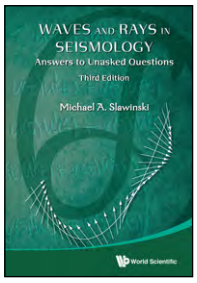
384pp	**Jun 2021**	
978-981-123-827-7	**US$98**	**£85**
978-981-123-849-9(pbk)	**US$48**	**£40**

Waves and Rays in Seismology

Answers to Unasked Questions

(3rd Edition)

by **Michael A Slawinski** *(Memorial University, Canada)*



Reviews of the Second Edition:

"This one-of-a-kind book is refreshing in its presentation of an amazing blend of fundamental scientific and philosophical questions with their practical implications to concrete examples in Seismology. It is refined in its style, in the sophistication of its quotes, in the breadth of its sources and in the many details that reveal a labour of love."

Marcelo Epstein, University of Calgary, Canada

650pp	**Dec 2020**	
978-981-122-643-4	**US$188**	**£165**

Related Titles on Seismology by Michael A Slawinski

Waves and Rays in Elastic Continua (4th Edition)

680pp	**Oct 2020**	
978-981-122-640-3	**US$188**	**£165**

Wavefronts and Rays as Characteristics and Asymptotics (3rd Edition)

co-authored with **Andrej Bóna** *(Curtin University, Australia)*

356pp	**Dec 2020**	
978-981-122-646-5	**US$128**	**£115**

Major American Universities Ph.D. Qualifying Questions and Solutions - Physics

Problems and Solutions on Mechanics (2nd Edition)

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

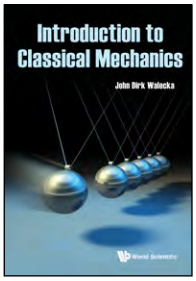
This volume is a compilation of carefully selected questions at the PhD qualifying exam level, including many actual questions from Columbia University, University of Chicago, MIT, etc. over a twenty-year period. Topics covered in this book include dynamics of systems of point masses, rigid bodies and deformable bodies, Lagrange's and Hamilton's equations, and special relativity. The problems range from fundamental to advanced in a wide range of topics on mechanics, easily enhancing the student's knowledge through workable exercises.

712pp	**Jul 2020**	
978-981-121-340-3	**US$148**	**£130**
978-981-121-445-5(pbk)	**US$68**	**£60**

Textbook

Introduction to Classical Mechanics

by **John Dirk Walecka** *(College of William and Mary, USA)*



Key Features:

- Provides a clear, self-contained, calculus-based introduction to classical mechanics for first-year undergraduates
- Takes one from Newton's law to Hamilton's principle of stationary action and Lagrangian continuum mechanics in a relatively concise presentation
- Contains an extensive set of accessible problems that enhances and extends the coverage. Detailed solutions are provided in a separate manual.

184pp	**Apr 2020**	
978-981-121-743-2	**US$78**	**£70**
978-981-121-823-1(pbk)	**US$38**	**£35**

Solutions to Problems

152pp	**Oct 2020**	
978-981-122-494-2	**US$78**	**£70**
978-981-122-762-2(pbk)	**US$38**	**£35**

CLASSIC TEXTBOOKS

Classical Mechanics (5th Edition)

by **Kibble T W B** *(Imperial College London, UK)* & **Berkshire F H** *(Imperial College London, UK)*

9781860944352

Classical Mechanics and Electrodynamics

by **Leinaas J M** *(University of Oslo, Norway)*

978-981-3279-98-8

Fundamental Principles of Classical Mechanics

A Geometrical Perspective

by **Lam K S** *(California State Polytechnic University, Pomona, USA)*

978-981-4551-48-9

An Introduction to Lagrangian Mechanics (2nd Edition)

by **Brizard A J** *(Saint Michael's College, USA)*

9789814623629

Lectures on Classical Mechanics

by **Berthold-Georg Englert** *(NUS, Singapore)*

376pp	**Apr 2015**	
978-981-4678-44-5	**US$99**	**£82**
978-981-4678-45-2(pbk)	**US$48**	**£40**

COMPUTATIONAL, MATHEMATICAL AND THEORETICAL PHYSICS

Textbook

A Mathematics Primer for Physics Students

by **Andrew E Blechman** *(Wayne State University, USA)*

Key Features:

- Covers mathematical methods needed in advanced undergraduate or early graduate physics studies
- Includes a wide range of topics: linear algebra, vector and tensor analysis, geometric tools such as metrics and curvature, mathematical groups, etc., avoiding the need to get several books or plow through more advanced texts.
- Emphasizes on examples that you would see in physics problems with less formalism and proof, suitable for students who are not necessarily studying the pure mathematics

300pp	**Sep 2022**	
978-981-3238-01-5	**US$78**	**£69**

Textbook

Quantum Field Theory, Quantum Physics and Micro-Macro Duality

by **Izumi Ojima** *(Research Origin for Dressed Photon, Japan)*, **Kazuya Okamura** *(Nagoya University, Japan)* & **Hayato Saigo** *(Nagahama Institute of Bio-Science and Technology, Japan)*

This book provides a totally new framework of theoretical and mathematical understanding of various natural and technological phenomena based on category theory. According to the fundamental concept "adjunctions" in category theory, the Micro and Macro in nature can be connected in a coherent way, which facilitate deep understanding and satisfactory solution of many important problems in quantum theory.

Readership: Graduate students and researchers in quantum theory, mathematical physics, neural networks, pattern recognition.

300pp	**Feb 2023**	
978-981-3238-36-7	**US$98**	**£86**

Textbook

Theoretical Physics in Your Face

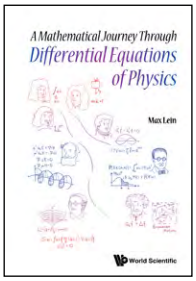
Selected Correspondence of Sidney Coleman

by **Aaron S Wright** *(Dalhousie University, Canada)*, **Diana Coleman** & **David Kaiser** *(Massachusetts Institute of Technology, USA)*

Sidney Coleman was a renowned theoretical physicist, who contributed critical work on quantum field theory, high-energy particle physics, and cosmology. He was also a remarkably effective teacher who mentored generations of physicists. This selection of his previously unpublished correspondence illuminates changes in theoretical physics and in academic life over the course of Coleman's illustrious career. The letters show the depth of Coleman's activities and interests, including science fiction, space travel, and the US counter culture. The volume also includes for the first time in print Coleman's legendary lecture "Quantum Mechanics in Your Face."

450pp	**Sep 2022**	
978-981-120-135-6	**US$98**	**£85**
978-981-120-204-9(pbk)	**US$48**	**£40**

Textbook

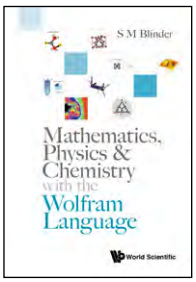


A Mathematical Journey Through Differential Equations of Physics

by **Max Lein** *(Tohoku University, Japan)*

Mathematics is the language of physics, and over time physicists have developed their own dialect. This book bridges this language barrier, showcasing conceptual and mathematical commonalities across different physical theories. The author translates physical problems to concrete mathematical questions, shows how to answer them and explains how to interpret the answers physically. For example, if two Hamiltonians are close, why are their dynamics similar? With plenty of concrete examples and 76 exercises with solutions, this book can be used as a reference in mathematical physics courses to illustrate non-trivial cases where mathematics and physics augment one another.

440pp	**Jun 2022**	
978-981-122-537-6	**US$118**	**£105**
978-981-122-766-0(pbk)	**US$68**	**£60**



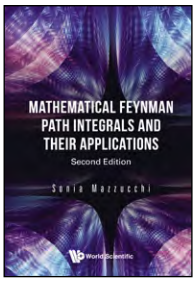
Mathematics, Physics & Chemistry with the Wolfram Language

by **S M Blinder** *(University of Michigan, USA & Wolfram Research, USA)*

"This book will be of great help for instructors teaching math, physics and chemistry classes. While the topics covered can be found in other textbooks, the uniqueness of this book lies in translating them into interactive Mathematica code. This makes it possible for students and instructors to interact with the problem dynamically in a manner that is not possible when using more traditional graphical aids. This compute-to-learn approach can be thought of as a form of active learning. In the process, it also provides an intuitive learn-by-example way of teaching the reader how to use coding in order to solve and provide graphic interpretation for a wide range of mathematical and scientific problems."

Eitan Geva
Professor, University of Michigan, USA

500pp	**Mar 2022**	
978-981-124-718-7	**US$148**	**£120**



Mathematical Feynman Path Integrals and Their Applications

Second Revised and Enlarged Edition

by **Sonia Mazzucchi** *(University of Trento, Italy)*

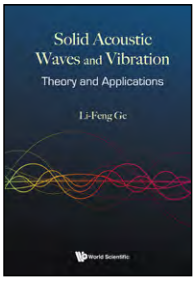
Reviews of the First Edition:
"This book is written clearly, with great detail, and is accessible to graduate students and researchers alike."

Zentralblatt MATH

This book provides an extensive and self-contained description of the mathematical theory of Feynman path integration, from the earlier attempts to the latest developments, as well as its applications to quantum mechanics. This book bridges between the realm of stochastic analysis and the theory of Feynman path integration, and is accessible to mathematicians and physicists alike.

300pp	**Dec 2021**	
978-981-121-478-3	**US$68**	**£60**

Solid Acoustic Waves and Vibration

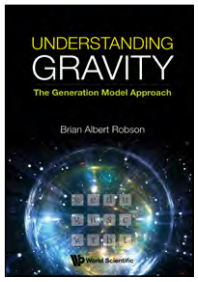


Theory and Applications
by **Li-Feng Ge** *(Anhui University, China)*

This book discusses solid acoustic waves and vibration that are key to the modelling of micro- and nano-electromechanical systems (MEMS and NEMS). It is a summary of the author's long-term research and provides an excellent description combining theory and application. Micro-diaphragms are modeled by a plate in tension and mounted on air-spring, a general TDK equation of vibration of plates, including free, forced and damped vibrations, and its solutions are developed. The principle of electromechanical transducers is elucidated profoundly. The author also describes relevant applications such as micromachined capacitive ultrasonic transducers (mCUTs, CMUTs) for biomedical imaging and ultrasonic mass resonators (mUMRs) for biochemical sensing, including plate-type, beam-type, nanowire, bulk-wave, LAW and SAW delay-line ultrasonic resonators. This interdisciplinary book will be increasingly attractive as MEMS and NEMS technology develop.

436pp **Oct 2021**
978-981-123-500-9 **US$148** **£130**

Understanding Gravity

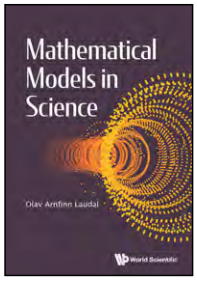


The Generation Model Approach
by **Brian Albert Robson** *(Australian National University, Australia)*

At present, one of the deepest problems in theoretical physics is harmonizing General Relativity, which describes gravitation, with quantum mechanics, which describes the other three fundamental forces acting on the atomic scale. This book aims to provide an understanding of gravity in terms of a quantum theory given by the Generation Model, an alternative to the Standard Model of particle physics. The author presents a fully quantum theory of gravity, which describes both the large cosmological scale and the small atomic scale interactions between all particles.

200pp **Jul 2021**
978-981-121-491-2 **US$88** **£75**

Mathematical Models in Science



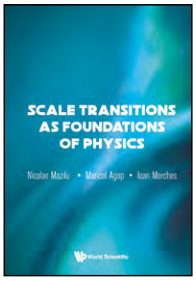
by **Olav Arnfinn Laudal** *(University of Oslo, Norway)*

Mathematical Models in Science treats General Relativity and Quantum Mechanics in a non-commutative Algebraic Geometric framework. It will be of value to researchers in most fields of mathematics and theoretical physics and serves as an entry point to PhD students or post-docs interested in the application of non-commutative algebraic geometry in physics.

Based on ideas first published in *Geometry of Time-Spaces: Non-commutative Algebraic Geometry Applied to Quantum Theory* (World Scientific, 2011), Olav Arnfinn Laudal proposes a Toy Model as a Theory of Everything, starting with the notion of the Big Bang in Cosmology, modeled as the non-commutative deformation of a thick point. One may develop within the model much of the physics known to the reader. In particular, this theory is applicable to the concept of Dark Matter and its effects on our visual universe.

320pp **Jun 2021**
978-1-80061-027-9 **US$98** **£85**

Scale Transitions as Foundations of Physics



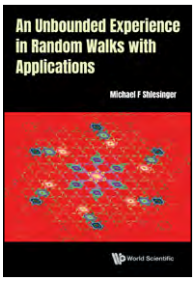
by **Ioan Merches** *(Al I Cuza University, Romania)*, **Maricel Agop** *(Asachi Technical University, Romania)* & **Nicolae Mazilu** *(Institute for Nuclear Research, Russia)*

The scale transitions are essential to physical knowledge. The book describes the techniques for the construction of a theoretical physics founded on scale transition. The indispensable mathematical technique is analyticity, helping in the construction of space coordinate systems. The indispensable theoretical technique from physical point of view is the affine theory of surfaces. The connection between the two techniques is provided by a duality in defining the physical properties.

Readership: Graduate students and researchers in Physics, Mathematics and Engineering.

358pp **Feb 2021**
978-981-123-186-5 **US$128** **£115**

An Unbounded Experience in Random Walks with Applications



by **Michael F Shlesinger**

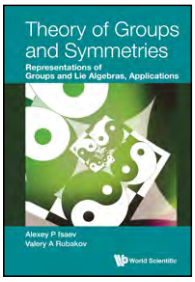
"Michael Shlesinger has provided a compelling personal and scientific account of a remarkable career a nd at the same time has presented a highly pedagogical and accessible account of many topics related to probability, random walks and complex systems. This would be a valuable book for everyone interested in learning about a personal view of life of a scientist as well as mathematical aspects of random walks and related subjects."

Fereydoon Family
Samuel Candler Dobbs Emeritus Professor of Physics
Emory University

216pp **Jun 2021**
978-981-123-280-0 **US$78** **£70**

Textbook

Theory of Groups and Symmetries



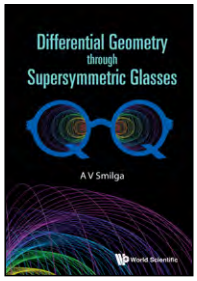
Representations of Groups and Lie Algebras, Applications
by **Alexey P Isaev** *(Joint Institute for Nuclear Research, Dubna, Russia & M V Lomonosov Moscow State University, Russia)* & **Valery A Rubakov** *(Russian Academy of Sciences, Russia & M V Lomonosov Moscow State University, Russia)*

This book is a sequel to the book by the same authors titled *Theory of Groups and Symmetries: Finite Groups, Lie Groups, and Lie Algebras*. The presentation begins with the Dirac notation, which is illustrated by boson and fermion oscillator algebras and also Grassmann algebra. Then, finite-dimensional representations of various groups and their Lie algebras are presented. Finally, the covering groups Spin(p, q) for pseudo-orthogonal groups $SO^{\uparrow}(p, q)$ are studied.

Readership: Graduate students and researchers in theoretical physics and mathematical physics.

616pp **Aug 2020**
978-981-121-740-1 **US$178** **£155**

Differential Geometry through Supersymmetric Glasses



by **A V Smilga** *(University of Nantes, France)*

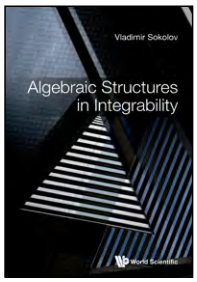
"Professor Smilga has contributed in many of these developments and the book has been written by expert hands. The reader will navigate through the theory of Special Geometric Structures explained both from traditional Differential Geometry and Supersymmetry points of view. The material is clearly exposed and illustrated with many pictures, a pleasant feature for an advanced textbook. This book is essential reading for those that want to understand the fascinating relation between Geometry and Supersymmetry."

Georgios Papadopoulos
King's College London, UK

It comprises three parts: The first, GEOMETRY, gives basic information on the geometry of real, complex, hyper-Kaehler and HKT manifolds, and is principally addressed to the physicist. The second part "PHYSICS" presents information on classical mechanics with ordinary and Grassmann dynamics variables. Besides, the author introduces supersymmetry and dwells in particular on the representation of supersymmetry algebra in superspace. And the last and most important part of the book "SYNTHESIS", is where the ideas borrowed from physics are used to study purely mathematical phenomena.

348pp **Jul 2020**
978-981-120-677-1 **US$118** **£105**

Algebraic Structures in Integrability



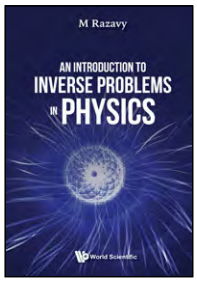
Foreword by Victor Kac
by **Vladimir Sokolov** *(Landau Institute for Theoretical Physics, Russia)*

Fundamental exactly integrable systems often have applications in theoretical physics. This book introduces the theory of classical integrable systems for scientists with algebraic inclinations. For newcomers to the field, the book can serve as a starting point in the study of many aspects of integrability, while professional algebraists will be able to use some examples of algebraic structures, which appear in the theory of integrable systems, for wide-ranging generalizations.

348pp **Jul 2020**
978-981-121-964-1 **US$138** **£120**

Textbook

An Introduction to Inverse Problems in Physics



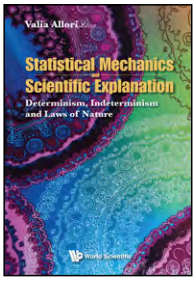
by **M Razavy** *(University of Alberta, Canada)*

This book is a compilation of different methods of formulating and solving inverse problems in physics from classical mechanics to the potentials and nucleus-nucleus scattering. The emphasis here is on finding numerical solutions to complicated equations. A detailed discussion is presented on the use of continued fractional expansion, its power and its limitation as applied to various physical problems. In particular, the inverse problem for discrete form of the wave equation is given a detailed exposition and applied to atomic and nuclear scattering. This technique is also used for inverse problem of geomagnetic induction and one-dimensional electrical conductivity. Among other topics covered are the inverse problem of torsional vibration, and also a chapter on the determination of the motion of a body with reflecting surface from its reflection coefficient.

Readership: Graduate students and researchers in mathematical and applied physics.

388pp **Jul 2020**
978-981-122-166-8 **US$118** **£105**

Statistical Mechanics and Scientific Explanation



Determinism, Indeterminism and Laws of Nature
edited by **Valia Allori** *(Northern Illinois University, USA)*

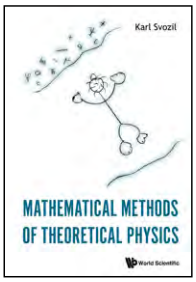
The book explores several open questions in the philosophy and the foundations of statistical mechanics. Each chapter is written by a leading expert in philosophy of physics and/or mathematical physics. The questions addressed in the book are, to mention a few examples: "How can one extend Boltzmann's analysis to the quantum domain? Can indeterminism help or it does not play a fundamental role?" and "Statistical mechanics has two main formulations: one due to Boltzmann and the other due to Gibbs. What is the connection between the two formulations? Is one more fundamental than the other?"

Readership: Graduate and research level students and professional in mathematical physics, statistical mechanics, quantum theory and physics.

700pp **May 2020**
978-981-121-171-3 **US$168** **£150**

Textbook

Mathematical Methods of Theoretical Physics



by **Karl Svozil** *(Vienna University of Technology (TU Wien), Austria)*

This book contains very detailed proofs and demonstrations of common mathematical methods used in theoretical physics. It combines and unifies many expositions of the subject and thus is accessible to a very wide range of students, such as those interested in experimental and applied physics. The content is divided into three parts: linear vector spaces, functional analysis and differential equations.

332pp **Mar 2020**
978-981-120-840-9 **US$78** **£70**

CLASSIC TITLES

Mathematics for Physics: An Illustrated Handbook
by **Marsh A**
9789813233911

PT Symmetry: In Quantum and Classical Physics
by **Carl M Bender** *(Washington University in St. Louis, USA)*
9781786346681

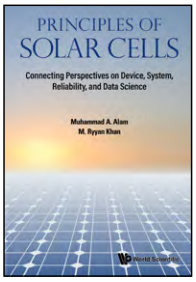
A Guide to Mathematical Methods for Physicists:
With Problems and Solutions
by **Petrini M** *(UniversitéPierre et Marie Curie, France)*,
Pradisi G *(University of Rome Tor Vergata, Italy)* &
Zaffaroni A *(University of Milano-Bicocca, Italy)*
9781786343444

Group Theory in Physics: A Practitioner's Guide
by **Campoamor-Stursberg R** *(Universidad Complutense de Madrid, Spain)* & **Traubenberg M R** *(Universitéde Strasbourg, CNRS, IPHC, France)*
9789811221279

Path Integrals in Quantum Mechanics, Statistics, Polymer Physics, and Financial Markets
(5th Edition)
by **Kleinert H** *(Freie Universität Berlin, Germany)*
9789814273565

CONDENSED MATTER PHYSICS

Principles of Solar Cells



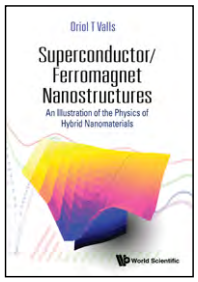
Connecting Perspectives on Device, System, Reliability, and Data Science
by **Muhammad A Alam** & **M Ryyan Khan**
(Purdue University, USA)

Written in a conversational style and with over one-hundred homework problems, this book connects the theory of electron-photon interaction at the molecular level to the design of kilometers-long solar farms. Starting from the basic physics and performance limits of solar cells, the author utilizes concepts from system science and data science to illustrate the design of efficient and reliable solar farms. Collaborations across multiple disciplines make photovoltaics real and given the concern about reducing the overall cost of solar energy, this interdisciplinary book is essential reading for anyone interested in photovoltaic technology.

Readership: Advanced undergraduate, beginning graduate students and researchers in physics and engineering working in academia, industry, and national laboratories across the world.

450pp	**Apr 2022**	
978-981-123-153-7	**US$138**	**£120**
978-981-123-302-9(pbk)	**US$68**	**£60**

Superconductor/Ferromagnet Nanostructures



An Illustration of the Physics of Hybrid Nanomaterials
by **Oriol T Valls** *(University of Minnesota, USA)*

This book offers a complete introduction to the fascinating topic of Superconductor/Ferromagnet (S/F) layered nanostructures. These structures are eminent, suitable candidates for many switching devices, ranging from non-volatile low-power memory to quantum computing architectures.

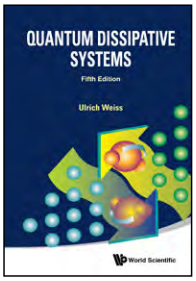
The author describes the basic physics of S/F nanostructures, focusing on their rich properties arising from the proximity effects. A particular focus is to explain how their equilibrium and transport properties can be accurately calculated starting from a standard BCS type Hamiltonian. The techniques, including both analytical and numerical methods, are discussed in detail.

Readership: Graduate students and researchers in spintronics, heterostructures and nanomaterials; quantum computing scientists.

280pp	**Feb 2022**	
978-981-124-956-3	**US$98**	**£85**

Textbook

Quantum Dissipative Systems (5th Edition)



by **Ulrich Weiss** *(University of Stuttgart, Germany)*

This is the worldwide leading textbook on dissipative quantum mechanics and related issues in condensed matter physics starting from first principles. Carefully maintained since 1992, it covers the fundamentals of decoherence, relaxation and dissipation in open quantum systems, which lead to potential applications in other areas such as quantum state engineering and quantum computing. The 5th edition builds on its tradition of clarity and topicality by carefully revising most chapters and adding 4 new chapters on recent developments in the field.

608pp	**Oct 2021**	
978-981-124-313-4	**US$198**	**£175**
978-981-124-149-9(pbk)	**US$98**	**£85**

Memorial Volume for Shoucheng Zhang

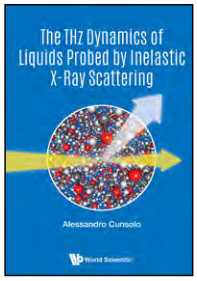
edited by **Biao Lian** *(Princeton University, USA)*, **Chao Xing Liu** *(Pennsylvania State University, USA)*, **Eugene Demler** *(Harvard University, USA)*, **Steven Kivelson** *(Stanford University, USA)* & **Xiaoliang Qi** *(Stanford University, USA)*

This book honors the remarkable science and life of Shoucheng Zhang, a condensed matter theorist known for his work on topological insulators, the quantum Hall effect, spintronics, superconductivity, and other fields. It contains the contributed articles and displayed items at the Shoucheng Zhang Memorial Workshop held on May 2 – 4, 2019 at Stanford University.

Readership: Students and professionals interested in condensed matter physics and the work of Shoucheng Zhang.

400pp	**Sep 2021**	
978-981-123-170-4	**US$98**	**£85**

The THz Dynamics of Liquids Probed by Inelastic X-Ray Scattering

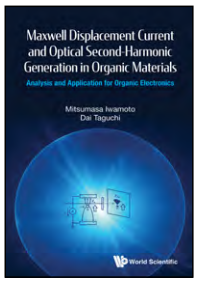


by **Alessandro Cunsolo** *(University of Wisconsin-Madison, USA)*

The book provides an exhaustive account of all available investigations of the high frequency dynamics of liquids performed by Inelastic X-Ray Scattering (IXS). It starts with an historical overview and the theoretical foundations of IXS; then moves forward to the theoretical frameworks necessary to interpret IXS experiments, such as memory function approaches and mode-coupling theories. The last part of this book reviews the application of IXS to the study of liquid materials and the results obtained across the years.

250pp	**Jul 2021**	
978-981-3229-48-8	**US$98**	**£86**

Maxwell Displacement Current and Optical Second-Harmonic Generation in Organic Materials



Analysis and Application for Organic Electronics
by **Mitsumasa Iwamoto** & **Dai Taguchi**
(Tokyo Institute of Technology, Japan)

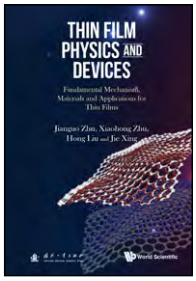
The probing and modeling of carrier transport in materials is a fundamental research subject in electronics and materials science. According to the Maxwell electromagnetic field theory, there are two kinds of currents, i.e., conduction current and Maxwell displacement current (MDC). It is therefore anticipated that we can probe and model carrier transport in materials in terms of "MDC". In other words, we can find a novel way for modeling and analyzing materials on the basis of the dielectric physics approach.

This book shows the conceptual idea of using Maxwell displacement current (MDC) and optical second-harmonic generation (SHG) to study carrier transport mechanism of solids. Besides dielectric phenomena like charging and discharging, dielectric physics approach for studying new materials and organic electronic devices, such as molecular films, is shown theoretically and experimentally.

Readership: Students and experts in the field of condensed matter physics, materials science and electrical & electronic engineering.

512pp	**Jun 2021**	
978-981-123-694-5	**US$158**	**£140**

Textbook



Thin Film Physics and Devices

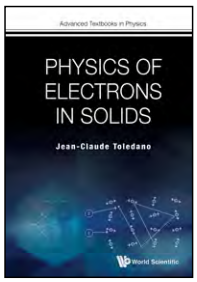
Fundamental Mechanism, Materials and Applications for Thin Films

by **Jianguo Zhu**, **Dingquan Xiao** & **Jiliang Zhu** *(Sichuan University, China)*

A systematic treatment of this increasingly interdisciplinary field, this book sets off to inform the basics of thin film physics and thin film devices. Readers are introduced to the synthesis, processing and application of thin films; they will also study the formation of thin films, their structure and defects, and their various properties — mechanical, electrical, semiconducting, magnetic, and superconducting. This book is effective as a textbook or reference material. The original Chinese version has been used as a key text across many universities and colleges in China.

517pp **Jun 2021**
978-981-122-398-3 **US$128** **£115**

Textbook



Advanced Textbooks in Physics

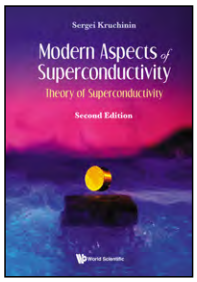
Physics of Electrons in Solids

by **Jean-Claude Toledano** *(École Polytechnique, France)*

Based on an introductory course taught to undergraduate students on solid state physics, this book explains the properties of solids through the study of non-interacting electrons in solids. It contains a qualitative introduction to the main ideas behind solid state physics, while providing detailed calculations of utmost importance to graduate students.

The introductory chapters contain crystallographic and quantum prerequisites. The central chapters are devoted to the quantum states of an independent electron in a crystal and to the equilibrium properties of conductors, insulators, and semiconductors. The final chapters contain insights into the assumptions made throughout, briefly describing the origin of ferromagnetism and superconductivity. The last 60 pages of this book contain exercises with solutions.

320pp **Jun 2021**
978-1-78634-972-9 **US$108** **£95**



Modern Aspects of Superconductivity

Theory of Superconductivity **(2nd Edition)**

by **Sergei Kruchinin** *(Bogolyubov Institute for Theoretical Physics, Kyiv, Ukraine)*

Reviews of the First Edition:

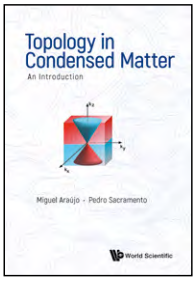
"This book is devoted to superconductivity, which is one of the most interesting problems in physics. In accordance with the outline of the book, it treats the key problems in the field of superconductivity, in particular, it discusses the mechanism(s) of superconductivity. This book is useful for researchers and graduate students in the fields of solid state physics, quantum field theory, and many-body theory."

K H Bennemann
Institut für Theoretische Physik, Berlin, Germany

Contents: Theory of Superconductivity; Physics of High-T_c Superconductors; Iron Superconductors; Multiband Superconductivity; Nanoscale Superconductivity; Summary and Conclusions

308pp **Apr 2021**
978-981-123-451-4 **US$108** **£95**

Textbook



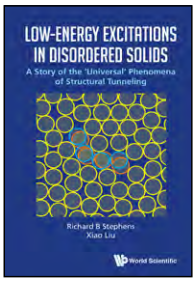
Topology in Condensed Matter

An Introduction

by **Miguel Araújo** *(University of Évora, Portugal)* & **Pedro Sacramento** *(University of Lisbon, Portugal)*

This text serves as a pedagogical introduction to the theoretical concepts on application of topology in condensed matter systems. It contains an introduction to basic concepts of topology, emphasizes the relation of geometric concepts such as the Berry phase to topology. The authors then describe two basic systems: topological insulators and topological superconductors, before moving on to review topological spin systems and photonic systems. They also describe the use of quantum information concepts in the context of topological phases and phase transitions, and the effect of non-equilibrium perturbations on topological systems.

276pp **May 2021**
978-981-123-721-8 **US$98** **£85**



Low-Energy Excitations in Disordered Solids

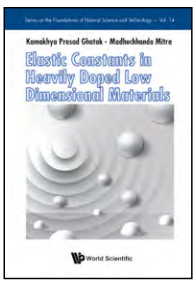
A Story of the 'Universal' Phenomena of Structural Tunneling

by **Richard B Stephens** *(University of Pennsylvania, USA)* & **Xiao Liu** *(US Naval Research Laboratory, USA)*

This book provides a unified, comprehensive description of tunneling systems in disordered solids suitable for graduate students or researchers looking for an introduction to the field. Its focus is on the tunneling systems intrinsic to glassy solids. It describes the experimental observations of 'glassy' properties, develops the basic empirical tunneling model, and discusses the dynamics changes on cooling to temperatures where direct excitation interactions become important and on heating to where tunneling gives way to thermal activation. Finally, it discusses how theories of glass formation can help us understand the ubiquity of these excitations.

Readership: Graduates and research professionals interested in condensed matter physics and quantum information.

300pp **May 2021**
978-981-121-724-1 **US$118** **£105**



Series on the Foundations of Natural Science and Technology: Volume 14

Elastic Constants in Heavily Doped Low Dimensional Materials

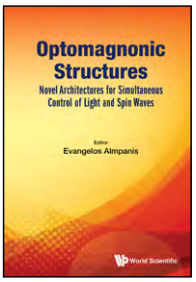
by **Kamakhya Prosad Ghatak** *(Institute of Engineering and Management, India & University of Engineering and Management, India)* & **Madhuchhanda Mitra** *(University of Calcutta, India)*

- Discusses the quantum effects in the elastic constants (EC) of heavily doped low dimensional materials.
- Takes into consideration the EC-changing effect of intense light waves in optoelectronics and strong external electric field on nanodevices
- Presents the experimental methods of determining the Einstein Relation, screening length and the EC, as well as 200 open research problems which are useful for both PhD aspirants and researchers

Readership: Students, researchers and engineers in the fields of condensed matter physics, materials science, nanoscience, semiconductors and related areas.

600pp **Apr 2021**
978-981-122-946-6 **US$168** **£150**

Optomagnonic Structures



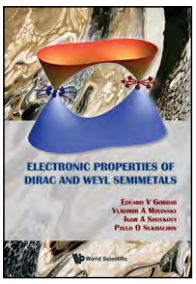
Novel Architectures for Simultaneous Control of Light and Spin Waves
edited by **Evangelos Almpanis** *(NCSR "Demokritos", Greece & National and Kapodistrian University of Athens, Greece)*

- Focuses on optomagnonics, a new research field concerning materials that can simultaneously control light and spin waves and enhance their interactions
- Employs a pedagogical style suitable for young researchers or scientists who want to enter the field
- Many pioneering researchers/groups in the field of optomagnonics contributed to this book

Readership: Advanced undergraduate, graduate/PhD students, post-docs, and researchers in the fields of photonics, magnetics and magnonics.

316pp **Feb 2021**
978-981-122-004-3 **US$118** **£105**

Electronic Properties of Dirac and Weyl Semimetals



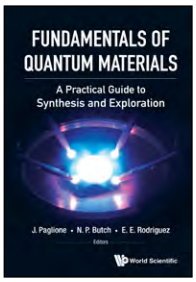
by **Eduard V Gorbar** *(Taras Shevchenko National Kiev University, Ukraine & Bogolyubov Institute for Theoretical Physics, Ukraine)*, **Vladimir A Miransky** *(Western University, Canada)*, **Igor A Shovkovy** *(Arizona State University, USA)* & **Pavlo O Sukhachov** *(Western University, Canada & Nordic Institute for Theoretical Physics, Sweden)*

The monograph reviews various aspects of electronic properties of Dirac and Weyl semimetals. After a brief discussion of 2D Dirac semimetals, a comprehensive review of 3D materials is given. The description starts from an overview of the topological properties and symmetries of Dirac and Weyl semimetals. The key ab initio approaches and material realizations are given. The authors then move on to discuss in detail the surface Fermi arcs, anomalous transport properties, and collective modes of Dirac and Weyl semimetals.

Readership: Students and researchers in condensed matter, high-energy, and plasma physics

450pp **Jan 2021**
978-981-120-734-1 **US$148** **£130**

Fundamentals of Quantum Materials



A Practical Guide to Synthesis and Exploration
edited by **J Paglione** *(University of Maryland, College Park, USA)*, **N P Butch** *(National Institute of Standards and Technology, USA)* & **E E Rodriguez** *(University of Maryland, College Park, USA)*

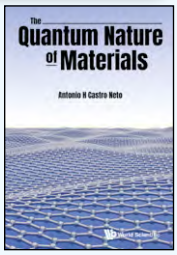
This book is a practical guide on the modern methods of the synthesis, characterization and electronic modelling of quantum materials. It is originated from the Fundamentals of Quantum Materials Winter School held annually at the University of Maryland. Motivated by the success of the school, the editors brought together the lecturers to record their most important ideas and share their expertise. It is hoped that the reader will enjoy these essential guides and state-of-the-art techniques from senior scientists on the synthesis of quantum materials.

276pp **Jan 2021**
978-981-121-936-8 **US$98** **£85**

RELATED TITLES IN MATERIALS SCIENCE

Textbook

The Quantum Nature of Materials

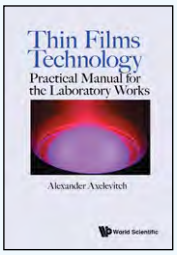


by **Antonio H Castro Neto** *(National University of Singapore, Singapore)*

This self-contained book takes the reader on a journey from the basic facts about atoms to topics at the forefront of current condensed matter research, giving students a broad view of materials science. With its practical topics and intuitive mathematical exposition, this book is an ideal introduction to the field for any mathematically inclined scientist or engineer with a basic knowledge of quantum mechanics.

492pp **Dec 2021**
978-981-124-240-3 **US$128** **£100**

Thin Films Technology

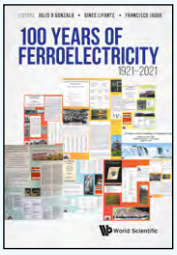


Practical Manual for the Laboratory Works
by **Alexander Axelevitch** *(Holon Institute of Technology (HIT), Israel)*

This book deals with key aspects of modelling, deposition and characterization of thin solid films. The main attention is paid to the physical vacuum deposition methods, particularly to the magnetron sputtering, and measurement of the optical and electrical properties of thin films. Derived from the author's 30 years of experience in the thin-films laboratory of the Holon Institute of Technology (HIT), it is mainly intended for students in the fields of microelectronics, electrooptics and nanotechnology, as well as for professional engineers.

236pp **Dec 2021**
978-981-124-632-6 **US$88** **£70**

100 Years of Ferroelectricity 1921 – 2021



edited by **Julio A Gonzalo**, **Gines Lifante** & **Francisco Jaque** *(Universidad Autó noma de Madrid, Spain)*

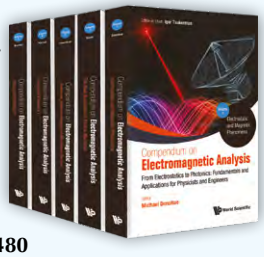
This book gives an overview of major experimental and theoretical results in ferroelectricity. It is organized into three sections denoted by time: 1921 – 1960, 1961 – 2002 and 2002 – 2021. It starts with early works by Valasek, Busch and Scherrer, etc. and traces the developments of the field up to the latest results such as neutron diffraction work on PZT, quantum tunneling and zero-point energy in ferroelectrics. The book will be a useful compendium on ferroelectrics for materials scientists.

228pp **Oct 2021**
978-981-124-309-7 **US$98** **£85**

Compendium on Electromagnetic Analysis

From Electrostatics to Photonics: Fundamentals and Applications for Physicists and Engineers **(In 5 Volumes)**
Volume 1: Electrostatic and Magnetic Phenomena **Volume 2:** The New Generation of Electric Machines **Volume 3:** Antennas, Antenna Arrays and Microwave Devices **Volume 4:** Optics and Photonics I **Volume 5:** Optics and Photonics II

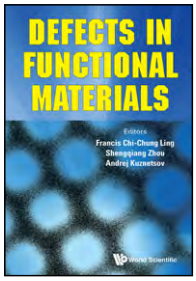
Major Reference Work



edited by **Michael Donahue** *(National Institute of Standards & Technology, USA)*, **Yilmaz Sozer** *(The University of Akron, USA)*, **Thomas Bauernfeind** *(Graz University of Technology, Austria)* & **Vadim A Markel** *(University of Pennsylvania, USA)*
Editor-in-chief: **Igor Tsukerman** *(The University of Akron, USA)*

2068pp **Aug 2020**
978-981-3270-16-9(SET) **US$1680** **£1480**

Defects in Functional Materials



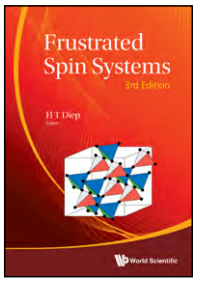
edited by **Francis Chi-Chung Ling** *(University of Hong Kong, Hong Kong)*, **Shengqiang Zhou** *(Institute of Ion Beam Physics and Materials Research, Germany)* & **Andrej Kuznetsov** *(University of Oslo, Norway)*

The research of functional materials has attracted extensive attention in recent years. Its advancement nitrifies the developments of modern sciences and technologies like green sciences, energy, medical sciences and information technology. The present book summarizes the research activities carried out in recent years on the physics and chemistry of how defects play a role in the electrical, optical and magnetic properties of materials. It also introduces applications of the different functional materials in the fields of magnetism, optoelectronic, and photovoltaic, etc.

340pp	**Sep 2020**	
978-981-120-316-9	**US$128**	**£115**

Frustrated Spin Systems

(3rd Edition)



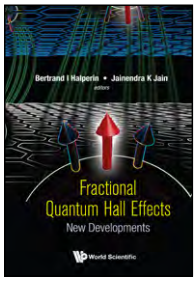
edited by **H T Diep** *(University of Cergy-Pontoise, France)*

- Pedagogical introduction to the burgeoning field of frustrated spin systems, where more and more frustrated materials are discovered with interesting properties for applications.
- Written by top-level researchers who have actively contributed to the field.
- Frustrated systems cannot be fully explained by existing theories and thus provide an excellent testing ground for simulations and approximations.

752pp	**Jul 2020**	
978-981-121-413-4	**US$188**	**£165**

Fractional Quantum Hall Effects

New Developments



edited by **Bertrand I Halperin** *(Harvard University, USA)* & **Jainendra K Jain** *(Penn State University, USA)*

The fractional quantum Hall effect has been one of the most active areas of research in quantum condensed matter physics for nearly four decades, serving as a paradigm for unexpected and exotic emergent behavior arising from interactions. This book, featuring a collection of articles written by experts and a Foreword by Klaus von Klitzing, the discoverer of quantum Hall effect and winner of 1985 Nobel Prize in physics, aims to provide a coherent account of the exciting new developments and the current status of the field.

Readership: Graduate students and researchers interested in the current status of the field that has seen significant progress in the last 10 years.

552pp	**Jun 2020**	
978-981-121-748-7	**US$148**	**£130**
978-981-121-822-4(pbk)	**US$48**	**£40**

CLASSIC TITLES

Topology and Physics
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The Physics of Solar Cells
by **Nelson J** *(Imperial College, UK)*
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Introduction to Solid State Physics
by **Aharony A** *(Ben Gurion University of the Negev, Israel & Tel Aviv University, Israel)* & **Entin-Wohlman O** *(Ben Gurion University of the Negev, Israel & Tel Aviv University, Israel)*
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(5th Edition)
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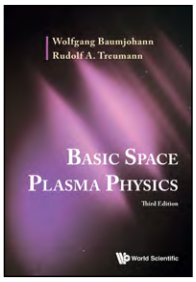
ELECTROMAGNETISM AND PLASMA PHYSICS

Textbook

Basic Space Plasma Physics

(3rd Edition)



by **Wolfgang Baumjohann** *(Austrian Academy of Sciences, Austria)* & **Rudolf A Treumann** *(Munich University, Germany)*

This established textbook on space plasma physics describes Earth's plasma environment from single particle motion in electromagnetic fields, with applications to Earth's magnetosphere up to plasma wave generation and wave-particle interaction. The second half of the book focuses on the more theoretical aspects of space plasma physics, from kinetic theory of plasma through the formation of moment equations and derivation of magnetohydrodynamic theory of plasmas.

The new edition includes the most recent developments in the theory of statistical particle distributions in space plasma, etc. There is also a new section dedicated to space climatology, an emerging field in space plasma physics that is of vital interest when considering the possible hazards to civilization from space.

Readership: Students, researchers and instructors focusing on space plasma, astronomy and astrophysics.

530pp	**Mar 2022**	
978-981-125-405-5	**US$158**	**£125**
978-981-125-440-6(pbk)	**US$78**	**£60**

Topological Foundations of Electromagnetism

(2nd Edition)

by **Terence W Barrett** *(BSEI, USA)*

The book discusses how the classical theory of electromagnetism, or Maxwell theory, can be developed to address situations and signals of differing symmetry form. It shows that different topological spaces and symmetries are paramount in determining the form and group symmetry of electromagnetic description

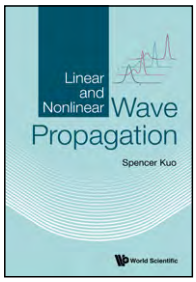
Readership: Post graduates and research professionals in the field of electromagnetism or laser.

300pp	**Jul 2022**	
978-981-125-329-4	**US$118**	**£95**

Textbook

Linear and Nonlinear Wave Propagation

by **Spencer Kuo** *(New York University, USA)*

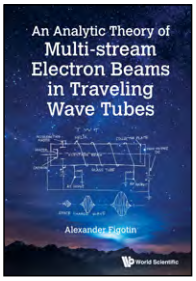


Waves are essential phenomena in most scientific and engineering disciplines, such as electromagnetism and optics, and different mechanics including fluid, solid, structural, quantum, etc. This book introduces generic equations describing wave and pulse propagation in linear and nonlinear systems and analyses them as initial/boundary value problems. It provides students with an understanding of waves and methods of solving wave propagation problems. The selection of topics and the focus given to each provide essential materials for a lecturer to cover the bases in a linear/nonlinear wave course.

200pp	**Apr 2021**	
978-981-123-163-6	**US$88**	**£75**

An Analytic Theory of Multi-stream Electron Beams in Traveling Wave Tubes

by **Alexander Figotin** *(University of California, Irvine, USA)*



A traveling-wave tube (TWT) is a powerful vacuum electronic device used to amplify radio-frequency (RF) signals, with numerous applications in radar systems, television and satellite communications. This monograph is devoted to the author's original analytical developments on the theory of TWTs. It offers new insight into the physics of electron beams including origins of plasma instabilities and the "wave-particle interaction". Thus, it provides tools for analytical assessment of regimes of TWT operation as well for conceiving new amplification regimes.

500pp	**Nov 2020**	
978-981-120-919-2	**US$158**	**£140**

CLASSIC TITLES

Classical Theory of Electromagnetism
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by **Müller-Kirsten H J W** *(University of Kaiserslautern, Germany)*
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GENERAL PHYSICS

Textbook

Exploring the Integrated Science

(2nd Edition)

by **Belal E Baaquie** *(The Global University of Islamic Finance, Malaysia)* & **Frederick H Willeboordse** *(National University of Singapore, Singapore)*

This richly illustrated volume shows how the simplest questions can lead us through a chain of reasoning that explains some of the most fascinating principles of science. Each chapter begins with a short question, such as "why is rubber elastic?", "why are leaves green?". Step by step, the text then delves into the more sophisticated scientific matters necessary for explaining the question, thus elucidating key principles and concepts. The writing style adds rigor to the 'playfulness' of the general science books by gently making use of mathematics to introduce, in an intuitive manner, the quantitative aspects.

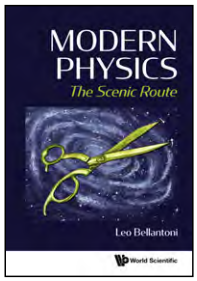
900pp	**Apr 2023**	
978-981-121-109-6	**US$148**	**£130**
978-981-121-208-6(pbk)	**US$48**	**£40**

Textbook

Modern Physics

The Scenic Route

by **Leo Bellantoni** *(Fermi National Accelerator Laboratory, USA)*



"This delightful book transports students first encountering quantum mechanics directly into the heart of profound issues at the heart of modern physics. Sophomore physics majors and even advanced high school students will gain a deep understanding of the most profound issues at the forefront of research."

Scott Dodelson
Carnegie Mellon University

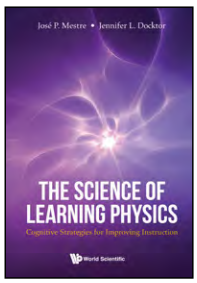
This book leapfrogs over the usual pedagogical progression, taking readers to a real understanding of quantum, relativistic, nuclear and particle physics. These areas are usually reserved for the end of one's undergraduate study or even for graduate students, but do not need to be. Created out of the joy of science, this book can serve well alongside conventional physics courses to nourish the curious mind.

155pp	**Feb 2022**	
978-981-124-220-5	**US$58**	**£50**
978-981-124-317-2(pbk)	**US$28**	**£25**

The Science of Learning Physics

Cognitive Strategies for Improving Instruction

by **José P Mestre** *(University of Illinois at Urbana-Champaign, USA)*& **Jennifer L Docktor** *(University of Wisconsin-La Crosse, USA)*



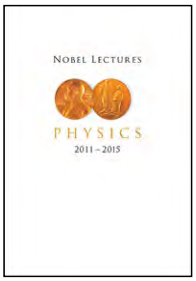
"For many decades, Jose Mestre and the teams of researchers he led have carried out deep and insightful research into the psychology of how students learn (and resist learning) physics. In this book, he and his long-time collaborator, Jennifer Docktor, give a clear and compelling explanation of what they have learned and how a physics teacher can use this understanding of student learning to produce more effective instruction. This should be required reading for any new physics teacher and could serve as an excellent text for a graduate seminar for physics teaching assistants."

Joe (E. F.) Redish
University of Maryland

Readership: Instructors of college-level introductory physics as well as introductory courses in science technology, engineering and mathematics.

105pp	**Dec 2020**	
978-981-122-654-0	**US$48**	**£40**
978-981-122-776-9(pbk)	**US$25**	**£20**

Nobel Lectures in Physics (2011 – 2015)



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

This volume collects the Nobel lectures delivered by the Nobel laureates, together with their biographies and the presentation speeches by Nobel Committee members for the period 2011 – 2015. The records are not only valued for their historical significance, but also for their detailed and accessible accounts of the phenomena for which the laureate were awarded the Nobel Prize.

(2011) **Saul Perlmutter**, **Brian P Schmidt** and **Adam G Riess**

(2012) **Serge Haroche** and **David J Wineland**

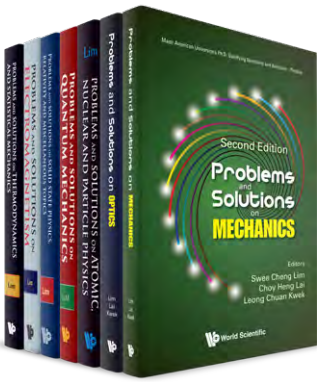
(2013) **François Englert** and **Peter W Higgs**

(2014) **Isamu Akasaki**, **Hiroshi Amano** and **Shuji Nakamura**

(2015) **Takaaki Kajita** and **Arthur B McDonald**

420pp	**Apr 2022**	
978-981-124-552-7	**US$118**	**£95**
978-981-124-680-7(pbk)	**US$58**	**£45**

Problems and Solutions in Physics



"This collection will present students with the opportunity to test their comprehension and lecturers with ideas for problems."
Contemporary Physics

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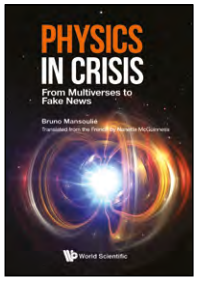
POPULAR PHYSICS

Physics in Crisis



From Multiverses to Fake News
by **Bruno Mansoulié** *(CEA, France)*
translated by **Nanette McGuinness**

Today's physics has led to incredible advances in the technology we use in daily life — from cell phones and GPS systems to PET scans and more. Yet all is far from well: the two foundational concepts in physics — Quantum Theory and General Relativity — are still incompatible with each other, and observations of the universe show that our theories are incomplete at best. Society dreams of the romantic notion of a single genius like Einstein and Newton heroically creating a massive paradigm shift. Still, is this scenario likely today? Perhaps the next steps in physics will be incremental rather than gigantic.

In *Physics in Crisis*, Bruno Mansoulié uses simple language, insightful examples, and his personal experience as a working physicist to address these fundamental questions and reflect on how today's crises in physics might be solved.

Readership: Scientists and general readers interested in physics and philosophy of sciences

150pp	**Jul 2022**	
978-1-80061-234-1	**US$29.95**	**£25**

Enigma of the Skies

Unveiling the Secrets of Auroras
by **Yohsuke Kamide** *(Rikubetsu Space and Earth Science Museum, Japan & Nagoya University, Japan)* & **Yoshi Otsuka** *(Nanook Aurora Guide, Canada)*

Enigma of the Skies is a joint endeavor by a scientist and a photographer to present everything there is to know about auroras in an easy-to-understand matter. It explains the phenomena and describes how to predict when auroras occur using simple physics. The book features a beautiful collection of aurora photos taken both from Earth and from space.

190pp	**Jul 2022**	
978-981-122-877-3	**US$98**	**£85**
978-981-123-039-4(pbk)	**US$48**	**£40**

How Does Sunshine Become Electricity

by **Junhao Chu** *(Chinese Academy of Sciences, China)*, **Bo Hai** *(Shanghai Media Group, China)* & **Chang Qin** *(Shanghai Media Group, China)*
translated by **Zhongying Xue** *(Chinese Academy of Sciences, China)*

In recent decades, scientists have done a lot of research to find ways to make use of solar energy, such as using solar cells to transform sunshine into electricity. What are the current products that use solar energy? And what can humans do with solar energy in the future? Written for primary school students by an academian of the Chinese Academy of Science and two talented broadcasting hosts from Shanghai Media Group, this book answers these questions and more.

65pp	**May 2022**
978-981-124-685-2(pbk)	**TBD**

For more information,
visit: **www.worldscientific.com**

World of Chips

Roaming Integrated Circuit World

by **Shichang Zou** *(Chinese Academy of Sciences, China)*

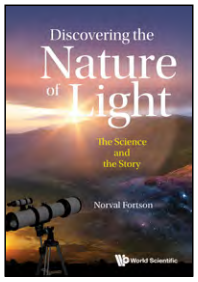
The book is Zou Shichang's introduction of chips and integrated circuits to elementary students. It includes many talks, where Dr. Zou introduces to children common knowledge of chips and integrated circuits and the present situation of China's chip industry. With the great scientist's introduction of cutting-edge science and industry, this book is a rare-to-find popular science book for elementary students.

- His Fate is Entwined with the Cause of Science in China
- Amazing Chips
- Semiconductor: A Kind of Unique Materials
- Chip Manufacture Line

Readership: Students of all levels with interest in physics and applied/technical physics.

136pp	**May 2022**	
978-981-120-902-4	**US$48**	**£40**

Discovering the Nature of Light



The Science and the Story

by **Norval Fortson** *(University of Washington, USA)*

This book is a science text about light for the general reader; it is also an adventure story and a detective story revealing how the secrets of light were uncovered. Readers can share in the thrill of each discovery and learn about some of the myriad applications opened up by these fascinating discoveries, including the telescope, fiber optics, the laser, and even the recent optical detection of gravitational waves from space.

250pp	**Apr 2022**	
978-981-124-959-4	**US$58**	**£50**
978-981-125-029-3(pbk)	**US$28**	**£25**

I Never Call It Big Bang

George Gamow: The Extraordinary Story of a Genius of Physics

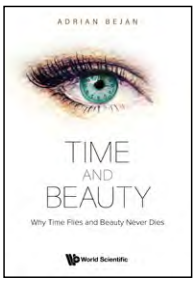
by **Alessandro Bottino** *(University of Turin, Italy)* & **Cristina Favero**

This book tells the incredible story of George Gamow, one of the most brilliant and extravagant physicists of the past century. Gamow was a key figure in physics between the 1920s and the 1960s, characterized by rapid developments in quantum theory and relativity. His true merits were seldom fully recognized. Yet his ideas are behind a number of Nobel Prizes for Physics. The figure of Gamow is interesting also from a cultural perspective as he moves geographically from Russia to the USA, via Europe. His story provides insights into the complex dialogue between historical events and scientific developments during the twentieth century.

Our book builds on the extensive interview that science historian Charles Weiner did with Gamow shortly before his death, enriched by materials gathered from his autobiography and relevant writings about his scientific contributions. Altogether, these form a critical and complex representation of the life and character of this extraordinary scientist and human being.

150pp	**Mar 2022**	
978-981-124-230-4	**US$34.95**	**£30**

Time and Beauty



Why Time Flies and Beauty Never Dies

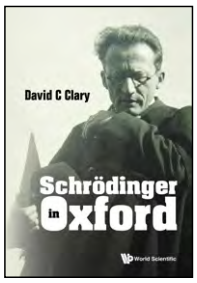
by **Adrian Bejan** *(Duke University, USA)*

Time and beauty are two of our most visceral perceptions. Yet, their nature is seldom questioned. In this ground-breaking new work, Adrian Bejan — a true 'original' among physicists — explains, in a scholarly yet colorful style, the scientific basis for the perception of time and beauty.

The author expounds on why we feel that time flies faster as we get older, and how the global pandemic had decelerated our mind time. Next, readers will discover that the concept of beauty is linked with time as beautifully-shaped images are scanned faster by two eyes. Through scientific research on physics and cognition, the author submits an original and rewarding approach to understanding time and beauty together, which will change the reader's worldview about time, beauty, and design.

250pp	**Mar 2022**	
978-981-124-546-6	**US$58**	**£50**
978-981-124-679-1(pbk)	**US$28**	**£25**

Schrödinger in Oxford



by **David C Clary** *(University of Oxford, UK)*

"This is a biography of a towering figure in the most marvellous century of science, just past. The delight of this book is to share with its reader the miracle of Schrödinger's equation in which it was revealed how solid matter partakes of the properties of waves. The reader will learn that even the most solitary scientist depends on the brilliance of his colleagues, and also on the existence of great centres of learning."

John Polanyi FRS
Nobel Laureate in Chemistry, 1986

350pp	**Apr 2022**	
978-981-125-000-2	**US$98**	**£85**
978-981-125-100-9(pbk)	**US$38**	**£35**

The Spaceship Orion and Other Scientific Explorations

by **Jeremy Bernstein** *(Stevens Institute of Technology, USA)*

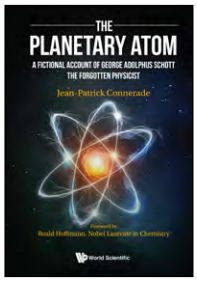
A curation of essays penned by Jeremy Bernstein, this book is a treasure trove of personal stories ranging from Bernstein's expedition to Mount Everest, cherished encounters with the fathers of Quantum Mechanics (Werner Heisenberg, Paul Dirac and Erwin Schrodinger), to a jovial collaboration with Freeman Dyson on the Orion spaceship project.

This essay collection is a door into several pieces of scientific explorations as well as the celebrated life of Jeremy Bernstein, a physicist, professor and phenomenal writer. Readers will enjoy this book as both an autobiography and a popular science reading.

Readership: Scientists, science historians, philosophers, and laypersons interested in science and its stories.

148pp	**Nov 2021**	
978-981-124-349-3	**US$45**	**£40**
978-981-124-569-5(pbk)	**US$24**	**£20**

The Planetary Atom



A Fictional Account of George Adolphus Schott the Forgotten Physicist
by **Jean-Patrick Connerade**, **Chaunes** *(Imperial College London, UK)*

Foreword by **Roald Hoffmann** & **Nobel Laureate in Chemistry**

"I read The Planetary Atom *with great interest. Of course, we are all aware of the major contributions made by legendary researchers such as Ernest Rutherford, who first set up the model known as 'the planetary atom'. But I knew nothing of the much more discrete figure of George Adolphus Schott. I was impressed, on reading this book, to discover the significance and conceptual depth of his work."*

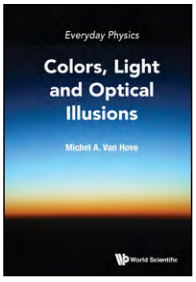
Claude Cohen-Tannoudji
Nobel Laureate in Physics, 1997

"Although Science is not fiction, the lives and works of scientists provide real substance for a novel like The Planetary Atom, which tells a story of general public interest."

Jean-Marie Lehn
Nobel Laureate in Chemistry
Université Louis Pasteur, Strasbourg

248pp	**Nov 2021**	
978-1-80061-002-6	**US$58**	**£50**
978-1-80061-014-9(pbk)	**US$28**	**£25**

Everyday Physics

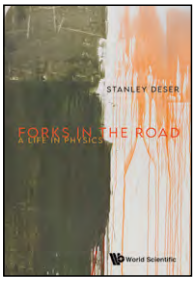


Colors, Light and Optical Illusions
by **Michel A Van Hove** *(Hong Kong Baptist University, Hong Kong)*

This book aims to popularize physics by emphasizing conceptual ideas of physics and their interconnections, while avoiding mathematics entirely. The topic of this volume, "Colors, light and Optical Illusions", is chosen because we face colors and light every waking minute of our lives, and we experience optical illusions much more often than we realize. This book will attract all those with a curious mind about nature and with a desire to understand how nature works, especially the younger generation of secondary-school children and their teachers.

296pp	**Sep 2021**	
978-981-123-833-8	**US$68**	**£60**
978-981-123-931-1(pbk)	**US$28**	**£25**

Forks in the Road



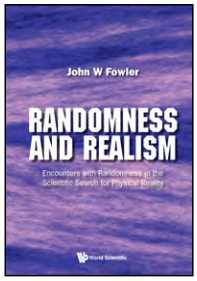
A Life in Physics
by **Stanley Deser** *(Brandeis University, USA & Caltech, USA)*

"Fleeing 1930s Poland first for Palestine and then for France; escaping Paris in 1940 hours before the Nazi tanks came rolling in... Anyone with a childhood as tumultuous as this might reasonably expect adulthood to be something of an anticlimax, but for Stanley Deser another adventure was only just beginning. Both the scientist and the lay reader can relish the anecdotes, told with wit and literary aplomb, involving the greatest minds of 20th century physics. Both will come away with a greater appreciation of a golden era for quantum field theory and general relativity to which Deser, co-discoverer of supergravity, was himself a major contributor."

Michael J Duff
Imperial College London

164pp	**Sep 2021**	
978-981-123-418-7	**US$58**	**£50**
978-981-123-566-5(pbk)	**US$24.90**	**£20**

Randomness and Realism



Encounters with Randomness in the Scientific Search for Physical Reality
by **John W Fowler** *(California Institute of Technology, USA)*

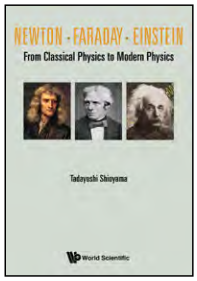
Randomness is an active element relevant to all scientific activities. The book explores the way in which randomness suffuses the human experience, starting with everyday chance events, followed by developments into popular ideas in media like modern probability theory, statistical mechanics, scientific data analysis, quantum mechanics, and quantum gravity. An accessible introduction to these theories is provided for lay readers as a basis for going into deeper topics.

Fowler unveils the influence of randomness in the two pillars of science, measurement and theory. Some emphasis is placed on the need and methods for optimal characterization of uncertainty. An example of the cost of neglecting this is the St. Petersburg Paradox, a theoretical game of chance with an infinite expected payoff value. The role of randomness in quantum mechanics reveals another particularly interesting finding: that in order for the physical universe to function as it does and permit conscious beings within it to enjoy sanity, irreducible randomness is necessary at the quantum level.

Readership: Scientists, engineers and students in science and engineering.

536pp	**Jul 2021**	
978-981-124-345-5	**US$158**	**£140**

Newton . Faraday . Einstein



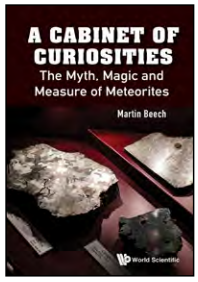
From Classical Physics to Modern Physics
by **Tadayoshi Shioyama** *(Kyoto Institute of Technology, Japan)*

Our lives have benefited immensely from the scientific evolution over the years. This book provides an overview of the lives of three great scientists, Newton, Faraday and Einstein, who made the most significant contributions to physics. Along the way, readers will be able to understand the progress from classical physics to modern physics, as well as gain insights into the personalities and lives of the three great scientists.

Readership: High school students and undergraduates interested in history of science.

188pp	**May 2021**	
978-981-123-567-2	**US$58**	**£50**
978-981-123-624-2(pbk)	**US$28**	**£25**

A Cabinet of Curiosities



The Myth, Magic and Measure of Meteorites
by **Martin Beech** *(University of Regina, Canada)*

Hurtling through the atmosphere, in a blaze of light and reverberating percussions, the arrival of a meteorite on Earth is a magical, rare, and precious sight. Meteorites are cosmic messengers. They tell us about the entire history of the solar system, their story carrying us from the very earliest moments, when solid material first began to form in the solar nebula. Indeed, meteorites played a key role in the origins of Earth's oceans and the genesis of life. Much is known about the structure and chemistry of meteorites, but for all this, they still harbor many scientific mysteries that have yet to be resolved.

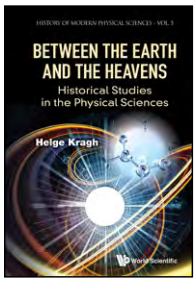
Readership: Undergraduate science students, amateur astronomers and the informed public.

572pp	**Apr 2021**	
978-981-122-491-1	**US$128**	**£115**

History of Modern Physical Sciences - Vol 5

Between the Earth and the Heavens

Historical Studies in the Physical Sciences
by **Helge Kragh** *(Niels Bohr Institute, Denmark)*



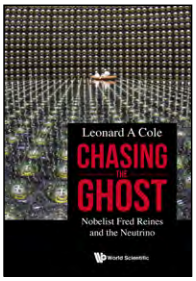
Between the Earth and the Heavens is not an ordinary history of science book. It presents an episodic history of modern physical sciences covering the chronological development of physics, chemistry and astronomy since about 1860. Integrating historical authenticity and modern scientific knowledge, the cases within reveals the often surprising connections between science done in the laboratory (physics, chemistry) and science based on observation (astronomy, cosmology).

Readership: Scientists, undergraduates and the general public with an interest in the history of physical sciences.

412pp	**Apr 2021**	
978-1-78634-984-2	**US$98**	**£85**

Chasing the Ghost

Nobelist Fred Reines and the Neutrino
by **Leonard A Cole** *(Rutgers University, USA)*



The first full volume about Nobel Laureate Fred Reines and his co-detection of the neutrinos with Clyde Cowan.

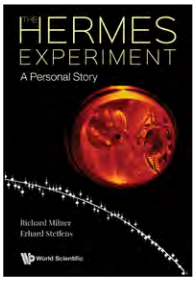
"Chasing the Ghost nicely describes how successful the derring-do attitude of individual researchers can be. Reines variously comes across as endearing, admirable and irritating. He could alarm his team by tugging on cables to test electronics as he whistled his way through a lab, and was quick to over-interpret results. But he was a hands-off, respectful lab chief who addressed his team with old-fashioned formality as 'Mr' (they seem to have all been men) — even as he ignored their rights to holidays. Those interviewed all tell how they fell under his spell, and worked hard to please him. One anecdote has him on one knee, singing an aria at a party. Unlike his neutrinos, it seems, Reines was always an unmistakable presence."

Nature

300pp	**Mar 2021**	
978-981-123-105-6	**US$68**	**£60**
978-981-123-148-3(pbk)	**US$19.95**	**£15.95**

The HERMES Experiment

A Personal Story
by **Richard Milner** *(Massachusetts Institute of Technology, USA* & **Erhard Steffens** *(University of Erlangen-Nürnberg, Germany)*



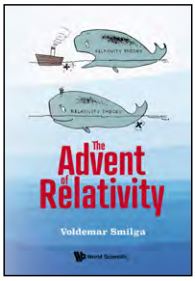
This book describes the story of how the HERMES experiment was developed and operated at the DESY laboratory to study the spin structure of the fundamental structure of matter. The authors played a leading role within the HERMES collaboration. They describe, using an accessible language, the technical design of HERMES; the effort to secure the necessary funds in different countries; the fabrication of the components by the different HERMES institutes; and the story of the installation and commissioning of HERMES in the East Hall of the HERA particle accelerator in the hot summer of 1995 until 2007. They also cover the HERMES scientific results, their considerable impact, and how HERMES shaped an entire generation of young people into scientific leaders.

Readership: Students and researchers in nuclear and particle physics and general public interested in how large-scale experimental scientific research originates and is carried out.

250pp	**Apr 2021**	
978-981-121-533-9	**US$48**	**£40**

The Advent of Relativity

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



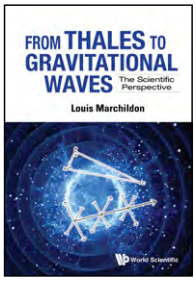
This book explains the history of the discovery of special relativity to any person with a high school background. It narrates how physicists, from Galileo, Newton to Lorentz, Poincare and Einstein were distracted in their reflections by numerous fallacies (like aether, dragged or not), but eventually reached the laws of kinematics and dynamics of the objects moving at high speed. The last chapter "Photon dreams" caters to the science fiction fans, in which the author proves to the disappointed reader that the laws of physics that we know do not allow the construction of spaceships that could reach even the nearest stars during the life span of the crew.

This popular book on special relativity was first published in Moscow back in 1961 under the Russian title "Очевидное? Нет, ещё неизведанное", which can be roughly translated as "Is it evident? No, it's unexplored yet!". It includes nice pictures, drawn with soft humour by Boris Zhutovsky, a well-known Russian artist.

350pp	**Mar 2021**	
978-981-123-114-8	**US$58**	**£50**

From Thales to Gravitational Waves

The Scientific Perspective
by **Louis Marchildon** *(Universitédu Québec àTrois-Riviè res, Canada)*



Key Features:

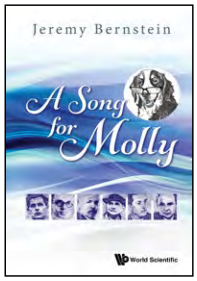
- A concise historical account of how science, from the Greeks to the present day, answered fundamental questions like: Where do we come from? What are we made of? How big is the Universe? Are we alone?
- Reflections on science methodology and the relation of science to other human concerns
- Vindication of the value of science in the face of contemporary anti-science critics

Readership: Educated lay readers interested in science and concerned about the current multipronged attack on science.

150pp	**Feb 2021**	
978-981-121-459-2	**US$48**	**£40**
978-981-121-531-5(pbk)	**US$24**	**£20**

A Song for Molly

by **Jeremy Bernstein** *(Stevens Institute of Technology, USA)*



"Bernstein was a New Yorker staff writer for several decades and has written over a dozen books on such diverse matters as computers, cosmology, cryptography, quantum mechanics, and mountain climbing. Having published many short stories, he has now ventured into longer fictional forms. Could it be an accident that the text of his enchanting novella fills just 137 pages, a prime number that once fascinated such luminaries of physics as Arthur Eddington, Wolfgang Pauli, and Richard Feynman?"

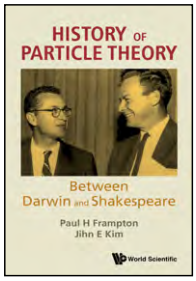
Sheldon Lee Glashow
Nobel Laureate in Physics (1979)

A Song for Molly is both a love story and a poetic homage to science. The subjects in this first-person novella range from encounters with Wittgenstein, Einstein and Gödel, to trying to live with a dog named Molly. The science is serious although the tone is whimsical.

148pp	**Oct 2020**	
978-981-121-819-4	**US$58**	**£50**
978-981-121-894-1(pbk)	**US$28**	**£25**

History of Particle Theory

Between Darwin and Shakespeare
by **Paul H Frampton** & **Jihn E Kim**



History of Particle Theory fills an important gap existing in the literature by treating elementary particle physics as an essential part of the broader spectrum of human knowledge and culture, which is constantly being extended by creative individuals such as the two mentioned in the subtitle, Darwin and Shakespeare.

The book starts from the time of Democritus and Archimedes, progressing through the Newtonian era and ultimately reaching our current standard model of particle physics. The closing chapter provides a series of quotations written in the 16th and 17th centuries by Shakespeare and here applied to particle theory. The inclusion of this is based on our premise that particle theory is just one out of several opportunities for exceptional human creativity.

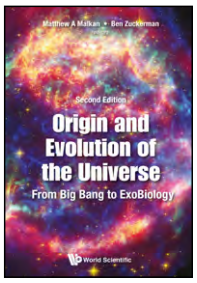
Readership: General public interested in physics and/or history of science.

232pp	**Sep 2020**	
978-981-122-465-2	**US$86**	**£75**

Textbook

Origin and Evolution of the Universe

From Big Bang to ExoBiology
(2nd Edition)
edited by **Matthew A Malkan** *(University of California, Los Angeles, USA)* & **Ben Zuckerman** *(University of California, Los Angeles, USA)*



"This book presents a clear, highly readable view of science's best understanding of how things in the Universe came to be the way they are. Each chapter is written by a leading expert in that sub-field. Together they cover nearly all major advances made in the past century, in fields from cosmology to exobiology."

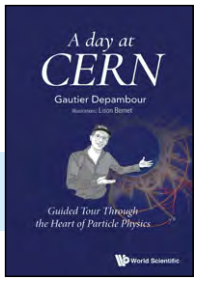
Joseph H Taylor Jr.
Nobel Laureate in Physics, 1993

Readership: Science students, professionals and general public interested in astronomy.

248pp	**Aug 2020**	
978-981-120-645-0	**US$88**	**£75**
978-981-120-772-3(pbk)	**US$48**	**£40**

A Day at CERN

Guided Tour Through the Heart of Particle Physics
by **Gautier Depambour** *(Université de Paris, France)*



Named a CHOICE Outstanding Academic Title in 2021

What lies within CERN's entrails? What does the ATLAS detector look like? Does research at CERN find applications in everyday life? Follow Gautier for a guided tour into CERN, the largest scientific collaboration in the world. Our visit, whose path will mimic that of the particles during their journey, will be full of anecdotes and surprises!

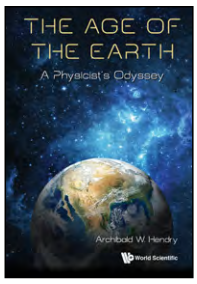
Key Features:

- A unique presentation of CERN in the form of a guided tour
- Foreword by Frédérick Bordry, Director for Accelerators and Technology at CERN
- Interviews with important CERN personnel on various aspects of the organization

164pp	**Aug 2020**	
978-981-122-110-1	**US$58**	**£50**
978-981-122-064-7(pbk)	**US$28**	**£25**

The Age of the Earth

A Physicist's Odyssey
by **Archibald W Hendry**



"Since the seventeenth century human ideas about the age of our home planet have changed drastically, from the biblically motivated age of a few thousand years to the present value of 4.5 billion years. In this engaging and readable book, Prof Hendry takes us on a journey through this dizzyingly complex change, laying out the arguments advanced during each phase."

James Trefil
George Mason University
***Co-Author of* Dictionary of Cultural Literacy**

148pp	**Feb 2020**	
978-981-3279-69-8	**US$58**	**£50**
978-981-120-131-8(pbk)	**US$28**	**£25**

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by **t' Hooft G** *(Utrecht University, The Netherlands)* & **Vandoren S** *(Utrecht University, The Netherlands)*
Translated by **t' Hooft S E**
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9789814350136

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by **Don Lincoln** *(Fermilab)*
9789812387059

NUCLEAR PHYSICS

Star Power

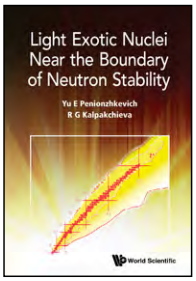
edited by **Wendell Horton** *(University of Texas at Austin, USA)*

Life on Earth depends on the Sun — our star. The book describes the past 100 years of research to understand and build a model of a star. Starting from a breakthrough in 1938 of our understanding of the nuclear fusion reactions that power the Sun and other stars, this book describes the history of the first early attempts to build fusion reactors and how man has worked for decades to design a structure capable of starting and maintaining the steady solar nuclear burning of hydrogen. It is a fascinating read of the history and the current state of international efforts to build star power.

Readership: Students and researchers interested in nuclear, solar and plasma physics.

500pp	**Nov 2022**	
978-981-120-869-0	**US$158**	**£140**

Light Exotic Nuclei Near the Boundary of Neutron Stability



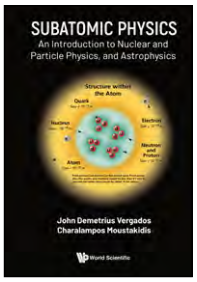
by **Yu E Penionzhkevich** *(Joint Institute for Nuclear Research, Dubna, Russia)* & **R G Kalpakchieva** *(Joint Institute for Nuclear Research, Dubna, Russia)*

The monograph describes the properties of the lightest nuclei with large excess of neutrons. The results of theoretical and experimental studies of neutron-rich isotopes with $1 \le Z \le 20$ are presented while also changes in the structure of nuclei when going away from the line of β-stability are discussed. Information presented is on the mass, radii of distribution of nuclear matter, energy levels for excited states of these nuclei, the possibility of manifestation of a halo, as well as the deformation of nuclei and the quantum properties of ground states. The position of the boundary of nucleon stability for these nuclei is considered. The effects associated with weakening and even the disappearing influence of standard magic numbers and the appearance of new ones are discussed.

480pp	**Oct 2021**	
978-981-124-297-7	**US$158**	**£140**

Textbook

Subatomic Physics



An Introduction to Nuclear and Particle Physics, and Astrophysics

by **John Demetrius Vergados** *(University of Ioannina, Greece)* & **Charalampos Moustakidis** *(Aristotle University of Thessaloniki, Greece)*

"This book provides a thorough study of these outstanding developments starting from the early days with the Rutherford experiment and covering all the important branches of the modern physics era.... Furthermore, several useful mathematical tools and technical developments of the nuclear and particle physics theories can be found in the Appendices. This book resulted from a series of lectures given by both authors at several universities and as such, it is perfectly designed for the students."

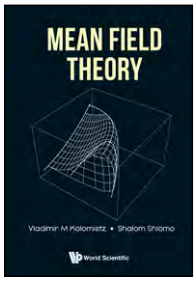
George K Leontaris
University of Ioannina

Readership: For undergraduate students, graduate students, as well as teachers teaching Nuclear and Particle Physics or Astrophysics course.5

04pp	**Jan 2021**	
978-981-122-979-4	**US$138**	**£120**

Textbook

Mean Field Theory



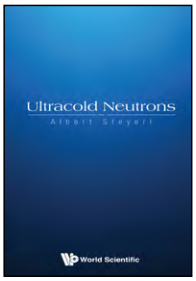
by **Vladimir M Kolomietz** *(Institute for Nuclear Research, Ukraine)* & **Shalom Shlomo** *(Texas A& M University, USA)*

This book describes recent theoretical and experimental developments in the study of static and dynamic properties of atomic nuclei, many-body systems of strongly interacting neutrons and protons. The theoretical approach is based on the concept of the mean field, describing the motion of a nucleon in terms of a self-consistent single-particle potential well which approximates the interactions of a nucleon with all the other nucleons. The concepts and methods developed in this book can also be used to describe properties of other many-body systems.

Readership: Students with basic knowledge of quantum mechanics and nuclear physics, as well as researchers and students interested in advanced topics in the study of properties of many-body systems.

588pp	**May 2020**	
978-981-121-177-5	**US$178**	**£155**

Ultracold Neutrons



by **Albert Steyerl** *(University of Rhode Island, USA)*

Ultracold neutrons (UCNs) are neutrons moving at the low speed of a bicycle rider. They are distinguished from ordinary neutrons by their ability to be confined in "neutron bottles" for up to several hundred seconds, allowing their properties and interactions with the environment to be studied with superb precision. This book is an excellent introduction to the field of UCNs that is not highly specialized but touches on many aspects of our physical world, classical as well as quantum mechanical.

Readership: Undergraduate and graduate students interested in experimental techniques and challenges in UCNs.

500pp	**Jul 2020**	
978-981-121-270-3	**US$158**	**£140**

CLASSIC TITLES

Principles of Fusion Energy
An Introduction to Fusion Energy for Students of Science and Engineering
by **Harms A A** *(McMaster University, Canada)*, **Kingdon D R** *(McMaster University, Canada)*, **Schoepf K F** *(University of Innsbruck, Austria)* & **Miley G H** *(University of Illinois, Urbana-Champaign, USA)*
9789812380333

Introduction to Nuclear and Particle Physics (2nd Edition)
by **Das A** *(University of Rochester, USA)* & **Ferbel T** *(University of Rochester, USA)*
9789812387448

Subatomic Physics (3rd Edition)
by **Henley E M** *(University of Washington, USA)* & **Garcia A** *(University of Washington, USA)*
9789812700575

Basics of Transport and Storage of Radioactive Materials
edited by **Saegusa T** *(CRIEP, Japan)*, **Sert G** *(IRSN, France)*, **Völzke H** & **Wille F** *(Bundesanstalt für Materialforschung und-prüfung, Germany)*
9789813234031

Nuclear Radiation Interactions
by **Yip S** *(MIT)*
9789813144538

OPTICS

Textbook

Series in Optics and Photonics

Fundamentals of Laser Optoelectronics
(2nd Edition)

by **See Leang Chin** *(Laval University, Canada)*, **Huailiang Xu** *(Jilin University, China)* & **Shuai Yuan** *(Shanghai University of Science and Engineering, China)*

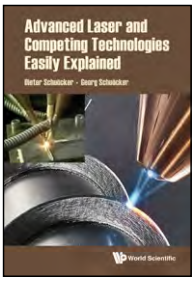
This textbook is based on a course given by the first-named author to third and fourth year undergraduate students from physics, engineering physics and electrical engineering. The purpose is to introduce and explain some of the fundamental principles underlying laser beam control in optoelectronics, especially those in relation to optical anisotropy which is at the heart of many optical devices. The book attempts to give the reader the background knowledge needed to work in a laser, optoelectronic or photonic environment, and to manage and handle laser beam equipment with ease.

Readership: Undergraduate students in physics and electrical engineering taking courses in laser optoelectronics. Graduated students and scientists working in the field.

360pp	**Jul 2022**	
978-981-125-475-8	**US$108**	**£85**
978-981-125-498-7(pbk)	**US$58**	**£45**

Textbook

Advanced Laser and Competing Technologies Easily Explained



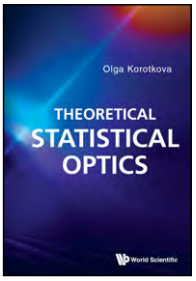
by **Dieter Schuöcker** *(Technical University of Vienna, Austria)* & **Georg Schuöcker**

High power lasers and their industrial applications have evolved rapidly during the last decades and now offer improved performance over classical methods in cutting or welding, and new techniques such as 3D-printing of metals. This book treats the basic principles underlying laser technology, including long-time-used equipment and processes but also the most recent advances. It makes detailed comparison between lasers and competing technologies for engineers to understand the benefit of lasers in enhancing production speed, quality, and reducing cost. Co-authored by a physicist and a senior engineer in manufacturing, this book is written with practicality in mind and in a friendly style that can be read by people without a broad basis in physics.

Readership: Professionals in Mechanical, electrical, physical and materials engineering and production.

224pp	**Feb 2022**	
978-981-124-635-7	**US$78**	**£60**

Theoretical Statistical Optics

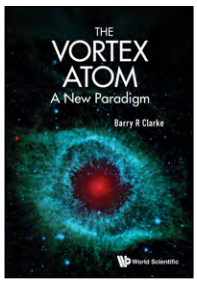


by **Olga Korotkova** *(University of Miami, USA)*

This monograph reviews classical and recent results in theoretical statistical optics in connection with stationary and non-stationary (pulsed) optical source characterization and modeling. It discusses various phenomena of random light propagating in free space, and its interaction with optical systems, extended media and particulate collections. The text includes a large number of math models, examples and illustrations. A brief statistical description of four fundamental experiments relating to random light: spatial and temporal field interference, intensity interferometry and phase conjugation, is also included in order to relate the analytical descriptions with practical observations.

280pp	**Aug 2021**	
978-981-123-497-2	**US$98**	**£85**

The Vortex Atom
A New Paradigm

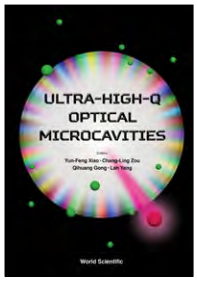


by **Barry R Clarke** *(Brunel University, UK)*

This is an entirely original examination of unsolved problems in theoretical physics. Working with the latest experimental data in photonics, the author proposes a solution to the wave-particle dilemma based on an array of circular-polarized rays. The Bose – Einstein counting procedure is recast in terms of distinguishable elements. Finally, a vortex model of a 'particle' is developed based on a trapped photon. This consists of a single ray revolving around a toroidal surface, and allows a geometrical definition of mass, electric potential, and magnetic momentum. With the adjustment of two parameters, values to 4 dp for the hyperfine frequencies (MHz) of hydrogen can be obtained for which a computer program is available.

304pp	**Apr 2021**	
978-981-122-758-5	**US$98**	**£85**

Ultra-High-Q Optical Microcavities



edited by **Yun-Feng Xiao** *(Peking University, China)*, **Chang-Ling Zou** *(University of Science and Technology of China, China)*, **Qihuang Gong** *(Peking University, China)* & **Lan Yang** *(Washington University in St. Louis, USA)*

Whispering gallery microcavities confine photons by means of continuous total internal reflection along a curved and smooth surface. The long photon lifetime, strong field confinement, and in-plane emission characteristics make them promising candidates for enhancing light-matter interactions on a chip. This book introduces different ultra-high-Q whispering gallery microcavities and their applications in enhancing light-matter interaction, such as ultralow-threshold microlasing, highly sensitive optical biosensing and nonlinear optics.

Readership: Researchers in Optics and Laser Physics and related fields, such as quantum mechanics, nanomaterials, nanostructures and applied physics.

412pp	**Nov 2020**	
978-981-4566-06-3	**US$148**	**£130**

CLASSIC TITLES

Quantum Optics for Experimentalists
by **Ou Z J** *(Indiana University - Purdue University Indianapolis, USA)*
9789813220201

Short Pulse Laser Interactions with Matter: An Introduction
by **Gibbon P** *(Research Centre Jülich, Germany)*
9781860941351

Optical Trapping and Manipulation of Neutral Particles Using Lasers: A Reprint Volume with Commentaries
by **Ashkin A** *(Retired, former head of Laser Science Research Department, Bell Laboratories, Lucent Technologies, USA)*
9789810240585

Introduction to Geometrical Optics
by **Katz M** *(State University of New York, USA)*
9789812382245

Scattering and Diffraction in Physical Optics (2nd Edition)
by **Nieto-Vesperinas M** *(Instituto de Ciencia de Materiales de Madrid, Spain)*
9789812563408

Nonlinear Optics (4th Edition)
by **Bloembergen N** *(Harvard)*
9789810225995

PARTICLE PHYSICS / HIGH ENERGY PHYSICS, QUANTUM FIELDS

Textbook

Special Topics in Accelerator Physics

by **Alexander Wu Chao** *(SLAC National Accelerator Laboratory, USA)*

As accelerator physics evolved to meet the ever-increasing needs of society, many of its branches developed into special topics of research by their own rights. With this view, the author presents a selection of these special topics in this volume. Although not exhaustive, they are chosen to present accelerator physics as a diversified and exciting field with both theoretical depth and industrial applications. The reader is assumed to have basic knowledgeable of accelerator physics. Otherwise, the book is self-contained and suitable as an advanced level textbook.

Readership: Accelerator, high-energy, nuclear, plasma and applied physicists.

712pp	**Nov 2022**	
978-981-125-349-2	**US$188**	**£150**

Textbook

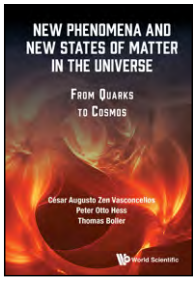
Electroweak Symmetry and its Breaking

by **Regina Demina** *(University of Rochester, USA)* & **Aran Garcia-Bellido** *(University of Rochester, USA)*

The unified theory of electroweak interactions was developed over 50 years ago. The Higgs scalar field named after one of the theorists that proposed it, is believed to be responsible for the breaking of the electroweak symmetry. Yet, it is only now after the discovery of the Higgs boson in 2012 by the LHC experiments, that we can study the mechanism of the electroweak symmetry breaking. This book discusses the theoretical developments that led to the construction of this theory, the discovery and the experimental observations that need to come to fully establish the validity of the model.

300pp	**Nov 2022**	
978-981-122-224-5	**US$98**	**£85**

New Phenomena and New States of Matter in the Universe



From Quarks to Cosmos

edited by **César Augusto Zen Vasconcellos** *(Universidade Federal do Rio Grande do Sul, Brazil & ICRANet, Italy)*, **Peter Otto Hess** *(Universidad Nacional Autó noma de México, Mexico)* & **Thomas Boller** *(Max Planck Institute for Gravitational Physics, Germany)*

Recent discoveries in astrophysics as well as experiments on particle and nuclear physics have blurred the traditional boundaries of physics. It is believed that at the birth of the Universe, a whirlwind of matter and antimatter, of quarks and exotic leptons, briefly appeared and merged into a sea of energy. The new phenomena and new states of matter in the Universe revealed the deep connection between quarks and the Cosmos. Motivated by these themes, this book discusses different topics: gravitational waves, dark matter, dark energy, exotic contents of compact stars, high-energy and gamma-ray astrophysics, heavy ion collisions and the formation of the quark – gluon plasma in the early Universe. It presents some of the latest researches on these fascinating topics and is useful for experts and students in the field.

Readership: Graduate students and researchers in high energy physics and astrophysics.

300pp	**Nov 2022**	
978-981-122-090-6	**US$118**	**£105**

The Alpha Sequence

by **Malcolm H Mac Gregor**

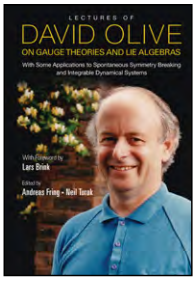
Key Features:

- This book is centered on a surprising Tevatron and LHC experimental result that both the masses and *lifetimes* of elementary particles are α-quantized, where α ≈ 1/137 is the fine-structure constant.
- Other studies published by physicists about the number 137 have assumed the electron to be a point. On the contrary, the author's model is based on a rotating spherical electron which has a *mechanical mass*. The model has been verified in experiments.
- The number 137 acts as a conjugate unit for the sequential transformation of photon bundles (packets) into atomic entities that support all of the matter of the universe.

150pp	**Aug 2022**	
978-981-125-232-7	**US$78**	**£60**

Textbook

Lectures of David Olive on Gauge Theories and Lie Algebras



With Some Applications to Spontaneous Symmetry Breaking and Integrable Dynamical Systems With Foreword by Lars Brink

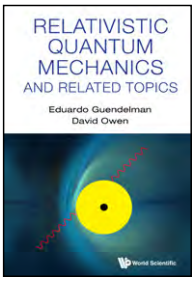
edited by **Andreas Fring** *(City, University of London, UK)* & **Neil Turok** *(Perimeter Institute for Theoretical Physics, Canada)*

Professor David Olive was a renowned British theoretical physicist who made seminal contributions to superstrings, quantum gauge theories and mathematical physics, for which he was awarded the Dirac Medal together with his long-standing collaborator Peter Goddard. These lectures, delivered by David Olive in 1982 at the University of Virginia, show his visionary conjectures and exceptionally clear and insightful style of exposition. They provide a pedagogical, self-contained introduction to some of the most complex topics in quantum gauge theory, such as Lie algebras, electromagnetic duality and integrable models.

Readership: Graduate students and academics interested in quantum field theory.

170pp	**Sep 2021**	
978-981-3237-57-5	**US$68**	**£60**

Relativistic Quantum Mechanics and Related Topics



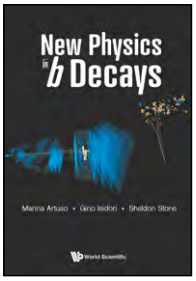
by **Eduardo Guendelman** *(Ben Gurion University, Israel)* & **David Owen** *(Ben Gurion University, Israel)*

This book describes Relativistic Quantum Mechanics starting from the free field equations for spin-zero particles and for spin-one-half particles, leading to the Klein – Gordon equation and Dirac equations. Interactions of these particles with the electromagnetic field through minimal coupling are introduced as well as other particle interactions.

Contents: Preliminaries; The Relativistic Principle; Klein – Gordon Equation & its Physical Applications; The Dirac Equation; Photon – Electron Interactions; Feynman Diagrams; Non-Abelian Gauge Theories; Weak Interactions; Bibliography;

181pp	**Jun 2022**	
978-981-124-875-7	**US$78**	**£70**

New Physics in *b* Decays



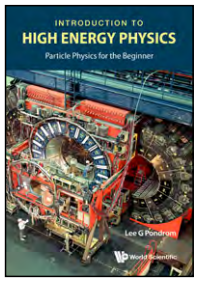
by **Sheldon Stone** *(Syracuse University, USA)*, **Marina Artuso** *(Syracuse University, USA)* & **Gino Isidori** *(University of Zurich, Switzerland)*

The Standard Model (SM) of particle physics has withstood thus far every trial by experimentalists who are searching for violation to the theory. We discuss the SM in some detail, focusing on the mechanism of fermion mixing, which represents one of its most intriguing aspect. We discuss how this mechanism can be tested in *b*-quark decays, and how it can be used to extract information on physics beyond the SM. Particular attention is devoted to recent results from *b* decays into a hadron, a lepton and an anti-lepton, that show discrepancies with the SM predictions — the so-called B-physics anomalies — whose statistical significance has been increasing steadily. We discuss these experiments in a detailed manner, and also provide theoretical interpretation of these results in terms of physics beyond the SM.

200pp	**Jun 2022**	
978-981-125-129-0	**US$88**	**£70**

Textbook

Introduction to High Energy Physics



Particle Physics for the Beginner

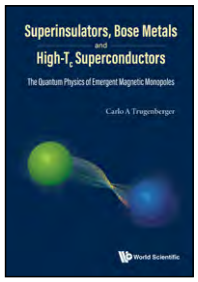
by **Lee G Pondrom** *(University of Wisconsin – Madison, USA)*

The goal of the book is to enable undergraduates or fresh graduate students to understand and enjoy the fascinating subject of elementary particle physics. Each topic has been selected for its accessibility to as wide an audience as possible, without any compromise in mathematical sophistication. The text covers the derivations of many essential formula and details the various steps and clever tricks, and how to avoid pitfalls. A wealth of end-of-chapter exercises are provided to enhance the reader's understanding of the material.

Readership: Advanced undergraduate and graduate physics students.

450pp	**Apr 2022**	
978-981-122-209-2	**US$118**	**£105**
978-981-122-301-3(pbk)	**US$68**	**£60**

Superinsulators, Bose Metals and High-T_c Superconductors



The Quantum Physics of Emergent Magnetic Monopoles

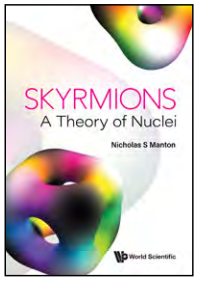
by **Carlo A Trugenberger** *(SwissScientific Technologies SA, Switzerland)*

In 1931 Dirac showed that magnetic monopoles, while classically forbidden in a gauge theory, are allowed alongside electric charges in a quantum theory of electromagnetism. This book is about the physical effects of such emergent magnetic monopoles. These range from a new mechanism for local, strong pairing of electrons possibly relevant for high-T superconductivity, to the formation of a new quantum phase of matter when monopoles condense. In such a condensate the electric interaction becomes extremely strong, so much so that only extended neutral states survive, with the consequence of an infinite resistance, even at finite temperatures. This state, called a superinsulator, is a dual superconductor and has been experimentally detected in various materials. Magnetic monopoles might thus have been hiding in plain sight where no one was looking for them for a long time.

Readership: Theoretical physicists in the fields of quantum field theory/ high energy and condensed matter physics

240pp	**May 2022**	
978-981-125-095-8	**US$88**	**£75**

Skyrmions — A Theory of Nuclei



by **Nicholas S Manton** *(University of Cambridge, UK)*

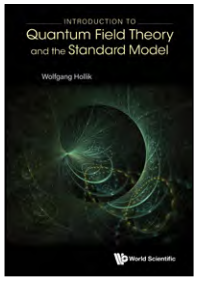
Skyrmions — A Theory of Nuclei surveys 60 years of research into the brilliant and imaginative idea of Tony Skyrme that atomic nuclei can be modelled as topologically stable states, known as Skyrmions.

The author summarises the particle and field theory background, then presents Skyrme field theory together with the mathematics needed to understand it. Many beautiful and surprisingly symmetric Skyrmions are described and illustrated. A later chapter explores variants of Skyrme theory, incorporating mesons heavier than pions, and extending the basic theory to include particles like kaons that contain strange quarks. The final chapter introduces the Sakai – Sugimoto model, which relates Skyrmions to gauge theory instantons in a higher-dimensional framework inspired by string theory.

320pp	**May 2022**	
978-1-80061-247-1	**US$108**	**£85**

Textbook

Introduction to Quantum Field Theory and the Standard Model



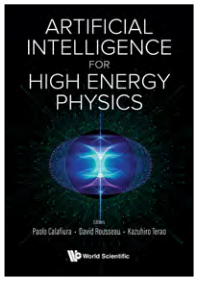
by **Wolfgang Hollik** *(Max Planck Institute for Physics, Germany)*

Based on the lectures given at TU Munich for third-year physics students, this book provides the basic concepts of quantum field theory and particle physics. It covers relativistic quantum field theory, perturbation theory, Feynman graphs, Abelian and non-Abelian gauge theories, with application to QED, QCD, and the electroweak Standard Model. The later chapters introduce phenomenology of W and Z bosons, Higgs bosons, as well as recent experimental results, precision tests and current status of the Standard Model. Explicit derivations are given and calculations are included for specific examples so that the reader can perform practical calculations for scattering amplitudes, cross sections and decay rates wat lowest order.

Readership: Advanced undergraduate and graduate students interested in experimental and theoretical particle physics.

212pp	**Feb 2022**	
978-981-124-217-5	**US$68**	**£60**

Artificial Intelligence for High Energy Physics



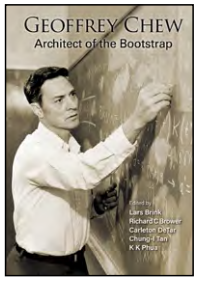
edited by **Paolo Calafiura** *(Lawrence Berkeley National Laboratory, USA)*, **David Rousseau** *(Laboratoire de Physique des 2 Infinis Irè ne Joliot-Curie, France)* & **Kazuhiro Terao** *(SLAC National Accelerator Laboratory, USA)*

Key Features:

- The 19 reviews in this book offer a self-contained, pedagogical introduction to ML models' real-life applications in HEP, written by some of the foremost experts in this area.
- It provides the reader with state-of-the-art tools to address classic HEP research problems and with the foundations to develop methods to solve new ones
- This book bridges the gap between introductory general-purpose machine learning texts and cutting-edge research papers in AI applied to HEP. This is a handy resource for new student or researcher entering the field.

720pp	**Mar 2022**	
978-981-123-402-6	**US$188**	**£165**

Geoffrey Chew: The Architect of Bootstrap



edited by **Lars Brink** *(Chalmers University of Technology, Sweden)*, **Richard C Brower** *(Boston University, USA)*, **Carleton DeTar** *(University of Utah, USA)*, **Chung-I Tan** *(Brown University, USA)* & **K K Phua** *(Founding Director Emeritus IAS NTU, Singapore)*

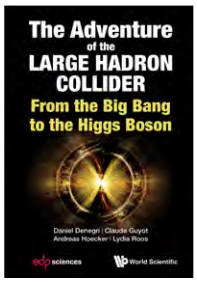
This special volume is dedicated to Geoffrey Chew who passed away in 2019 at age 94. From the Chew-Low theory for meson-nucleon scattering to Analytic S-Matrix, Regge Poles, and Bootstrap principle, his originality left its mark in ways that continue to the present. With contributions from Chew's former collaborators, students, and friends, the book will cover various facets of his life and impact on physics.

Contributors include: Steven Weinberg, Steven Frautschi, Gabriele Veneziano, Peter Landshoff, Carl Rosenzweig, Basarab Nicolescu, William Frazer, David Gross, John Schwartz, Ling-Lie Chau, Chung-I Tan, Richard Brower, Carleton DeTar, R Shankar, David Kaiser, Fritjof Capra, and others.

330pp	**Dec 2021**	
978-981-121-982-5	**US$98**	**£85**

Textbook

The Adventure of the Large Hadron Collider



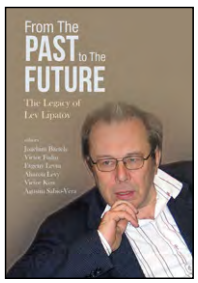
From the Big Bang to the Higgs Boson
by **Daniel Denegri** *(Paris-Saclay University, France)*, **Claude Guyot** *(Paris-Saclay University, France)*, **Andreas Hoecker** *(CERN, Switzerland)* & **Lydia Roos** *(Sorbonne University, France)*

Foreword by **Carlo Rubbia, Nobel laureate in Physics 1984**

This book gives a lively and accessible view of the amazing scientific adventure of the Large Hadron Collider (LHC). The authors are researchers from CERN, CEA and CNRS (France), and deeply engaged in the LHC program. Beginning with an introduction to the world of quarks and leptons, and of particle interactions governed by fundamental symmetries of nature, they describe the many facets of the LHC project and its associated experiments, most notably the discovery of the Higgs boson.

600pp	**Dec 2021**	
978-981-3236-08-0	**US$98**	**£86**

From the Past to the Future

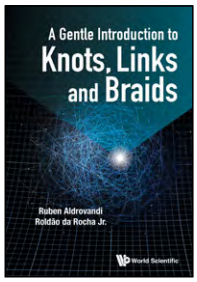


The Legacy of Lev Lipatov
edited by **Joachim Bartels** *(Hamburg University, Germany)*, **Victor Fadin** *(Russian Academy of Sciences, Russia)*, **Eugene Levin** *(Tel Aviv University, Israel)*, **Aharon Levy** *(Tel Aviv University, Israel)*, **Victor Kim** *(National Research Center "Kurchatov Institute", Russia & Saint Petersburg Polytechnic University, Russia)* & **Agustin Sabio-Vera** *(Universidad Autonoma de Madrid, Spain)*

This book honors Lev Nikolaevich Lipatov as a person and as one of the leading scientists in theoretical high energy physics. It begins with three articles on Lev as a person, written endearingly by family members and friends. The reminiscence is followed by 18 articles by Lev's close collaborators. They summarize parts of Lev's achievements, present new results which are based upon Lev's work, and paint an outlook on possible future developments.

600pp	**Dec 2021**	
978-981-123-111-7	**US$158**	**£140**

A Gentle Introduction to Knots, Links and Braids



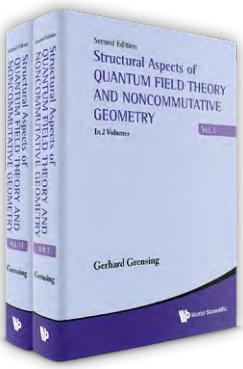
by **Ruben Aldrovandi** *(São Paulo State University (UNESP), Brazil)* & **Roldão da Rocha Jr.** *(Federal University of ABC, Brazil)*

This book presents a self-contained guide to knots, braids, links, and polynomial invariants which are powerful and developing techniques that rise up to the challenges in String Theory, Quantum Field Theory, and Statistical Physics. It introduces readers to Knot Theory and its applications through formal and practical (computational) methods, with clarity and minimal demand of requisite knowledge on the subject. Exercises are provided at the end of each chapter

216pp	**Nov 2021**	
978-981-124-848-1	**US$98**	**£85**
978-981-124-932-7(pbk)	**US$58**	**£50**

Textbook

Structural Aspects of Quantum Field Theory and Noncommutative Geometry



(2nd Edition) (In 2 Volumes)
by **Gerhard Grensing** *(University of Kiel, Germany)*

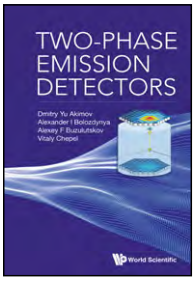
Reviews of the First Edition:
"The book is primarily addressed to physicists. Nevertheless, as numerous examples are known in which exploration of the land where physics and mathematics overlap (and which quantum field theory definitely belongs to) resulted in important developments in mathematics, many mathematicians may also find this book interesting and even inspiring."

MathSciNet

This book on quantum field theory is divided into two volumes. The first volume serves as a textbook on main techniques and results of quantum field theory, while the second deals with more recent developments, in particular the subject of quantum groups and noncommutative geometry, and their interrelation. The second edition is extended by additional material, mostly concerning the impact of noncommutative geometry on theories beyond the standard model of particle physics.

1700pp	**Sep 2021**	
978-981-123-701-0(SET)	**US$258**	**£225**

Two-Phase Emission Detectors



by **Alexander I Bolozdynya** *(Institute for Theoretical and Experimental Physics, Russia & National Research Nuclear University, Russia)*, **Dmitry Yu Akimov** *(National Research Nuclear University, Russia)*, **Alexey F Buzulutskov** *(Budker Institute of Nuclear Physics, Russia & Novosibirsk State University, Russia)* & **Vitaly Chepel** *(University of Coimbra, Portugal)*

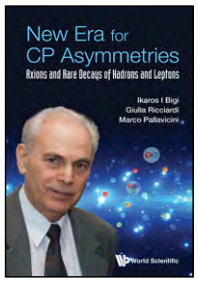
Particle and astrophysical processes of extremely low cross sections, such as the study of neutrino and the search for WIMPs, require efficient large-mass detectors capable of detecting small energy releases down to electrons. This monograph is devoted exclusively to two-phase emission detectors, an effective method to achieve this purpose. The authors consider the technology's basic features while taking into account new experimental practice in the last ten years. This comprehensive review will be of interest to specialists and new generations of physicists involved in related experiments.

250pp	**Aug 2021**	
978-981-123-108-7	**US$98**	**£85**

New Era for CP Asymmetries

Axions and Rare Decays of Hadrons and Leptons

by **Ikaros I Bigi** *(University of Notre Dame, USA)*, **Giulia Ricciardi** *(Universitàdi Napoli Federico II, Italy)* & **Marco Pallavicini** *(University of Genova, Italy)*



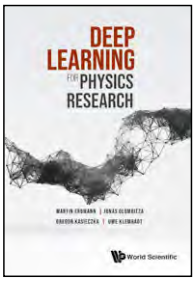
This book is dedicated to Lev Okun, who passed away in November 2015. It has two objectives. First is to showcase Okun's impact in particle physics since 1963, when he published his remarkable book *Weak Interaction of Elementary Particles*. Second is to present the current progress of our scientific community in the studies of our Universe. The authors mostly focus on CP asymmetries in the transitions of hadrons and leptons, but they also discuss their rare decays, and talk about axions and supersymmetry, and possible connections with dark matter, extra dimensions, baryogenesis and multiverse.

350pp	**Jul 2021**	
978-981-3233-07-2	**US$118**	**£105**

Textbook

Deep Learning for Physics Research

by **Martin Erdmann** *(RWTH Aachen University, Germany)*, **Jonas Glombitza** *(RWTH Aachen University, Germany)*, **Gregor Kasieczka** *(University of Hamburg, Germany)* & **Uwe Klemradt** *(RWTH Aachen University, Germany)*



A core principle of physics is knowledge gained from data. Thus, deep learning has instantly entered physics and may become a new paradigm in basic and applied research. This textbook addresses physics students and physicists who want to understand what deep learning actually means, and what is the potential for their own scientific projects. Being familiar with linear algebra and parameter optimization is sufficient to jump-start deep learning. Simple hands-on exercises are offered for implementing deep networks, for which Python code and training data can be downloaded.

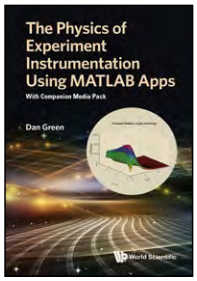
Readership: Physicists worldwide looking for a practical introduction to the technology of deep learning, students who wish to get started in a subfield of artificial intelligence.

340pp	**Jun 2021**	
978-981-123-745-4	**US$98**	**£85**

The Physics of Experiment Instrumentation Using MATLAB Apps

With Companion Media Pack

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



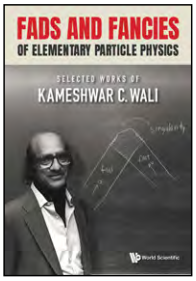
Some twenty years ago the author published a book entitled *The Physics of Particle Detectors*. Much has evolved since that time, not in the basic physics, but in the complexity, number and versatility of the detectors in common use in both experiments, beam-lines and accelerators. The present volume explores the physics needed to understand the full suite of front-end devices in use today. In particular, the physics concepts is explained concurrently with the discussion of specific device, thus making the coupling more immediate. That study is made more interactive by using newer educational tools now available such as dynamic Matlab Apps.

264pp	**Apr 2021**	
978-981-123-243-5	**US$88**	**£75**
978-981-123-383-8(pbk)	**US$38**	**£35**

Fads and Fancies of Elementary Particle Physics

Selected Works of Kameshwar C Wali

edited by **Kameshwar C Wali** *(Syracuse University, USA)*



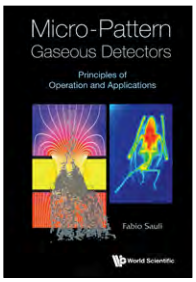
As known to many physicists, theoretical fancies are not always realized in experimental research. The book explores this important aspect of elementary particle physics through the author's work over the last six decades (1957 – 2017). This compilation of selected papers offers valuable insights into the predominant challenges that occupied theoretical physicists over the most part of the last century. They will continue to be of interest to physicists and students pursuing advanced courses in particle physics and historians interested in this aspect.

492pp	**May 2021**	
978-981-123-690-7	**US$148**	**£130**

Micro-Pattern Gaseous Detectors

Principles of Operation and Applications

by **Fabio Sauli** *(CERN, Switzerland)*



Key Features:

- Authored by the inventor of the Gas Electron Multiplier — an instrument widely used in particle physics and other applied fields
- Details the most basic observations, measurements and applications of advanced micro-pattern gaseous devices
- Covers uniquely the MPGD technologies and applications

Readership: Students and researchers in High Energy Physics; developers of detector technologies.

364pp	**Dec 2020**	
978-981-122-221-4	**US$118**	**£105**

Lattice Quantum Field Theory of the Dirac and Gauge Fields

Selected Topics

by **Belal Ehsan Baaquie** *(INCEIF, The Global University of Islamic Finance, Malaysia)*

The applications of lattice gauge theory are vast, from the study of high-energy theory and phenomenology to the numerical studies of quantum fields. This book examines the mathematical foundations of lattice gauge theory from first principles. It is an ideal guide for the study of Dirac and lattice gauge fields and lays the foundation for more advanced and specialized studies.

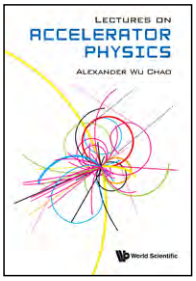
Readership: Researchers in theoretical particle physics.

316pp	**Sep 2020**	
978-981-120-969-7	**US$108**	**£95**

Textbook

Lectures on Accelerator Physics

by **Alexander Wu Chao** *(SLAC National Accelerator Laboratory, USA)*



"Alexander Chao's Lectures on Accelerator Physics is a clearly written textbook covering all the important aspects of the subject, emphasizing physical concepts and the richness of the field. I believe that it will become the standard reference text for students and anyone working in this area, so important in many parts of modern science, from the exploration of the atomic/molecular structure of matter with synchrotron radiation and free-electron lasers to that of the ultimate structure of elementary particles."

Claudio Pellegrini
Professor Emeritus, UCLA

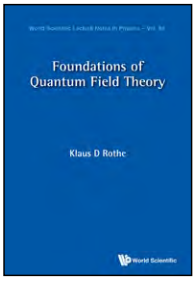
916pp	**Oct 2020**	
978-981-122-673-1	**US$228**	**£200**
978-981-122-796-7(pbk)	**US$98**	**£85**

Textbook

World Scientific Lecture Notes in Physics - Vol 84

Foundations of Quantum Field Theory

by **Klaus D Rothe** *(University of Heidelberg, Germany)*



Based on a two-semester course held at the University of Heidelberg, Germany, this book provides an adequate resource for the lecturer and the student. The contents are primarily aimed at graduate students who wish to learn about the fundamental concepts behind constructing a Relativistic Quantum Theory of particles and fields. It provides a comprehensive foundation for subsequent dives into Quantum Chromodynamics and Weak Interactions.

Key Features:

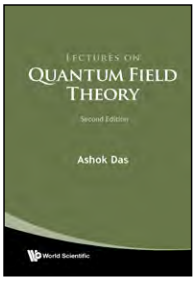
- Emphasis on the Lorentz Hilbert-space behind the second quantization
- Extensive discussion on Callan-Symanzik (CS) equation and asymptotics
- Special perspective on the Renormalization Group (RG) and its link to CS equation

352pp	**Sep 2020**	
978-981-122-192-7	**US$118**	**£105**
978-981-122-300-6(pbk)	**US$58**	**£50**

Textbook

Lectures on Quantum Field Theory (2nd Edition)

by **Ashok Das** *(University of Rochester, USA)*



Reviews of the First Edition:

"This book is a comprehensive introduction to modern quantum field theory. The topics under consideration would be of great interest for every physicist and mathematician who are interested in methods of the quantum physics."

Zentralblatt MATH

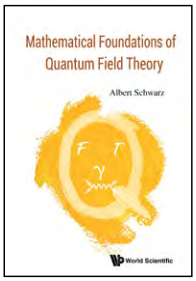
This book comprises the lectures of a two-semester course on quantum field theory, presented in an informal and personal manner. The course starts with relativistic one-particle systems, and develops the basics of quantum field theory with an analysis on the representations of the Poincaré group. The second edition includes two new chapters, one on Nielsen identities and the other on basics of global supersymmetry.

940pp	**Aug 2020**	
978-981-122-086-9	**US$198**	**£175**
978-981-122-216-0(pbk)	**US$98**	**£85**

Textbook

Mathematical Foundations of Quantum Field Theory

by **Albert Schwarz** *(University of California at Davis, USA)*



Written for both mathematicians and physicists, this book explains the theoretical formulation of quantum field theory with a mixture of rigorous proofs and heuristic arguments. It is not assumed that the reader is familiar with quantum mechanics; a short introduction to quantum mechanics is included for mathematicians.

In terms of topics, almost all other books are devoted to relativistic quantum field theory, conversely this book is concentrated on the material that does not depend on the assumptions of Lorentz-invariance and/or locality. It contains also a chapter discussing application of methods of quantum field theory to statistical physics.

460pp	**May 2020**	
978-981-3278-63-9	**US$148**	**£130**

CLASSIC TITLES

Textbook

Lectures of Sidney Coleman on Quantum Field Theory
Foreword by David Kaiser
edited by **Chen B G** *(Leiden University, Netherlands)*, **Derbes D** *(University of Chicago, USA)*, **Griffiths D** *(Reed College, USA)*, **Hill B** *(Saint Mary's College of California, USA)*, **Sohn R** *(Kronos, Inc., Lowell, USA)* & **Ting Y** *(Harvard University, USA)*
9789814635509

Quantum Field Theory II
by **Shifman M** *(University of Minnesota, USA)*
9789813234185

Field Theory: A Path Integral Approach
(3rd Edition)
by **Das A** *(University of Rochester, USA & Institute of Physics, Bhubaneswar, India)*
9789811202667

Accelerator Physics
(4th Edition)
by **Lee S Y** *(Indiana University, USA)*
9789813274785

The State of the Art of Neutrino Physics:
A Tutorial for Graduate Students and Young Researchers
edited by **Ereditato A** *(University of Bern, Switzerland)*
9789813226081

Particles and Quantum Fields
by **Kleinert H** *(Freie Universität Berlin, Germany)*
9789814740906

Handbook of Accelerator Physics and Engineering
(2nd Edition)
edited by **Chao A W** *(SLAC National Accelerator Laboratory, USA)*, **Mess K H** *(CERN)*, **Tigner M** *(Cornell)* & **Zimmermann F** *(CERN)*
9789814417174

Lattice Gauge Theories: An Introduction (4th Edition)
by **Rothe H J** *(Universität Heidelberg, Germany)*
9789814365864

Foundations of Quantum Chromodynamics: An Introduction to Perturbative Methods in Gauge Theories (3rd Edition)
by **Muta T** *(Fukuyama University, Japan)*
9789812793546

50 Years of Yang-Mills Theory
edited by **'t Hooft G** *(Utrecht University, The Netherlands)*
9789812560070

An Elementary Primer for Gauge Theory
by **Moriyasu K**
9789971950941

QUANTUM MECHANICS AND QUANTUM INFORMATION

Textbook

Quantum Computation and Information Using Continuous Variables

by **Christian Weedbrook** *(Massachusetts Institute of Technology, USA)* & **Bhaskar Roy Bardhan** *(Massachusetts Institute of Technology, USA)*

This book is an introductory text to the field of Continuous Variable Quantum Computing and Quantum Information. Continuous variables (CVs) offer an extremely important alternative to the usual qubit substrate, as it involves easy to analyze Gaussian statistics, off-the-shelf experimental components and near universal deterministic quantum gates and operations. For communications, CVs can be easily adapted to the current telecommunication infrastructures and components, offering much higher communication rates. The contents intend to cover the most exciting topics in this field.

Readership: Advanced undergraduate, graduate students and researchers working on quantum computing and quantum information.

350pp	**Feb 2023**	
978-981-3234-79-6	**US$78**	**£69**

Quantum Electrodynamics: Atoms, Lasers and Gravity

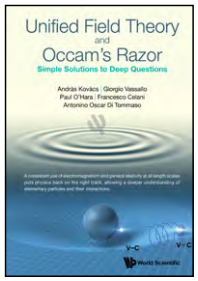
by **Ulrich D Jentschura** *(Missouri S& T University, USA)* & **Gregory S Adkins** *(Franklin and Marshall College, USA)*

This book is a much needed modernization of a classic text titled Quantum Mechanics of One- And Two-Electron Atoms (Bethe & Salpeter, 1957). It introduces readers to a variety of topics surrounding quantum field theory, notably its role in bound states, laser physics, and the gravitational coupling of Dirac particles. It discusses some rather sophisticated concepts based on detailed derivations which cannot be found elsewhere in the literature.

It is suitable for undergraduates, graduates, and researchers working on general relativity, relativistic atomic physics, quantum electrodynamics, as well as theoretical laser physics.

808pp	**Nov 2022**	
978-981-125-225-9	**US$198**	**£160**

Unified Field Theory and Occam's Razor



Simple Solutions to Deep Questions

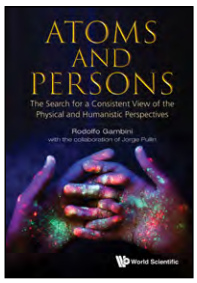
by **Andràs Kovàcs** *(BroadBit Energy Technologies, Finland)*, **Giorgio Vassallo** *(University of Palermo, Italy)*, **Paul O'Hara** *(Sophia University Institute, Italy)*, **Francesco Celani** *(INFN-LNF, Italy)* & **Antonino Oscar Di Tommaso** *(University of Palermo, Italy)*

Unified Field Theory was an expression first used by Einstein in his attempt to unify general relativity with electromagnetism. This book attempts to provide real answers to foundational questions related to this unification and should be of high interest to innovative scientists. It brings together theoretical researchers and experimentalists to present current research topics related to the foundations and unity of physics, including the composition of electrons, photons, and neutrinos, the relationship of quantum mechanics to general relativity, high-temperature superconductivity, among many others. New technology applications are outlined and theoretical results are complemented by interpretations of experimental data.

Readership: Students, researchers and practitioners studying the foundations of quantum physics, Maxwell's equations and general relativity.

398pp	**Apr 2022**	
978-1-80061-129-0	**US$128**	**£115**

Atoms and Persons



The Search for a Consistent View of the Physical and Humanistic Perspectives

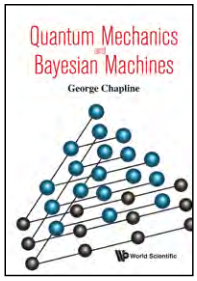
by **Rodolfo Gambini** *(University of the Republic, Uruguay)* & **Jorge Pullin** *(Louisiana State University, USA)*

What is consciousness? Does free will exist? There exists a widespread conviction that the recent discoveries in physics and biology question the traditional meaning of life and challenge the basis for our moral compass. This book aims to show that, contrary to what is usually considered, contemporary science allows us to re-evaluate the role of consciousness and human freedom without contradicting the scientific theories in place today. It discusses in detail the nature of quantum objects and the role they may have in consciousness. In particular, it presents models that allow phenomena of quantum nature to manifest themselves in the brains of animals and humans, and account for many of the properties of consciousness. Finally, the authors analyze how self-conscious and free entities like persons emerge, making compatible the scientific view with a renewed and better supported way of perceiving people, their values and culture.

Readership: People who are concerned about how to reconcile modern science and human consciousness.

150pp	**Nov 2022**	
978-981-124-113-0	**US$48**	**£40**

Quantum Mechanics and Bayesian Machines



by **George Chapline** *(Lawrence Livermore National Laboratory, USA)*

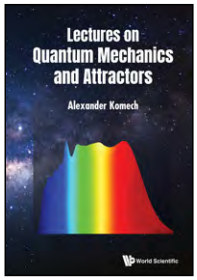
This compendium brings together the fields of Quantum Computing, Machine Learning, and Neuromorphic Computing. Written for students and researchers interested in quantum or neuromorphic computing, it provides an elementary introduction to the basics of machine learning and the possibilities for using quantum devices for pattern recognition and Bayesian decision tree problems. The volume also highlights some possibly new insights into the meaning of quantum mechanics, for example, why a description of Nature requires probabilistic rather than deterministic methods.

Readership: Academics and professionals in pattern recognition/ image analysis, machine learning, quantum mechanics and general applied maths.

100pp	**Dec 2022**	
978-981-3232-46-4	**US$68**	**£60**

Textbook

Lectures on Quantum Mechanics and Attractors



by **Alexander Komech** *(Russian Academy of Sciences, Russia & Lomonosov Moscow State University, Russia & Vienna University, Austria)*

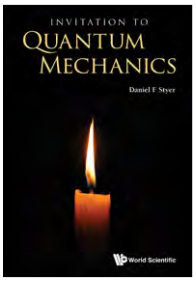
This book gives a concise introduction to quantum mechanics and related mathematical methods from the scattering theory and the theory of Partial Differential Equations. Key topics include the Schrödinger, Pauli, and Dirac equations, the corresponding conservation laws, spin, the hydrogen spectrum, and the Zeeman effect, scattering of light and particles, photoelectric effect, electron diffraction, and relations of quantum postulates with attractors of nonlinear Hamiltonian PDEs. Featuring problem sets and accompanied by extensive contemporary and historical references, this book could be used for advanced courses on quantum mechanics and is also suitable for individual study.

270pp	**Mar 2022**	
978-981-124-889-4	**US$88**	**£75**

Textbook

Invitation to Quantum Mechanics

by **Daniel F Styer** *(Oberlin College, USA)*



"Quantum mechanics has always been more than a jumble of tools. In this clear and engaging textbook, Daniel Styer invites students to explore some of the richness of quantum theory to think hard about novel concepts while building confidence and intuition with useful techniques. A marvelous, modern introduction to an essential subject."

David Kaiser
Massachusetts Institute of Technology and *author of* How the Hippies Saved Physics

Readership: Textbook for second-year undergraduate students in physics, chemistry and engineering

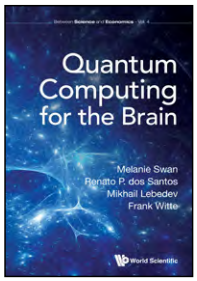
297pp	**Apr 2022**	
978-981-124-790-3	**US$88**	**£75**
978-981-124-928-0(pbk)	**US$38**	**£35**

Textbook

Between Science and Economics - Vol 4

Quantum Computing for the Brain

by **Melanie Swan** *(University College London, UK)*, **Renato P dos Santos** *(Lutheran University of Brazil, Brazil)*, **Mikhail Lebedev** *(National Research University Higher School of Economics, Russia)* & **Frank Witte** *(University College London, UK)*



"This far-ranging book explores approaches to understanding the brain through metaphorical connections to several cutting-edge information technologies and physics theories. The book proposes that these connections provide insights and tools for studying the brain and speculates on how these insights may advance neurobiology with nontraditional models of the brain. Along the way, the book provides concise surveys of the underlying concepts, motivations and applications in these fields."

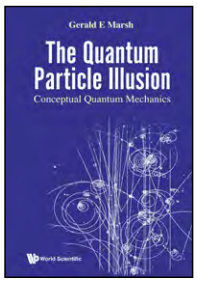
Tad Hogg
Institute for Molecular Manufacturing, USA

Readership: Thought-leaders, executives, industry strategists, research scientists, graduate students, advanced undergraduate students, policy-makers, research funding agencies, private research institutions, government regulators, investors, corporate managers, purchasing agents, and entrepreneurs in the areas of computer science, quantum computing, information theory, neuroscience, and physics.

512pp	**Apr 2022**	
978-1-80061-061-3	**US$148**	**£130**

The Quantum Particle Illusion

Conceptual Quantum Mechanics
by **Gerald E Marsh**



The historical approach to the teaching of quantum mechanics has led to difficulty understanding the foundations of the theory, primarily due to the attempts to maintain the idea of a classical particle in the context of the quantum world. This book hopes to dispel the confusion by taking a spacetime-centric approach. Because of the success of quantum mechanical calculations, those who wish to understand the foundations of the theory are often given the apocryphal advice, "just ignore the issue and calculate". It is hoped that this book will help to clear up some of the dismay, frustration, and confusion from those who refuse to take to heart this admonition.

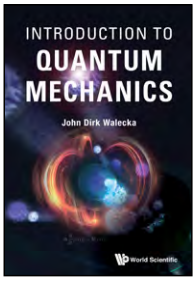
Readership: Students and physicists interested in quantum mechanics.

132pp	**Nov 2021**	
978-981-124-822-1	**US$68**	**£60**

Textbook

Introduction to Quantum Mechanics

by **John Dirk Walecka** *(College of William and Mary, USA)*

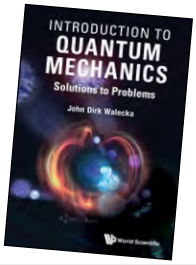


This textbook is a self-contained set of lectures on quantum mechanics, the very successful theory of the microscopic world. It is part of the author's three-book series aiming to provide a good, understandable first-year introduction to the fundamentals of physics.

The Schrödinger equation is motivated and presented. Several applications are explored, including scattering and transition rates, extending into quantum electrodynamics and quantum statistics. The lectures then arrive at a formal presentation of quantum theory together with a summary of its postulates. An extensive set of accessible problems enhances and extends the coverage.

180pp	**May 2021**	
978-981-123-472-9	**US$78**	**£70**
978-981-123-611-2(pbk)	**US$38**	**£35**

Solutions to Problems

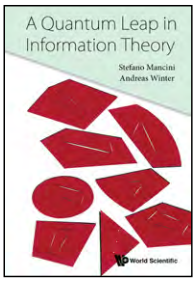


128pp	**Aug 2021**	
978-981-124-464-3	**US$28**	**£25**
978-981-124-525-1(pbk)	**US$16**	**£15**

Textbook

A Quantum Leap in Information Theory

by **Stefano Mancini** *(University of Camerino, Italy)* & **Andreas Winter** *(ICREA, Spain & Autonomous University of Barcelona, Spain)*



This is an introductory textbook on the quantum theory of information at graduate or advanced undergraduate level. It is suitable for students with diverse backgrounds, in mathematics, physics and computer science. In particular, a background in quantum mechanics is not needed, since quantum theory is used as a mere mathematical framework without entering into physical interpretations.

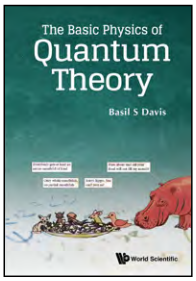
The book introduces all necessary concepts from quantum theory and classical information theory, to cover the elements of quantum Shannon theory: quantum states and channels, data compression and entropy, error correcting codes and channel capacities, as well as the basics of entanglement theory and quantum cryptography.

248pp	**May 2020**	
978-981-120-154-7	**US$88**	**£75**

Textbook

The Basic Physics of Quantum Theory

by **Basil S Davis** *(Xavier University of Louisiana, USA)*



This book is an introductory course on quantum theory accessible to anyone who is interested in obtaining an insider's knowledge of the subject, but who may not have studied physics at the college level. No mathematics is required beyond middle school algebra. The author develops the quantum theory directly from the historical experiments and shows how the abstraction of the theory is experimentally verifiable. Exercises are provided throughout the book, with answers at the back. This book is based on a course taught successfully at the undergraduate level can be used for self-study or as a textbook in an undergraduate or high school curriculum.

208pp	**Apr 2020**	
978-981-121-939-9	**US$98**	**£85**
978-981-121-995-5(pbk)	**US$48**	**£40**

Between Science and Economics - Vol 2

Quantum Computing

Physics, Blockchains, and Deep Learning Smart Networks

by **Melanie Swan** *(Purdue University, USA)*, **Renato P dos Santos** *(Lutheran University of Brazil, Brazil)* & **Frank Witte** *(University College London, UK)*

"It is an intellectual tour de force that bridges the borders between modern physics and computing and illustrates how obscure quantum-mechanical phenomena such as superposition and entanglement can ultimately result in computing applications that will severely impact our daily life in the not so distant future. I highly recommend this book for those who want to learn more about the wondrous world of quantum computing and its transformational power through smart networks, blockchain, advanced cryptography, machine learning and artificial intelligence."

Horst Treiblmaier
Modul University Vienna

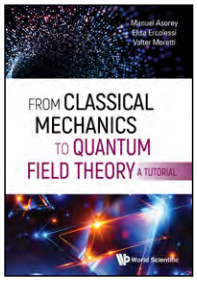
Readership: Thought-leaders, policy-makers, industry practitioners, and research scientists in the areas of computer science, blockchain, quantum information science, and theoretical physics.

400pp	**Apr 2020**	
978-1-78634-820-3	**US$138**	**£120**

Textbook

From Classical Mechanics to Quantum Field Theory, A Tutorial

by **Manuel Asorey** *(Universidad de Zaragoza, Spain)*, **Elisa Ercolessi** *(University of Bologna, Italy & INFN-Sezione di Bologna, Italy)* & **Valter Moretti** *(University of Trento, Italy & INFN-TIFPA, Italy)*



Key Features:

- Presents in one volume the different approaches to quantization, starting from the ideas of classical mechanics up to the development of quantum field theories
- Fills the gap between the mathematical-oriented and the physical-oriented literature on the subject
- Introduces the reader to current research topics in a pedagogical way

Readership: Young researchers in both mathematics and physics interested in classical mechanics and quantum field theory.

256pp	**Jan 2020**	
978-981-121-048-8	**US$88**	**£75**

CLASSIC TITLES

Principles of Quantum Computation and Information: A Comprehensive Textbook
by **Benenti G** *(Universitàd egli Studi dell'Insubria, Italy)*, **Casati G** *(Università degli Studi dell'Insubria, Italy)*, **Rossini D** *(Università di Pisa, Italy)* & **Strini G** *(Università di Milano, Italy)*
9789813279995

Problems and Solutions in Quantum Computing and Quantum Information (4th Edition)
by **Steeb W** *(University of Johannesburg, South Africa)* & **Hardy Y** *(University of the Witwatersrand, South Africa)*
9789813239289

Quantum Mechanics: A Modern Development (2nd Edition)
by **Ballentine L E** *(Simon Fraser University, Canada)*
9789814578585

Advanced Quantum Mechanics (2nd Edition)
by **Dyson F** *(IAS, Princeton)* Translated by **Derbes D** *(Laboratory Schools, University of Chicago, USA)*
9789814383417

John S Bell on the Foundations of Quantum Mechanics
edited by **Bell M** *(CERN)*, **Gottfried K** *(Cornell)* & **Veltman M** *(University of Michigan, Ann Arbor)*
9789810246884

RELATIVITY AND GRAVITATION

Textbook

Gravitational Lensing in Cosmology

by **Toshifumi Futamase** *(Kyoto Sangyo University, Japan)*

- Starts from the basics of general relativity and systematically develops the theory of gravitational lensing
- Helps students to catch up with the latest research findings
- Covers both the theory and a wide range of applications of gravitational lensing which are not available in usual textbooks of cosmology

Readership: Advanced undergraduate and graduate students in physics and astronomy.

200pp	**Sep 2022**	
978-981-3276-78-9	**US$98**	**£85**

Breakdown of Einstein's Equivalence Principle

edited by **Andrei G Lebed** *(University of Arizona, USA & Landau Institute, Russia)*

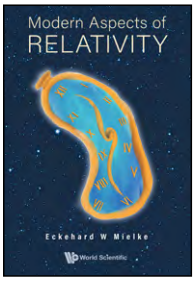
This book discusses possible violations of the Einstein's equivalence principle, an equality between inertial and gravitational masses. Considered one of the best established laws in physics, it was discovered by Galileo Galilei more than 400 years ago and was accepted by Albert Einstein as a key point of his theory of general relativity. The author describes some unusual situations where the Equivalence Principle is theoretically broken, and the design of experiments where such breakdowns can be observed. Therefore, this book suggests a real breakthrough in understanding Einstein's gravitational theory and its relation to quantum mechanics, which is a definite step towards the so-called "Theory of Everything".

150pp	**May 2022**	
978-981-125-358-4	**US$48**	**£40**

Textbook

Modern Aspects of Relativity

by **Eckehard W Mielke** *(Universidad Autó noma Metropolitana, Mexico)*



Today, Relativity is becoming an integrated aspect of engineering fields, evident in its application in the Global Positioning System (GPS). In rather expensive particle accelerators, physicists are "playing" Relativistic Billiards, commonly found in the betatrons of cancer therapy using electrons.

Against the backdrop of the applications, this book takes on a practical and intuitive approach in introducing the Lorentz invariance of light propagation and space-time concepts. The book begins with simple mathematics, like the classical Pythagoras formula for energy-momentum "triangles". Later, readers will find the intuitive vector calculus reemerging in the expansion of full relativistic expressions. Prepared with instructive diagrams of recent experiments, even the layperson can grasp the essential study of Relativity and marvel at its applications within this book.

200pp	**Mar 2022**	
978-981-124-404-9	**US$68**	**£60**

Textbook

Unusually Special Relativity

by **Andrzej Dragan** *(University of Warsaw, Poland & National University of Singapore, Singapore)*

Iconoclastic physics professor and artist Andrzej Dragan presents a unique feast of knowledge on special relativity in a straightforward, progressive manner that even a savvy high school student could follow. Using an accessible language and with only elementary math, Dragan peels back the enigmatic layers of special relativity to enable an intuitive understanding of not only the basic theory, but also more advanced topics such as Wigner rotations, Thomas precession, and Schwarzschild metric of black and white holes.

Readership: Can be used as the basis of a 65-70 hour undergraduate lecture course on Special Relativity as well as providing introductory material for advanced courses on General Relativity. Some elements of the book are appropriate for high schoolers or amateurs on their first encounter with relativistic physics.

205pp	**Dec 2021**	
978-1-80061-080-4	**US$58**	**£50**
978-1-80061-088-0(pbk)	**US$28**	**£25**

Fundamental Physics at the Vigier Centenary

"l'Hérétique de la Physique" Lives on

edited by **Richard L Amoroso** *(Noetic Advanced Studies Institute, USA)*, **Louis H Kauffman** *(University of Illinois at Chicago, USA)* & **Peter Rowlands** *(University of Liverpool, UK)*

Jean-Pierre Vigier, continually labeled l'Hérétique de la Physique (the Heretic of Physics) in French media, remains a pillar of modern mathematical physics. Unconventional works of Vigier are deemed by his followers to be critical to the evolution of physics, such as those related to extended electromagnetic theory incorporating photon mass and a longitudinal B(3) EM field, gravity, quantum theory, large-scale additional dimensions, the Dirac polarized vacuum and many more issues. This book aims to discuss the ignored portions of Vigier's work which could be relevant to implementing the Paradigm Shift to an Einsteinian Unified Field Theory and exploring physics beyond the Standard Model.

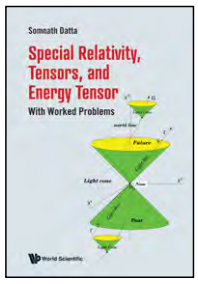
450pp	**Sep 2021**	
978-981-124-645-6	**US$138**	**£120**

Textbook

Special Relativity, Tensors, and Energy Tensor

With Worked Problems

by **Somnath Datta** *(National Council of Educational Research and Training, India)*



This textbook takes the reader from the preliminary ideas of the Special Theory of Relativity (STR) to the doorsteps of the General Theory of Relativity (GTR). It is suitable for advanced undergraduate and graduate courses in classical electrodynamics, modern physics, and relativity.

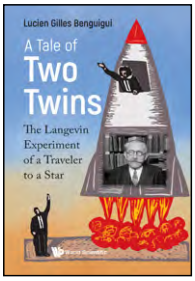
The first part explains the main concepts in a layman's language, including STR, the Lorentz transformation, relativistic mechanics. Thereafter the concept of tensors is built up in detail, especially Maxwell's stress tensor with illustrative examples. The graphs of important equations are included, and a large number of numerical examples are taken from atomic and nuclear physics.

384pp	**Mar 2021**	
978-981-122-811-7	**US$118**	**£105**

A Tale of Two Twins

The Langevin Experiment of a Traveler to a Star

by **Lucien Gilles Benguigui** *(Technion — Israel Institute of Technology, Israel)*



The thought experiment proposed by Langevin in 1911, known under the popular names, "Clock Paradox" or "Twin Paradox", is the most surprising result of the theory of Relativity. Much confusion was caused initially by this baffling phenomena even though Einstein had explained it himself, and a clear-cut answer was difficult to find even today. This book seeks to clarify how such confusion came about based on (1) the psychological difficulty to accept the theoretical results, and (2) the fact that scientific knowledge is not uniformly distributed among scientists.

Readership: Physicists, historians and philosophers; laypersons who are interested in the history and philosophy of science.

176pp	**Oct 2020**	
978-981-121-909-2	**US$68**	**£60**

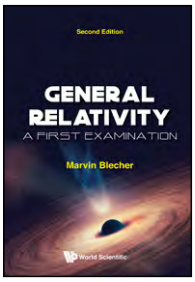
Textbook

General Relativity

A First Examination

(2nd Edition)

by **Marvin Blecher** *(Virginia Tech, USA)*



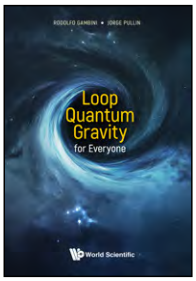
This textbook is suitable for a one-semester introduction to General Relativity for advanced undergraduates in physics and engineering. The materials are kept concise by focusing on the theoretical development without digressing too much into advanced mathematics. The exposition is lucid and the reader is exposed to a variety of analytic calculations. End-of-chapter problems are provided with detailed solutions available in the instructor's manual.

In the second edition, the famous twin paradox with acceleration is solved in full from the accelerated observer's frame. The findings of the Event Horizon Telescope (EHT) collaboration, which captured the first ever image of a black hole, are discussed in detail.

240pp	**Aug 2020**	
978-981-122-043-2	**US$78**	**£70**
978-981-122-108-8(pbk)	**US$38**	**£35**

Loop Quantum Gravity for Everyone

by **Rodolfo Gambini** *(University of the Republic, Uruguay)* & **Jorge Pullin** *(Louisiana State University, USA)*



"This slender volume discusses applications of LQG to black holes and cosmology and introduces the notion of spin foam, acknowledging that as yet the theory, though elegant, has no experimental confirmation ... This book offers a fascinating introduction to an esoteric realm otherwise accessible to only a fortunate few. Summing Up: Highly recommended. Upper-division undergraduates. Graduate students and faculty researchers."

CHOICE

104pp	**Mar 2020**	
978-981-121-195-9	**US$28**	**£25**

CLASSIC TITLES

One Hundred Years of General Relativity: From Genesis and Empirical Foundations to Gravitational Waves, Cosmology and Quantum Gravity **(In 2 Volumes)**
edited by **Ni W** *(National Tsing Hua University, Hsinchu, Taiwan)*
9789814635127

100 Years of General Relativity - Vol 5
Advanced Interferometric Gravitational-Wave Detectors (In 2 Vols.)
edited by **Reitze D** *(California Institute of Technology, USA)*, **Saulson P** *(Syracuse University, USA)* & **Grote H** *(Cardiff University, UK)*
9789813146075

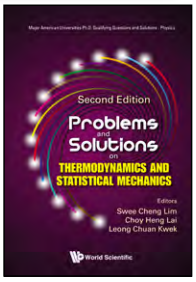
Special Relativity for Beginners
A Textbook for Undergraduates
by **Freund J** *(Schubart College, Germany)* 9789812771605

Loop Quantum Gravity: The First 30 Years
edited by **Ashtekar A** *(Pennsylvania State University, USA)* & **Pullin J** *(Louisiana State University, USA)* 9789813209930

Lectures on Gravitation
by **Das A** *(University of Rochester, USA & Saha Institute of Nuclear Physics, India)* 9789814329385

STATISTICAL PHYSICS, COMPLEXITY AND NONLINEAR SCIENCE (INCLUDING HEAT AND THERMODYNAMICS)

Study Guide



Major American Universities Ph.D. Qualifying Questions and Solutions - Physics

Problems and Solutions on Thermodynamics and Statistical Mechanics (2nd Edition)

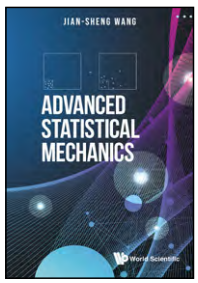
edited by **Swee Cheng Lim**, **Choy Heng Lai** & **Leong Chuan Kwek** *(National University of Singapore, Singapore)*

The volume compiles carefully selected questions at the PhD qualifying exam level, including many actual questions from University of Chicago, MIT, Princeton University, etc. The problems range from fundamental to advanced in a wide range of topics on thermodynamics and statistical physics, easily enhancing the student's knowledge through workable exercises. Topics covered in this book include the laws of thermodynamics, phase changes, Maxwell-Boltzmann statistics and kinetic theory of gases.

Readership: Lecturers, postgraduates and advanced undergraduates in physics.

404pp	**Dec 2021**	
978-981-125-080-4	**US$118**	**£105**
978-981-125-192-4(pbk)	**US$48**	**£40**

Textbook



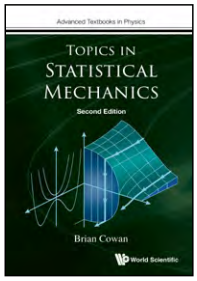
Advanced Statistical Mechanics

by **Jian-Sheng Wang** *(National University of Singapore, Singapore)*

This short textbook covers roughly one semester (13 weeks) of lectures on advanced statistical mechanics at the graduate level. The first half of the book begins with a brief introduction to the theory of ensembles and quantum statistical mechanics with density matrix. The author then expounds on advanced topics include the mean-field theory for phase transitions, the Ising models and their exact solutions, and critical phenomena and their scaling theory. The second half of the book studies nonequilibrium statistical mechanics, which includes the Brownian motion, the Langevin and Fokker-Planck equations, etc., ending with a brief discussion of irreversibility. The topics are supplemented by problem sets (with partial answers) and supplementary readings up to the latest research, such as heat transport with a Fokker-Planck approach.

216pp	**Nov 2021**	
978-981-124-214-4	**US$68**	**£60**

Textbook



Advanced Textbooks in Physics

Topics in Statistical Mechanics (2nd Edition)

by **Brian Cowan** *(Royal Holloway University of London, UK)*

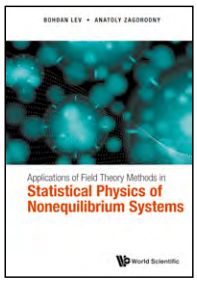
Reviews of the First Edition:

"Cowan has managed to capture the rich field of statistical mechanics in a concise and truly excellent exposition. His text should be accessible to good advanced undergraduates, and certainly to first- or second-year graduate students in physics, mathematics, or engineering."

Mathematical Reviews

Building on the material learned by students in their first few years of study, this textbook presents an advanced course on statistical mechanics and thermodynamics. The second edition has been revised particularly to help the self-learners. Details of *Mathematica* calculations are provided in most cases, and an accessible discussion of quantum gases is added.

502pp	**Aug 2021**	
978-1-78634-978-1	**US$138**	**£120**
978-1-78634-990-3(pbk)	**US$68**	**£60**



Applications of Field Theory Methods in Statistical Physics of Nonequilibrium Systems

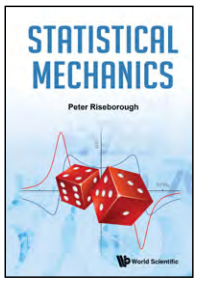
by **Bohdan Lev** & **Anatoly Zagorodny** *(National Academy of Science of Ukraine, Ukraine)*

Key Features:

- Describes interacting many-particle systems with a unified approach combining the methods of statistical physics and quantum field theory
- Covers in detail the quantum field theory approach and related topics, including path integration, saddle-point and stationary-phase methods, Hubbard-Stratonovich transformation, mean-field theory, and functional integrals
- Applies the general approach to solve various practically important problems (gravitating gas, Coulomb-like systems, thermodynamics of cellular structures, etc.)

352pp	**Mar 2021**	
978-981-122-997-8	**US$118**	**£105**

Textbook



Statistical Mechanics

by **Peter Riseborough** *(Temple University, USA)*

Key Features:

- Elucidates the basis of thermodynamics and provides a foundation for the understanding of not only the thermodynamic properties of a microscopic system, but also their fluctuations, correlations and close-to-equilibrium properties.
- Provides much of the mathematical details that, otherwise, may hinder students mastering the subject
- Includes material on quantum statistics that is frequently overlooked in current texts, but forms an important aspect of current research into quantum systems

Readership: Advanced undergraduate and graduate students reading a course in Statistical Mechanics or Statistical Physics.

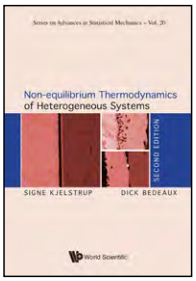
692pp	**Nov 2020**	
978-981-122-342-6	**US$158**	**£140**
978-981-122-424-9(pbk)	**US$88**	**£75**

Series on Advances in Statistical Mechanics - Vol 20

Non-equilibrium Thermodynamics of Heterogeneous Systems

(2nd Edition)

by **Signe Kjelstrup** & **Dick Bedeaux**
(Norwegian University of Science and Technology, Norway)



Review of the First Edition:

"This textbook may serve as a basis for an introductory course on the theory of non-equilibrium thermodynamics in heterogeneous media. It will appeal to both mathematicians and mathematics graduate students. The reader will find useful complementary materials included: a large number of good examples and exercises are solved for the benefit of the reader."

Mathematical Reviews

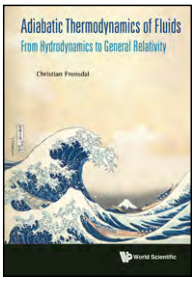
Readership: Graduate students, researchers, lecturers and professionals in physics, nanoscience and surface science.

492pp	**Sep 2020**	
978-981-121-676-3	**US$158**	**£140**

Adiabatic Thermodynamics of Fluids

From Hydrodynamics to General Relativity

by **Christian Fronsdal** *(University of California, Los Angeles, USA)*



This book describes the interaction of dynamical metric with extended distributions of matter. It will be shown that any theory of interacting fields that includes the Einsteinian metric must be based on an action principle. This allows us, for the first time, to use "energy" as a precise concept in vortex dynamics. The theory discussed in this book is applicable to rotating planets, Couette flow, tresses in fluids (inside the meniscus, negative pressures), immiscible fluids, amongst others.

Readership: Graduates, physicists and engineers interested in hydrodynamics and thermodynamics.

350pp	**Sep 2020**	
978-981-120-067-0	**US$128**	**£115**

Textbook

Lectures on Statistical Mechanics

by **Berthold-Georg Englert**
(National University of Singapore, Singapore)

These lecture notes cover Statistical Mechanics at the level of advanced undergraduates or postgraduates. After a review of thermodynamics, statistical ensembles are introduced, then applied to ideal gases, including degenerate gases of bosons and fermions, followed by a treatment of systems with interaction, of real gases, and of stochastic processes.

The book offers a comprehensive account of material that can and has been covered in a one-semester course for students with a basic understanding of thermodynamics and a solid background in classical mechanics. The presentation does not skip the technical details which renders the book particularly well-suited for the self-studying student

308pp	**Jul 2020**	
978-981-122-457-7	**US$98**	**£85**
978-981-122-554-3(pbk)	**US$49**	**£45**

CLASSIC TITLES

Principles of Classical Thermodynamics: Applied to Materials Science
by **De Fontaine D** *(University of California, Berkeley, USA)*
9789811221439

The Statistical Foundations of Entropy
by **Ramshaw J D** *(Portland State University, USA)*
9789813234123

Introduction to Statistical Mechanics
by **Walecka J D** *(College of William and Mary, USA)*
9789814366212

Statistical Mechanics
by **Ma S**
9789971966072

PROCEEDINGS (2020/2021)

Particle Physics at the Year of 150th Anniversary of the Mendeleev's Periodic Table of Chemical Elements - The Nineteenth Lomonosov Conference on Elementary Particle Physics
edited by **Studenikin A I** *(Moscow State University, Russia & Joint Institute for Nuclear Research (Dubna), Russia)*
9789811233906

Gribov-90 Memorial Volume: Field Theory, Symmetry, and Related Topics - The Memorial Workshop Devoted to the 90th Birthday of V N Gribov
edited by **Dokshitzer Y L** *(Laboratoire de Physique Théorique et Hautes Énergies, France)*, **Lévai P** *(Wigner Research Centre for Physics, Hungary)*, **Lukács Á** *(Wigner Research Centre for Physics, Hungary)* & **Nyíri J** *(Wigner Research Centre for Physics, Hungary)*
9789811238390

Hadron Spectroscopy and Structure - The 18th International Conference on Hadron Spectroscopy and Structure (HADRON2019)
edited by **Guo F** *(Chinese Academy of Sciences, China)* & **Liang W** *(Guangxi Normal University, China)*
9789811219191

30 Years of BES Physics - Symposium on 30 Years of BES Physics
edited by **Ye M** *(Institute of High Energy Physics, Beijing, China)*, **Yuan C** *(Institute of High Energy Physics, Beijing, China)*
9789811217722

Probing Nucleons and Nuclei in High Energy Collisions - INT Program INT-18-3
edited by **Prokudin A** *(Pennsylvania State University Berks, USA & Jefferson Lab, USA)*, **Hatta Y** *(Brookhaven National Laboratory, USA)*, **Kovchegov Y** *(The Ohio State University, USA)* & **Marquet C** *(École Polytechnique, France & CNRS, France)* 9789811214943

Quantum Bio-Informatics VI: From Quantum Information to Bio-Informatics - Quantum Bio-Informatics 2014
edited by **Accardi L** *(Universitàdi Roma "Tor Vergata", Italy)*, **Freudenberg W** *(Brandenburgische Technische Universität Cottbus, Germany)* & **Watanabe N** *(Tokyo University of Science, Japan)*
9789811217821

CPT and Lorentz Symmetry - Eighth Meeting on CPT and Lorentz Symmetry
edited by **Lehnert R** *(Indiana University, USA)*
9789811213977

The Physics of Living Matter: Space, Time and Information – The 27th Solvay Conference on Physics
edited by **Gross D** *(University of California at Santa Barbara)*, **Sevrin A** *(Vrije Universiteit Brussel, Belgium & International Solvay Institutes, Belgium)* & **Shraiman B** *(University of California at Santa Barbara)* 9789813239241

Lepton Photon Interactions at High Energies - The 28th International Symposium on Lepton Photon Interactions at High Energies
edited by **Wang W** *(Sun Yat-sen University, China)* & **Xing Z** *(Chinese Academy of Sciences, China)* 9789811204609

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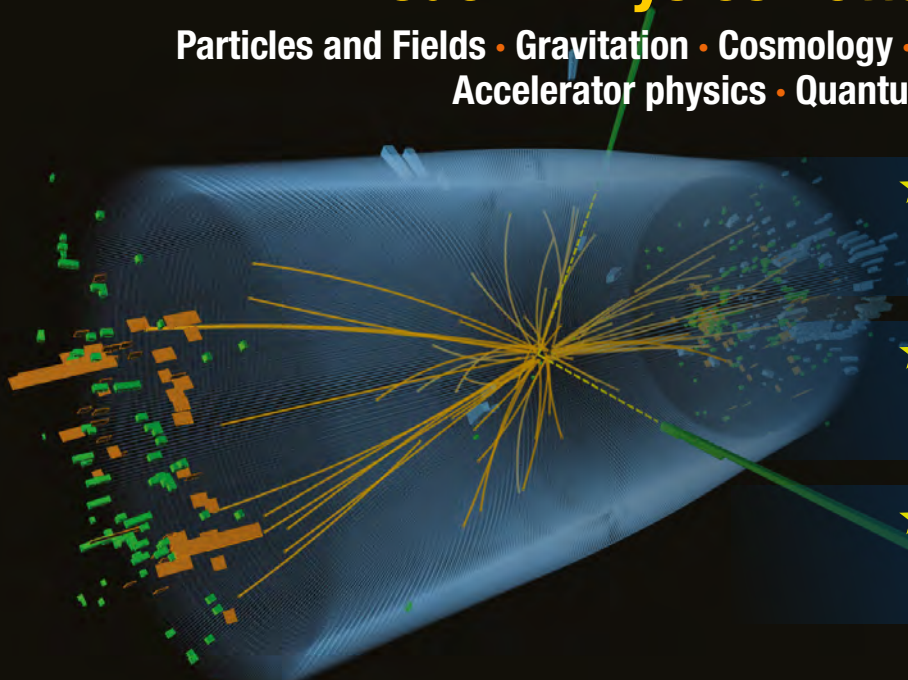

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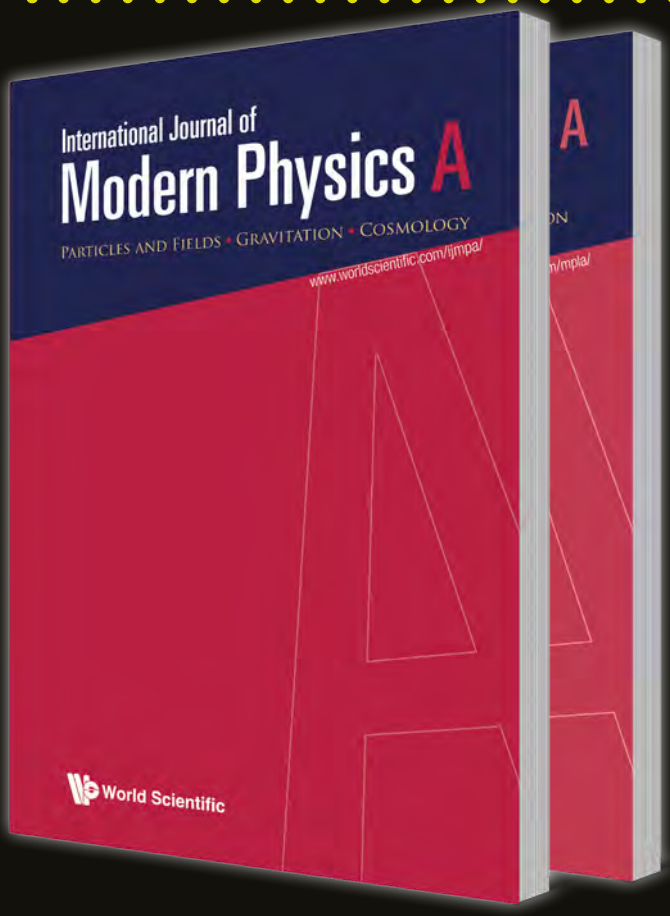

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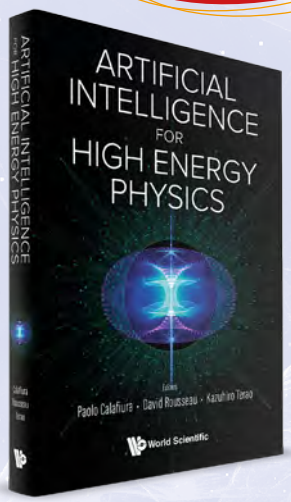

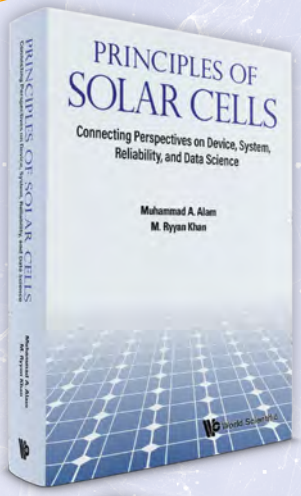

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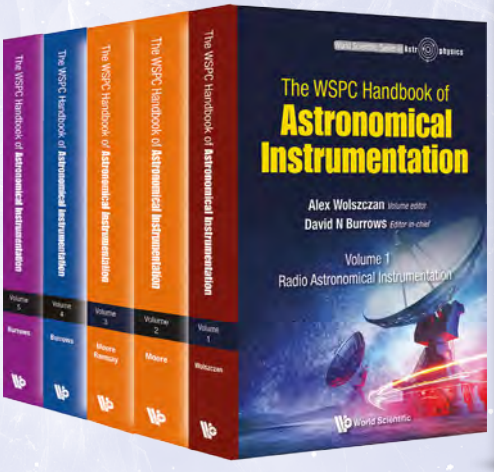

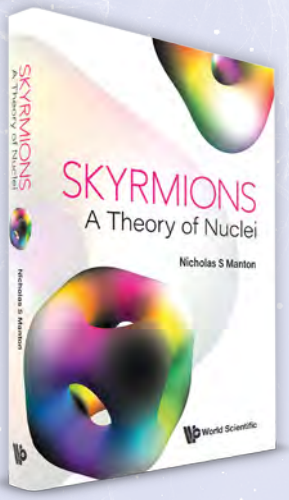

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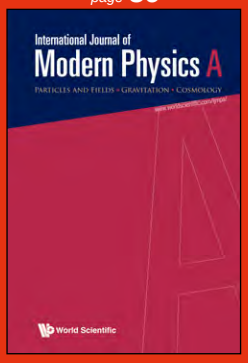

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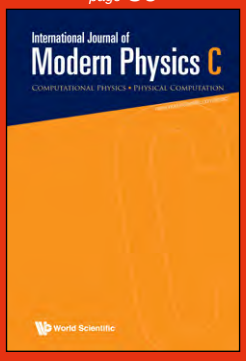

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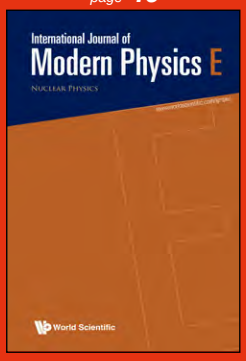

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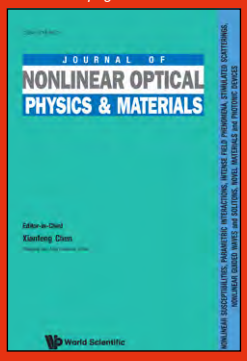

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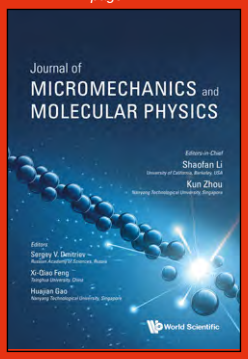

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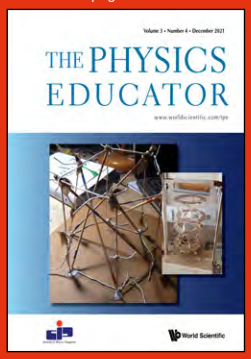

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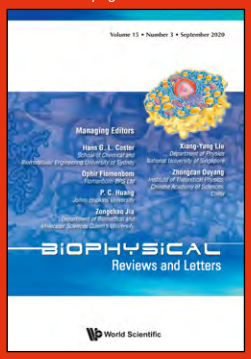

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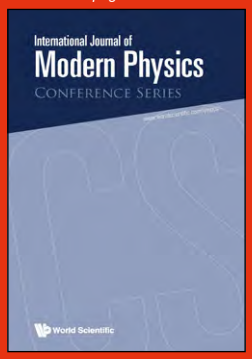

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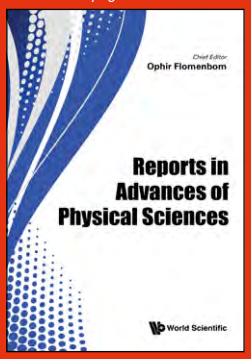

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