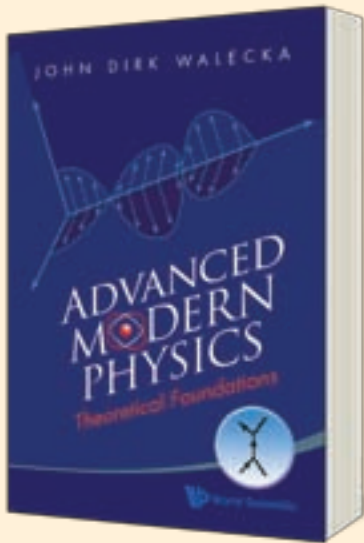


New & Forthcoming Physics Titles 2010



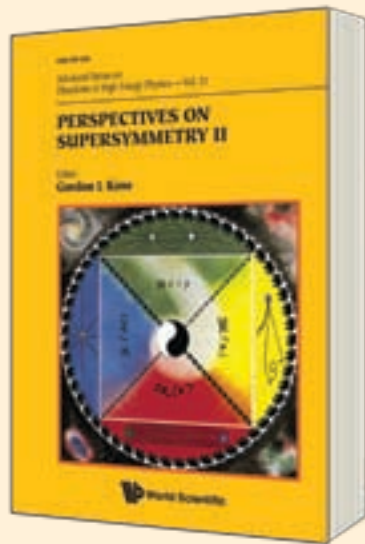
:: Textbook

ADVANCED MODERN PHYSICS

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

The present book focuses on the following topics: reformulation of quantum mechanics, angular momentum, scattering theory, lagrangian field theory, symmetries, Feynman rules, quantum electrodynamics, including higher-order contributions, path integrals, and canonical transformations for quantum systems. Many problems are included that enhance and extend the coverage. The book assumes a mastery of the material in Vol. 1: *INTRODUCTION TO MODERN PHYSICS: THEORETICAL FOUNDATIONS*, and the continued development of mathematical skills, including multivariable calculus and linear algebra. Several appendices provide important details, and any additional required mathematics. The reader should then find the text, together with the appendices and problems, to be self-contained. The aim is to cover the framework of modern theoretical physics in sufficient depth that things "make sense" to students, and, when finished, the reader should have an elementary working knowledge in the principal areas of theoretical physics of the twentieth century.

500pp	Spring 2010
978-981-4291-51-4	US\$88 £58
978-981-4291-52-1 (pbk)	US\$65 £43



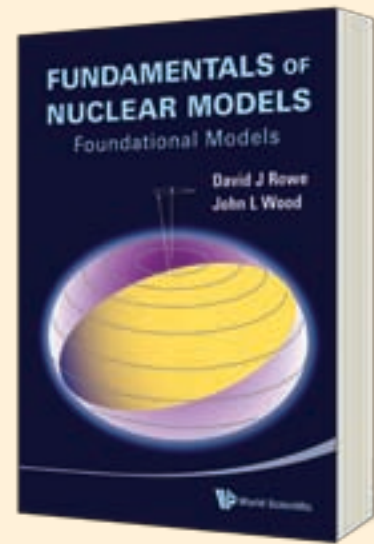
Advanced Series on Directions in High Energy Physics - Vol. 21

PERSPECTIVES ON SUPERSYMMETRY II

edited by **Gordon L Kane**
(University of Michigan, Ann Arbor, USA)

This volume begins with an excellent pedagogical introduction to the physics and methods and formalism of supersymmetry which is accessible to anyone with a basic knowledge of the Standard Model of particle physics. Next is an overview of open questions, followed by chapters on topics such as how to detect superpartners and tools for studying them, the current limits on superpartner masses as we enter the LHC era, the lightest superpartner as a dark matter candidate in thermal and non-thermal cosmological histories, and associated Z' physics. Most chapters have been extended and updated from the earlier edition and some are new.

580pp	May 2010
978-981-4307-48-2	US\$125 £83
978-981-4307-49-9 (pbk)	US\$58 £38



:: Textbook

FUNDAMENTALS OF NUCLEAR MODELS

Foundational Models
by **David J Rowe** (University of Toronto, Canada) & **John L Wood** (Georgia Institute of Technology, USA)

This unique book takes a newcomer from an introduction to nuclear structure physics to the frontiers of the subject along a painless path. It provides both the experimental and mathematical foundations of the essential models in a way that is accessible to a broad range of experimental and theoretical physicists. Thus, the book provides a unique resource and an exposition of the essential principles, mathematical structures, assumptions, and observational data on which the models and theories are based. It avoids discussion of many non-essential variations and technical details of the models.

350pp	Mar 2010
978-981-256-955-4	US\$120 £79
978-981-256-956-1 (pbk)	US\$75 £50

HIGHLIGHTS

AT THE LEADING EDGE
The ATLAS and CMS LHC Experiments

Pg 2

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

World Scientific Lecture Notes in Physics - Vol. 80
INTRODUCTION TO SUPERSYMMETRY
(2nd Edition)

Pg 3

by **Harald J W Müller-Kirsten** (University of Kaiserslautern, Germany) & **Armin Wiedemann** (Baden-Württemberg Cooperative State University Mannheim, Germany)

PHYSICS OVER EASY
Breakfasts with Beth and Physics
(2nd Edition)

Pg 12

by **Leonid V Azároff**
(University of Connecticut, USA)

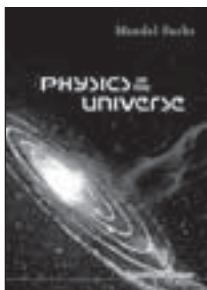
EDITOR'S CHOICE

PHYSICS OF THE UNIVERSE

by **Mendel Sachs**

(University at Buffalo, The State University of New York, USA)

This book presents a new approach to the subject of cosmology. It fully exploits Einstein's theory of general relativity. It is found that the most general formal expression of the theory replaces the (10-component) tensor formalism with a (16-component) quaternion formalism. This leads to a unified field theory, where one field incorporates gravitation and electromagnetism. The theory predicts an oscillating universe cosmology with a spiral configuration. Dark matter is explained in terms of a sea of particle-antiparticle pairs, each in a particular (derived) ground state.



200pp	Mar 2010
978-1-84816-532-8	US\$48 £32
978-1-84816-604-2(pbk)	US\$28 £18
978-1-84816-533-5(ebk)	US\$85

World Scientific Series in 20th Century Physics - Vol. 40

MURRAY GELL-MANN

Selected Papers

edited by **Harald Fritzsch** (University of Munich, Germany)

Contents: The Garden of Live Flowers; Strangeness; Quantum Electrodynamics at Small Distances; Theory of the Fermi Interaction; The Eightfold Way: A Theory of Strong Interaction Symmetry; Symmetries of Baryons and Mesons; A Schematic Model of Baryons and Mesons; Current Topics in Particle Physics; Quarks: Developments in the Theory of Hadrons; Current Algebra: Quarks and What Else?; Particle Theory from S-Matrix to Quarks; Time Symmetry and Asymmetry in Quantum Mechanics and Quantum Cosmology; Progress in Elementary Particle Theory, 1950-1964; Nature Conformable to Herself; Quarks, Color and QCD; Effective Complexity; and other papers.



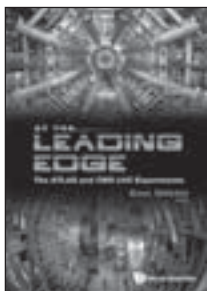
464pp	Feb 2010
978-981-283-684-7	US\$105 £69
978-981-4261-62-3(pbk)	US\$48 £32
978-981-283-685-4(ebk)	US\$137

AT THE LEADING EDGE

The ATLAS and CMS LHC Experiments

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

This volume aims to elucidate how the requirements of the physics at the Large Hadron Collider (LHC) define the detector environment. It comprises review articles by distinguished experts on recent advances in constructing the ATLAS and Compact Muon Solenoid (CMS) detectors in the vertex detectors, tracking systems, calorimetry, strong magnets, muon systems, front end electronics, trigger systems, and in the data acquisition methods used.



500pp	Jan 2010
978-981-4277-61-7	US\$120 £79
978-981-4304-67-2(pbk)	US\$58 £38
978-981-4277-62-4(ebk)	US\$156

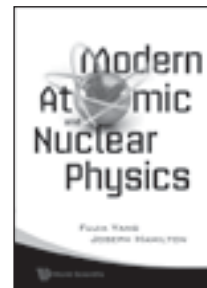
:: Textbook

MODERN ATOMIC AND NUCLEAR PHYSICS

(Revised Edition)

by **Fujia Yang** (Fudan University, China & Nottingham University, UK) & **Joseph H Hamilton** (Vanderbilt University, USA)

Contents: Theory of Relativity; The Configuration of Atoms: Rutherford's Model; Quantum States of Atoms: The Bohr Model; Fine Structure in Atomic Spectra: Electron Spin; Atoms containing Many Electrons: The Pauli Exclusion Principle; X-Rays; Introductory Quantum Mechanics I: Concepts; Introductory Quantum Mechanics II: The Schrödinger Equation; Basic Concepts of Nuclear Physics; Radioactive Decay; Nuclear Forces and Nuclear Models; Nuclear Interaction and Reactions; Hyperfine Interactions; High-Energy Physics.



750pp	Jan 2010
978-981-283-678-6	US\$128 £84
978-981-283-679-3(pbk)	US\$64 £42

QUARK-GLUON PLASMA 4

edited by **Rudolph C Hwa** (University of Oregon, USA) & **Xin-Nian Wang** (Lawrence Berkeley National Laboratory, USA)

This is a review volume containing articles written by experts on current theoretical topics in the subject of Quark-Gluon Plasma created in heavy-ion collisions at high energy. It is the fourth volume in the series with the same title sequenced numerically. The articles are written in a pedagogical style so that they can be helpful to a wide range of researchers from graduate students to mature physicists who have not worked previously on the subject. A reader should be able to learn from the reviews without having extensive knowledge of the background literature.



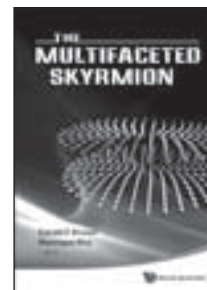
400pp	Feb 2010
978-981-4293-28-0	US\$118 £78
978-981-4293-29-7(ebk)	US\$153

THE MULTIFACETED SKYRMION

edited by **Gerald E Brown** (State University of New York, USA) & **Mannque Rho** (DSM-CEA Saclay, France & Hanyang University, Korea)

This volume consists of contributions from the active researchers who have made important progress in these three areas of theoretical physics — condensed matter physics, nuclear and particle physics, and string theory.

Contents: **Condensed Matter Physics:** Baby Skyrmions, Quantum Hall Ferromagnets, Deconfined Quantum Critical Phenomena, High Temperature Superconductivity;; **Particle and Nuclear Physics:** Pentaquark and Exotic Hadrons, Heavy-Quark Baryons, Skyrmion Structure of Light Nuclei, Electromagnetic Structure of Baryons, Dense Skyrmion Matter, Superqualitons;; **String Theory:** Holographic Baryons, Holographic Dense Matter, Holographic Cheshire Cat, Nuclear Force from String Theory



460pp	Jan 2010
978-981-4280-69-3	US\$86 £57
978-981-4280-70-9(ebk)	US\$112

REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

Volume 2: Medical Applications of Accelerators

edited by **Alexander W Chao** (*SLAC National Accelerator Laboratory, USA*) & **Weiren Chou** (*Fermi National Accelerator Laboratory, USA*)

Contents: Physical and Biological Basis of Proton and of Carbon Ion Radiation Therapy and Clinical Outcome Data (*H Suit et al.*); The Production of Radionuclides for Radiotracers in Nuclear Medicine (*T J Ruth*); Proton Radiation Therapy in the Hospital Environment: Conception, Development, and Operation of the Initial Hospital-Based Facility (*J M Slater et al.*); Microwave Electron Linacs for Oncology (*D H Whittum*); Heavy-Particle Radiotherapy: System Design and Application (*H Tsujii et al.*); High Frequency Linacs for Hadrontherapy (*U Amaldi et al.*); Medical Cyclotrons (*D L Friesel & T A Antaya*); Synchrotrons for Hadrontherapy (*M G Pullia*); Beam Delivery Systems for Particle Radiation Therapy: Current Status and Recent Developments (*J M Schippers*); Laser Acceleration of Ions for Radiation Therapy (*T Tajima et al.*); FFAGs as Accelerators and Beam Delivery Devices for Ion Cancer Therapy (*D Trbojevic*); The Dielectric Wall Accelerator (*G J Caporaso et al.*); The Supercollider: The Texas Days — A Personal Recollection of Its Short Life and Demise (*S Wojcicki*); A Man for All Seasons: Robert R Wilson (*E L Goldwasser*).



320pp **Dec 2009**
978-981-4299-34-3 **US\$108** **£81**
978-981-4299-35-0(ebk) **US\$140**

Series on Directions in Condensed Matter Physics – Vol. 18

P.G. DE GENNES' IMPACT ON SCIENCE

VOLUME I Solid State and Liquid Crystals

VOLUME II Soft Matter and Biophysics

edited by **Julien Bok**, **Jacques Prost** (*ESPCI ParisTech, France*) & **François Brochard-Wyart** (*Institut Curie and University Paris VI, France*)

This publication, in two volumes, is devoted to the scientific impact of the work of Nobel Laureate, Pierre-Gilles de Gennes, one of the greatest scientists of the 20th century. It covers the important fields for which de Gennes was renowned: solid state (magnetism and superconductivity), macroscopic random media and percolation, supersolids, liquid crystals, polymers, adhesion and friction, and biophysics.



The book brings together internationally renowned experts to contribute their perspectives on the significance of de Gennes' works. They have each selected a definitive paper, which gives the state of the field at the time the paper was published, highlights the paper's importance and provides an analysis of the development of the field right up to the modern day. The insightful perspectives of these scientists make the book both unique and intriguing.



Volume I **200pp** **Jul 2009**
978-981-4273-80-0 **US\$48** **£36**
978-981-4273-81-7(ebk) **US\$62** **£47**

Volume II **180pp** **Jul 2009**
978-981-4280-63-1 **US\$48** **£36**
978-981-4280-64-8(ebk) **US\$62** **£47**

Set
978-981-4280-65-5 **US\$86** **£65**

:: Textbook

World Scientific Lecture Notes in Physics - Vol. 80

INTRODUCTION TO SUPERSYMMETRY

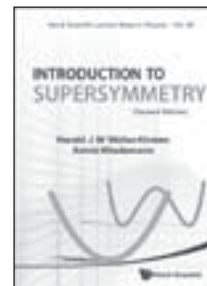
(2nd Edition)

by **Harald J W Müller-Kirsten** (*University of Kaiserslautern, Germany*) & **Armin Wiedemann** (*Baden-Württemberg Cooperative State University Mannheim, Germany*)

"... a very careful and thorough discussion of supersymmetry culminating in supersymmetric gauge field theories ... a valuable book for those hoping to learn supersymmetry in first year postgraduate courses."

Contemporary Physics

Contents: Lorentz and Poincaré Group; No-go Theorems and Graded Lie Algebras; The Supersymmetric Extension of the Poincaré Algebra; Representations of the Super-Poincaré Algebra; The Wess-Zumino Model; Superspace Formalism and Superfields; Constraint Superfields and Supermultiplets; Supersymmetric Lagrangians; Spontaneous Breaking of Supersymmetry; Supersymmetric Gauge Theories.



450pp **Jan 2010**
978-981-4293-41-9 **US\$90** **£59**
978-981-4293-42-6(pbk) **US\$58** **£38**

:: Textbook

INTRODUCTION TO QUANTUM STATISTICAL MECHANICS

(Second Edition)

by **N N Bogolubov** (*Moscow State University, Russia*) & **N N Bogolubov Jr** (*Moscow State University, Russia*)

Introduction to Quantum Statistical Mechanics (Second Edition) may be used as an advanced textbook by graduate students, even ambitious undergraduates in physics. It is also suitable for non experts in physics who wish to have an overview of some of the classic and fundamental quantum models in the subject. The explanation in the book is detailed enough to capture the interest of the reader, and complete enough to provide the necessary background material needed to dwell further into the subject and explore the research literature.

440pp **Dec 2009**
978-981-4295-19-2 **US\$80** **£60**
978-981-4295-82-6(pbk) **US\$48** **£36**

:: Bestselling Textbook

World Scientific Lecture Notes in Physics - Vol. 78

FOUNDATIONS OF QUANTUM CHROMODYNAMICS

An Introduction to Perturbative Methods in Gauge Theories

(Third Edition)

by **T Muta** (*Fukuyama University, Japan*)

This volume develops the techniques of perturbative QCD in great pedagogical detail starting with field theory. Aside from extensive treatments of the renormalization group technique, the operator product expansion formalism and their applications to short-distance reactions, this book provides a comprehensive introduction to gauge theories. Examples and exercises are provided to amplify the discussions on important topics. This is an ideal textbook on the subject of quantum chromodynamics and is essential for researchers and graduate students in high energy physics, nuclear physics and mathematical physics.

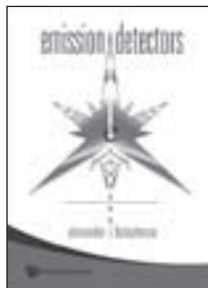
432pp **Sep 2009**
978-981-279-353-9 **US\$86** **£65**
978-981-279-354-6(pbk) **US\$55** **£41**

HIGH ENERGY PHYSICS/ NUCLEAR PHYSICS

EMISSION DETECTORS

by **Alexander I Bolozdynya** (Case Western Reserve University, USA)

After decades of research and development, emission detectors have recently become the most successful instrumentation used in modern fundamental experiments searching for cold dark matter, and are also considered for neutrino coherent scattering and magnetic momentum neutrino measurement. This book is the first monograph exclusively dedicated to emission detectors. Properties of two-phase working media based on noble gases, saturated hydrocarbon, ion crystals and semiconductors are reviewed.



320pp
978-981-283-405-8
978-981-283-406-5(ebk)

Jun 2010
US\$88 £58
US\$114

Advanced Series on Directions in High Energy Physics - Vol. 20

LEPTON DIPOLE MOMENTS

edited by **B Lee Roberts** (Boston University, USA) & **William J Marciano** (Brookhaven National Laboratory, USA)

This book provides a self-contained description of the measurements of the magnetic dipole moments of the electron and muon, along with a discussion of the measurements of the fine structure constant, and the theory associated with magnetic and electric dipole moments. Also included are the searches for a permanent electric dipole moment of the electron, muon, neutron and atomic nuclei. The related topic of the transition moment for lepton flavor violating processes, such as neutrinoless muon or tauon decays, and the search for such processes are included as well. The papers, written by many of the leading authors in this field, cover both the experimental and theoretical aspects of these topics.

772pp
978-981-4271-83-7
978-981-4271-84-4(ebk)

Dec 2009
US\$145 £109
US\$189

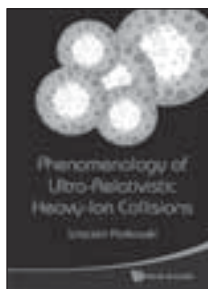
:: Textbook

PHENOMENOLOGY OF ULTRA-RELATIVISTIC HEAVY-ION COLLISIONS

by **Wojciech Florkowski** (Jan Kochanowski University, Kielce, Poland & Institute of Nuclear Physics, Polish Academy of Sciences, Kraków, Poland)

The main task of the book is to collect the available information and establish a uniform picture of ultra-relativistic heavy-ion collisions.

Contents: Basic Theoretical Ideas and Models Used in Description of Ultra-Relativistic Heavy-Ion Collisions; Relevant Physical Quantities and Main Experimental Observables; Thermodynamics of Strong Interactions; Glauber Model; Relativistic Kinetic Theory; Relativistic Hydrodynamics; Particle Interferometry; Statistical and Freeze-Out Models; Electromagnetic Signals; Hydrodynamic Interpretation of the Heavy-Ion Data from Relativistic Heavy-Ion Collider and Predictions for Large Hadron Collider.



400pp
978-981-4280-66-2

Apr 2010
US\$85 £56

SEVENTY YEARS OF DOUBLE BETA DECAY

From Nuclear Physics to Beyond-Standard-Model Particle Physics

edited by **H V Klapdor-Kleingrothaus**

(Max-Planck-Institut für Kernphysik, Germany)

This book presents the breathtaking manner in which achievements in particle physics have been made from a nuclear physics process. Consisting of a 150-page highly factual overview of the field of double beta decay and a 1200-page collection of the most important original articles, the book outlines the development of double beta decay research — theoretical and experimental — from its humble beginnings until its most recent achievements, with its revolutionary consequences for the theory of particle physics. It further presents an outlook on the exciting future of the field.



1300pp
978-981-283-235-1
978-981-283-236-8(ebk)

Jan 2010
US\$198 £131
US\$257

FUNDAMENTAL INTERACTIONS

A Memorial Volume for Wolfgang Kummer

edited by **Daniel Grumiller** (Vienna University of Technology, Austria), **Anton Rebhan** (Vienna University of Technology, Austria) & **Dimitri Vassilevich** (Universidade Federal do ABC, St Petersburg State University, Brazil/Russia)

This memorial volume on the work of Wolfgang Kummer brings together articles devoted to the history of high energy physics with detailed coverage on the scientific concepts and scientific institutions, in particular CERN — and the underlying physics involved. Covering recent advances and developments as well as giving a reminiscent overview in two rapidly evolving fields of high energy/particle physics, and gravitational physics, the commemorative volume contains more than 20 original invited paper contributions — which will appear for the first time in print — from eminent and renowned physicists who interacted and collaborated with Wolfgang Kummer, including Physics Nobel Laureate Jack Steinberger.

424pp
978-981-4273-07-7
978-981-4277-83-9(ebk)

Sep 2009
US\$98 £74
US\$127

:: Textbook

PRINCIPLES OF RADIATION INTERACTION IN MATTER AND DETECTION

(2nd Edition)

by **Claude Leroy** (Université de Montréal, Canada) & **Pier-Giorgio Rancoita** (Istituto Nazionale di Fisica Nucleare, Milan, Italy)

In this second edition, new sections dedicated to the following topics are included: space and high-energy physics radiation environment, non-ionizing energy loss (NIEL), displacement damage in silicon devices and detectors, single event effects, detection of slow and fast neutrons with silicon detectors, solar cells, pixel detectors, and additional material for dark matter detectors. This book will benefit graduate students and final-year undergraduates as a reference and supplement for courses in particle, astroparticle, and space physics and instrumentation.

952pp
978-981-281-827-0
978-981-281-828-7(pbk)

Feb 2009
US\$202 £112
US\$110 £61

:: Textbook

BETA BEAMS

Neutrino Beams

With a Foreword by Piero Zucchelli and a Contribution on

Low Energy Beta Beams by Cristina Volpe

by **Mats Lindroos** (CERN, Switzerland) &

Mauro Mezzetto (INFN, Sezione di Padova, Italy)

This is the first complete monograph on the beta-beam concept. The book describes both technical aspects and experimental aspects of the beta-beam, providing i) students and scientists with an insight into the possibilities offered by beta-beams; ii) facility designers with a starting point for future studies; and iii) policy makers with a comprehensive picture of the limits and possibilities offered by a beta-beam.



Contents: Foreword by Piero Zucchelli; Machine Aspects; CERN-Fréc's Potential of Other Beta Beam Settings; Physics Potential of Other Beta Beam Settings; Low-Energy Beta-Beams by Cristina Volpe.

168pp Jul 2009
978-1-84816-377-5 US\$78 £59

:: Textbook

INTRODUCTION TO RELATIVISTIC HEAVY ION PHYSICS

by **J Bartke** (Institute of Nuclear Physics, Cracow, Poland)

Contents: Quantum Chromodynamics and the Phase Transition in Strongly Interacting Matter; Basic Properties of Atomic Nuclei; Sources of Relativistic and Ultrarelativistic Nuclei; Detection Techniques; Cross Sections and Collision Geometry; Fragmentation Processes; Multiplicities and Relative Abundances of Secondary Particles; Longitudinal Distributions of Secondary Particles; Transverse Spectra of Secondary Particles; Electromagnetic Effects on Charged Meson Spectra; Production of Strangeness and Heavy Flavours; Emission of Light Nuclei, Antinuclei, and Hypernuclei; Hadronic Femtoscopy; Collective Flow; Charmonium Suppression; Puzzle in Di-Lepton Mass Spectrum; Direct Photons; High Transverse Momenta; Production and Absorption of Jets; More About Quark-Gluon Plasma; Predictions for the Large Hadron Collider; Relativistic Kinematics.

240pp Dec 2008
978-981-02-1231-5 US\$65 £36

:: Bestseller

PERSPECTIVES ON LHC PHYSICS

edited by **Gordon Kane** (University of Michigan, USA) &

Aaron Pierce (University of Michigan, USA)

This book provides an overview on the techniques that will be crucial for finding new physics at the LHC, as well as perspectives on the importance and implications of the discoveries. Among the accomplished contributors to this book are leaders and visionaries in the field of particle physics beyond the Standard Model, including two Nobel Laureates (Steven Weinberg and Frank Wilczek), and presumably some future Nobel Laureates, plus top younger theorists and experimenters. With its blend of popular and technical contents, the book will have wide appeal, not only to physical scientists but also to those in related fields.

352pp Jun 2008
978-981-277-975-5 US\$99 £55
978-981-283-389-1 (pbk) US\$54 £30
978-981-277-976-2 (ebk) US\$114

CONDENSED MATTER PHYSICS / STATISTICAL PHYSICS

:: Textbook

STATISTICAL MECHANICS FOR BEGINNERS

A Textbook for Undergraduates

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

Contents: The Thermodynamic Potentials; The Closed System; The Microcanonical Ensemble; Systems in Thermal Contact with a Reservoir; The Macrocanonical Ensemble and the Grand Canonical Ensemble; Quantum Statistics; The Density of States; Some Problems; The Gas of Photons and the Black Body Radiation; Atomic Vibration in Solids; Phonons; The Bose Gas at Low Temperature and the Bose-Einstein Condensation; Electrons in Metals and in Semiconductors; Short History of Statistical Mechanics.

Readership: Undergraduate students in physics, chemistry, material engineering and electrical engineering.

250pp Aug 2010
978-981-4299-11-4 US\$62 £41
978-981-4299-12-1 (pbk) US\$37 £24

:: Textbook

INTRODUCTION TO THE THEORY OF CRITICAL PHENOMENA

Mean Field, Fluctuations and Renormalization (2nd Edition)

by **Dimo I Uzunov** (Bulgarian Academy of Sciences, Bulgaria)

Contents: Classical Theories of Phase Transitions: Basic Thermodynamics and Statistical Physics; Thermodynamic Approach to Phase Transitions; Landau Theory; Weiss Theory and Mean-Field Approximation; Phase Diagrams; Types of Phase Transitions and Critical Phenomena (Multicritical Points in Complex Systems); **Modern Theories:** Scaling; Universality; Length-Scale Invariance and Renormalization Group Methods; Applications to Various Condensed Matter Systems (Vapor-Liquid-Solid, Magnets, Superconductors, Bose-Einstein Condensation); Anisotropy; Disorder and Quantum Effects; Quantum Critical Phenomena; Advanced Topics and Outstanding Problems; and other papers.;

Readership: Statistical and condensed matter physicists.

550pp Jun 2010
978-981-4299-48-0 US\$115 £76
978-981-4299-49-7 (pbk) US\$58 £38

HANDBOOK OF THERMOLUMINESCENCE

Second Edition

by **Claudio Furetta** (Touro University Rome, Italy)

This second edition of the *Handbook of Thermoluminescence* enlarges on all the subjects which were treated in the first edition and adds further arguments, including the theory of thermoluminescent dose measurement, several examples concerning the kinetics parameters determination using various methods such as peak shape, isothermal decay, and so on. A special section is devoted to food irradiation, an important subject at the present time, and to the thermoluminescent characterization of the minerals extracted from the irradiated food. Another new section is devoted to the thermoluminescent phosphors and their main characteristics.

564pp Dec 2009
978-981-283-891-9 US\$168 £126
978-981-283-892-6 (ebk) US\$218

:: Textbook

BASIC STATISTICAL PHYSICS

by **Nandita Rudra** (Retired from University of Kalyani, India) & **P Rudra** (Retired from University of Kalyani, India)

This is a masters/graduate level textbook on statistical physics. The basics of the discipline and its application in the current topics of interest like Bose–Einstein condensate, statistical astrophysics and phase transitions have been discussed with thoroughness.



Contents: Basic Concepts; Motion of Systems in Phase Space; States in Statistical Physics; Statistical Ensembles; Ideal Gas; Chemical Reaction Equilibrium; Real Gas; Strong Electrolytes; Quantum Statistics; Bose–Einstein Condensate; Statistical Astrophysics; Phase Transitions; Irreversible Processes; Mathematical Appendix.

248pp Dec 2009
978-981-4293-25-9 US\$50 £38

COLLECTIVE EXCITATIONS IN UNCONVENTIONAL SUPERCONDUCTORS AND SUPERFLUIDS

by **Peter Brusov** (University of Houston, USA & Rostov State University, Russia) & **Pavel Brusov** (Case Western Reserve University, USA)

Contents: Functional Integration Method; Collective Excitations in Superfluid Fermi-Systems with s–Pairing; Superfluid Phases in 3He; The Model of 3He; Collective Excitations in the B–Phase of 3He; Collective Excitations in the A–Phase of 3He; Stability of Goldstone Modes; Influence of Dipole Interaction and Magnetic Field on Collective Excitations; The Influence of the Electric Field on the Collective Excitations in 3He and 4He; The Order Parameter Distortion and Collective Modes in 3He–B; Collective Excitations in the Planar 2D–Phase of Superfluid 3He; Collective Excitations in the Polar–Phase; Superfluidity of Two–Dimensional and One–Dimensional Systems; Bose–Spectrum of Superfluid Solutions 3He–4He; Novel Sound Phenomena in Impure Superfluids; Collective Modes in the Heavy–Fermion Superconductors; Other Application of the Theory of Collective Excitations.



860pp Nov 2009
978-981-277-123-0 US\$168 £126
978-981-277-124-7(ebk) US\$218

:: Textbook

CHEMISTRY VERSUS PHYSICS

Chemical Reactions Near Critical Points
by **Moshe Gitterman** (Bar-Ilan University, Israel)

Contents: Criticality and Chemistry; Effect of Criticality on Chemical Reaction; Effect of Chemistry on Critical Phenomena; Phase Separation in Reactive Systems; Comments on the Geometry of the Phase Diagram of a Reaction Mixture; Sound Propagation and Light Scattering in Chemically Reactive Systems.

Readership: Physicists, chemists, biologists and material scientists, chemical engineers, advanced undergraduates and graduate students in science, university and college teachers.

148pp Oct 2009
978-981-4291-20-0 US\$58 £44

World Scientific Series in 20th Century Physics - Vol. 41

MANY-BODY THEORY OF MOLECULES, CLUSTERS, AND CONDENSED PHASES

edited by **N H March** (Oxford University & University of Antwerp, UK & Belgium) & **G G N Angilella** (Università di Catania, CNISM & INFN, Italy)

This book provides a comprehensive review of seminal and recent results in the theory of condensed phases, including liquid metals, quantum liquids and Wigner crystals, along with selected applications, especially in the physical chemistry of molecules and clusters. It is dedicated to the Thomas-Fermi semiclassical approximation for molecules and condensed phases, and its extension to inhomogeneous electron liquids and liquid metals. Correlation effects in quantum liquids and Wigner crystallization are other areas of focus of this work, with an emphasis towards the effect of low dimensionality and magnetic fields.



908pp Sep 2009
978-981-4271-77-6 US\$158 £119
978-981-4271-78-3(ebk) US\$205

:: Textbook

STATISTICAL DYNAMICS

A Stochastic Approach to Nonequilibrium Thermodynamics (Second Edition)

by **R F Streater** (King's College London, UK)

Contents: Classical Statistical Dynamics: Introduction; Probability Theory; Linear Dynamics; Isolated Dynamics; Isothermal Dynamics; Driven Systems; Fluid Dynamics; Quantum Statistical Dynamics: Introduction to Quantum Theory; Quantum Probability; Linear Quantum Dynamics; Isolated Quantum Dynamics; Isothermal and Driven Systems; Infinite Systems; Proof of the Second Law; Information Geometry;.

Readership: Mathematicians, physicists and chemical engineers.

392pp Mar 2009
978-1-84816-244-0 US\$83 £68
978-1-84816-250-1(pbk) US\$51 £41

:: Bestseller

PATH INTEGRALS IN QUANTUM MECHANICS, STATISTICS, POLYMER PHYSICS, AND FINANCIAL MARKETS

5th Edition

by **Hagen Kleinert** (Freie Universität Berlin, Germany)

"Kleinert's book presents the reader with a very complete and very thorough discussion of path integration ... a new extensive and complete chapter has been added on the use of path integration techniques in the analysis of financial markets. This chapter would do well in any high-level course on stochastic financial models and is a wonderful occasion for candidate mathematical and theoretical physicists to realize what great potential there hides still in the methodologies and techniques that have been developed... In fact, I don't know of any excuse not to have your own copy."

Journal of Statistical Physics

1624pp May 2009
978-981-4273-55-8 US\$168 £126
978-981-4273-56-5(pbk) US\$38 £29
978-981-4273-57-2(ebk) US\$218

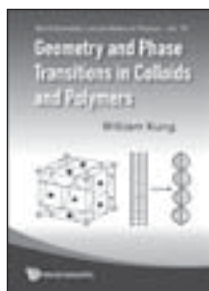


World Scientific Lecture Notes in Physics - Vol. 79

GEOMETRY AND PHASE TRANSITIONS IN COLLOIDS AND POLYMERS

by **William Kung** (Northwestern University, USA)

This monograph represents an extension of the author's original PhD thesis and includes a more thorough discussion on the concepts and mathematics behind his research works on the foam model, as applied to studying issues of phase stability and elasticity for various non-closed packed structures found in fuzzy and colloidal crystals, as well as on a renormalization-group analysis regarding the critical behavior of loop polymers upon which topological constraints are imposed. The common thread behind these two research works is their demonstration of the importance and effectiveness of utilizing geometrical and topological concepts for modeling and understanding soft systems undergoing phase transitions.



216pp
978-981-283-496-6
978-981-283-497-3(ebk)

May 2009
US\$70 £53
US\$91

:: Textbook

BASICS OF STATISTICAL PHYSICS

A Bachelor Degree Introduction
by **Harald J W Müller-Kirsten**
(University of Kaiserslautern, Germany)

Contents: Statistical Mechanics of an Ideal Gas (Maxwell); The a priori Probability; Classical Statistics (Maxwell-Boltzmann); Entropy; Quantum Statistics; Exact Form of Distribution Functions; Application to Radiation (Light Quanta); Debye Theory of Specific Heat of Solids; Electrons in Metals; Limitations of the Preceding Theory — Improvement with Ensemble Method; Averaging instead of Maximization, and Bose-Einstein Condensation.

Readership: Undergraduate, graduate students and academics interested in statistical physics.

224pp
978-981-4287-22-7

Aug 2009
US\$58 £44

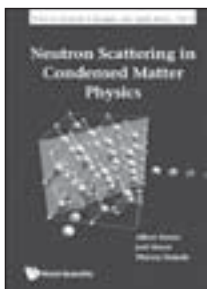
:: Bestselling Textbook

Series on Neutron Techniques and Applications - Vol. 4

NEUTRON SCATTERING IN CONDENSED MATTER PHYSICS

by **Albert Furrer** (ETH Zurich & PSI Villigen, Switzerland),
Joël Mesot (ETH Zurich & PSI Villigen, Switzerland), &
Thierry Strässle (ETH Zurich & PSI Villigen, Switzerland)

In this important book, an introduction to the basic principles and instrumental aspects of neutron scattering is provided, and the most important phenomena and materials properties in condensed matter physics are described and exemplified by typical neutron scattering experiments.



Contents: Basic Principles of Neutron Scattering; Instrumentation; Structure Determination; Lattice Dynamics; Liquids and Amorphous Materials; Magnetic Structures; Magnetic Excitations; Crystal-Field Transitions; Phase Transitions; Superconductivity; Superfluidity; Defects in Solids; Surfaces and Interfaces; Hydrogen Dynamics.

316pp
978-981-02-4830-7
978-981-02-4831-4(pbk)

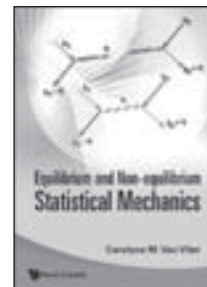
May 2009
US\$68 £51
US\$32 £24

:: Bestselling Textbook

EQUILIBRIUM AND NON-EQUILIBRIUM STATISTICAL MECHANICS

by **Carolyn M Van Vliet**
(Université de Montréal, Canada & University of Miami, USA)

"The text combines remarkable mathematical rigor with a well-balanced presentation of the underlying physical ideas and the ensuing conceptual framework. The author draws on many years of teaching experience and an expert career in the field, with the declared aim of offering a future standard graduate text and reference in statistical physics ... this volume should certainly become indispensable as a reference text for both lecturers and researchers."



Mathematical Reviews

988pp
978-981-270-477-1
978-981-270-478-8(pbk)

Jun 2008
US\$155 £86
US\$88 £48

COMPUTATIONAL PHYSICS

:: Textbook

PRACTICAL GUIDE TO COMPUTER SIMULATIONS

(With CD-ROM)
by **Alexander K Hartmann** (University of Oldenburg, Germany)

This book presents all the computational techniques and tools needed to start doing scientific research using computer simulations. After working through this book, the reader will possess the necessary basic background knowledge, from program design, programming in C, fundamental algorithms and data structures, random numbers, and debugging, all the way to data analysis, presentation and publishing. In each of these fields, no preliminary knowledge is assumed. The reader will be equipped to successfully perform complete projects from the first idea until the final publication. All techniques are explained using many examples in C; these C codes, as well as the solutions to exercises, are readily available in the accompanying CD-ROM.

384pp
978-981-283-414-0
978-981-283-415-7(pbk)

Mar 2009
US\$83 £68
US\$61 £51

:: Bestselling Textbook

COMPUTER SOLUTIONS IN PHYSICS

With Applications in Astrophysics, Biophysics, Differential Equations, and Engineering (With CD-ROM)
by **Steve VanWyk** (Olympic College, USA)

"Here the correct physics equations are set up and the excellent mathematical software packages are used to solve the problem."

Zentralblatt MATH

Contents: Equations of Motion; Vibrations and Waves; Building Differential Equation; Partial Differential Equations; Applications.

292pp
978-981-270-936-3
978-981-277-499-6(pbk)

Jun 2008
US\$81 £45
US\$43 £22



ASTROPHYSICS/COSMOLOGY

DARK MATTER, NEUTRINOS, AND OUR SOLAR SYSTEM

by **Nirmala Prakash**
(formerly of Massachusetts Institute of Technology, USA)

Dark Matter, Neutrinos, and Our Solar System is a unique enterprise that portrays the connection between cosmology, particle and nuclear physics, and atmospheric and terrestrial physics. Constituents of dark matter (classified as hot, warm and cold) are studied in detail with regard to their individual structures (baryonic and non-baryonic, massive and non-massive, interacting and non-interacting) and their detection facilities. Neutrinos (an important component of dark matter) are treated as a separate entity. A detailed study describes these elusive particles researched from the year 1913, as byproducts of beta-decay — until the discovery in 2007 that their flavors were not more than three (as considered by some).

700pp	Jul 2010	
978-981-4304-53-5	US\$118	£78
978-981-4304-54-2(pbk)	US\$68	£45
978-981-4304-55-9(ebk)	US\$153	

World Scientific Series in Astronomy and Astrophysics - Vol. 12

PHYSICS OF COMETS

(Third Edition)
by **K S Krishna Swamy** (retired from the Tata Institute of Fundamental Research, Bombay, India)

This revised edition places a unique emphasis on all the new results from ground-based, satellites and space missions — detection of molecule H₂ and prompt emission lines of OH for the first time; discovery of X-rays in comets; observed diversity in chemical composition among comets; the puzzle of the constancy of spin temperature; the well-established mineralogy of cometary dust; extensive theoretical modeling carried out for understanding the observed effects; the similarity in the migration of dust in circumstellar shell of stars, comets, meteorites, asteroids and IDPs, thus indicating the generic relationship between them.

500pp	Jun 2010	
978-981-4291-11-8	US\$75	£50
978-981-4291-12-5(ebk)	US\$98	

PRIMORDIAL COSMOLOGY

by **Giovanni Montani** (ENEA & ICRA Net, University of Rome "Sapienza", Italy), **Marco Valerio Battisti** (ICRA & University of Rome "Sapienza", Italy), **Riccardo Benini** (ICRA & University of Rome "Sapienza", Italy), & **Giovanni Imponente** (Queen Mary, University of London, UK)

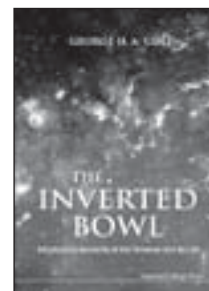
Primordial Cosmology deals with one of the most puzzling and fascinating topics debated in modern physics — the nature of the Big Bang singularity. The authors provide a self-consistent and complete treatment of the very early Universe dynamics, passing through a concise discussion of the Standard Cosmological Model, a precise characterization of the role played by the theory of inflation, up to a detailed analysis of the anisotropic and inhomogeneous cosmological models. The most peculiar feature of this book is its uniqueness in treating advanced topics of quantum cosmology with a well-traced link to more canonical and pedagogical notions of fundamental cosmology.

300pp	May 2010	
978-981-4271-00-4	US\$95	£71
978-981-4271-01-1(ebk)	US\$124	

THE INVERTED BOWL

Introductory Accounts of the Universe and Its Life
by **George H A Cole** (University of Hull, UK)

Well over 300 exoplanets have now been catalogued, each of mass comparable to or greater than those of the major planets of the Solar System. Earth-sized bodies remain out of reach for the present. This immediately raises the age-old question of whether there can be life elsewhere in the Universe and whether this might involve advanced technologically-capable beings like ourselves. The topic is explored in this notebook-cum-workbook which is written by an expert in the field. The arguments are set against the broad panorama of the Universe on the one hand and on the evolution of life on Earth leading to Homo sapiens on the other. It is hoped that the reader will extend the arguments further as the subject develops.

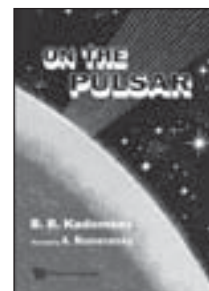


300pp	Jan 2010	
978-1-84816-503-8	US\$76	£50
978-1-84816-505-2(pbk)	US\$38	£25
978-1-84816-504-5(ebk)	US\$99	

ON THE PULSAR

by **B B Kadomsev** (formerly of Russian Academy of Sciences) & foreword by **A Nomerotsky**

This book serves as a good introduction to the physics of pulsars by explaining the subject matter in simple terms which are understandable to both undergraduate physics students and also the general public. On the Pulsar links together ideas about physics, informatics and biology, and contains many original examples, problems and solutions. It starts with simple examples about the regular structures that are possible in strong magnetic fields and the author then suggests that special conditions on the pulsar can result in some forms of self-organization. It will also make a valuable teaching guide.



148pp	Dec 2009	
978-981-4289-72-6	US\$48	£36
978-981-4289-74-0(ebk)	US\$62	

Bestseller

DID TIME BEGIN? WILL TIME END?

Maybe the Big Bang Never Occurred
by **Paul H Frampton** (University of North Carolina, USA)

Recent observational discoveries, especially that the expansion rate of the universe is accelerating, have revolutionized the understanding of the energy content of the universe. This development leads to new possibilities for the beginning and end of cosmological time. This book emphasizes the notion of entropy and describes how it is theoretically possible that the universe may end in a finite time or that time can cycle and never end. Provided here is twenty-first century scientific knowledge, written by one of the world's most eminent theoretical physicists, that will better enable the public to discuss further the fascinating idea of time. It is ideally suited also for young people considering a career in scientific research.



116pp	Sep 2009	
978-981-4280-58-7	US\$28	£21
978-981-4280-60-0(ebk)	US\$36	

:: Textbook

BLACK HOLES

An Introduction
(Second Edition)

by **Derek Raine** (*University of Leicester, UK*) &
Edwin Thomas (*University of Leicester, UK*)

The book provides an accessible introduction to the exact solutions of Einstein's vacuum field equations describing spherical and axisymmetric (rotating) black holes. The geometry and physical properties of these spacetimes are explored through the motion of particles and light. The use of different coordinate systems, maximal extensions and Penrose diagrams is explained. The association of the surface area of a black hole with its entropy is discussed and it is shown that with the introduction of quantum mechanics black holes cease to be black and can radiate. This result allows black holes to satisfy the laws of thermodynamics and thus be consistent with the rest of physics.



212pp	Sep 2009	
978-1-84816-382-9	US\$51	£38
978-1-84816-383-6(pbk)	US\$28	£21

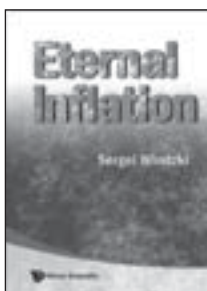
:: Textbook

ETERNAL INFLATION

by **Sergei Winitzki** (*Ludwig-Maximilians University, Germany*)

This volume is invaluable for researchers as a definitive reference in the rapidly developing field. Written in a self-contained manner with detailed mathematical derivations of the results, graduate students will also find it a readable and useful textbook for self-study.

Contents: Inflationary Cosmology; Eternal Inflation; Stochastic Approach to Inflation; Models with Bubble Nucleation; The Measure Problem and Proposed Solutions; The RV Measure for Random-Walk Inflation; The RV Measure for the Landscape.



236pp	Aug 2009	
978-981-283-239-9	US\$88	£48

:: Bestseller

THE LIGHT/DARK UNIVERSE

Light from Galaxies, Dark Matter and Dark Energy
by **James M Overduin** (*Stanford University, USA*) &
Paul S Wesson (*University of Waterloo, Canada*)

To the eyes of the average person and the trained scientist, the night sky is dark, even though the universe is populated by myriads of bright galaxies. Why this happens is a question commonly called Olbers' Paradox, and dates from at least 1823. How dark is the night sky is a question which preoccupies astrophysicists at the present. The answer to both questions tells us about the origin of the universe and the nature of its contents. In this book, the fascinating history of Olbers' Paradox is reviewed, and the intricate physics of the light/dark universe is examined in detail.

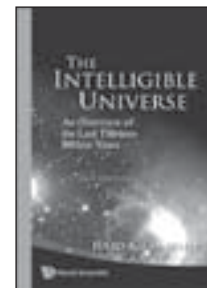


236pp	Aug 2008	
978-981-283-441-6	US\$61	£35
978-981-283-589-5(pbk)	US\$39	£22
978-981-283-442-3(ebk)	US\$72	

THE INTELLIGIBLE UNIVERSE

An Overview of the Last Thirteen Billion Years (2nd Edition)
by **Julio A Gonzalo** (*Universidad Autónoma de Madrid, Spain*)

This interesting book reviews WMAP's main results (2003) and discusses in detail how the accurate qualitative results for the "age" of the universe and the Hubble constant were anticipated in an article published five years before in *Acta Cosmologica*, Krakow. In the final chapter on "Cosmic Numbers", it is shown that, as a result of the coincidence at decoupling time between atom formation and matter/radiation equality, a reasonable cosmic justification for the mass ratio of protons and electrons is obtained.



368pp	Jul 2008	
978-981-279-410-9	US\$96	£53
978-981-279-411-6(pbk)	US\$52	£29
978-981-279-412-3(ebk)	US\$115	

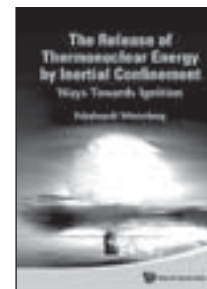
PLASMA PHYSICS

THE RELEASE OF THERMONUCLEAR ENERGY BY INERTIAL CONFINEMENT

Ways Towards Ignition

by **Friedwardt Winterberg** (*University of Nevada, Reno, USA*)

This is a comprehensive book which describes the three essential parts of what is known as "Inertial Confinement Fusion": the way thermonuclear burn takes place in non-magnetized, magnetized and fusion-fission hybrid assemblies; the pulse power ignition technology (nuclear, electrical, optical and chemical); and the applications of inertial confinement fusion technology for peaceful nuclear energy on Earth and in space. An integrated single text of such extensive technical width is a rare find, and younger generations of nuclear engineers any physicists will appreciate this book as a companion to their traditional textbooks.



420pp	Feb 2010	
978-981-4295-90-1	US\$110	£73
978-981-4295-91-8(ebk)	US\$143	

Biennial Reviews of the Theory of Magnetized Plasmas - Vol. 1

RELAXATION DYNAMICS IN LABORATORY AND ASTROPHYSICAL PLASMAS

edited by **Patrick H Diamond** (*University of California at San Diego, USA*), **Xavier Garbet** (*CEA, IRFM, France*), **Philippe Ghendrih** (*CEA, IRFM, France*), & **Yanick Sarazin** (*CEA, IRFM, France*)

This invaluable book provides a unique opportunity to embrace the complex and fascinating theory of relaxation processes in magnetized plasmas. The subjects range from dynamo and reconnection processes in magneto-hydrodynamics and electromagnetic turbulence to fast transport events in self-organized turbulence. Such phenomena, recognized as key bolts in our present understanding, turn out to be extremely challenging for theoretical models. This book efficiently helps to bridge our understanding and description of such processes, analogously observed in laboratory and astrophysical plasmas.

336pp	Dec 2009	
978-981-4291-54-5	US\$86	£65
978-981-4291-55-2(ebk)	US\$112	

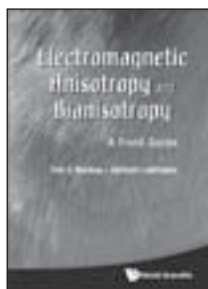
OPTICS/ELECTROMAGNETISM

ELECTROMAGNETIC ANISOTROPY AND BIANISOTROPY

A Field Guide

by **Tom G Mackay** (*University of Edinburgh, UK & Pennsylvania State University, USA*) & **Akhlesh Lakhtakia** (*Pennsylvania State University, USA*)

The topics of anisotropy and bianisotropy are fundamental to electromagnetics from both theoretical and experimental perspectives. These properties underpin a host of complex and exotic electromagnetic phenomena in naturally occurring materials and in relativistic scenarios, as well as in artificially produced metamaterials. As a unique guide to this rapidly developing field, the book provides a unified presentation of key classic and recent results on the studies of constitutive relations, spacetime symmetries, planewave propagation, dyadic Green functions, and homogenization of composite materials.



236pp
978-981-4289-61-0
978-981-4289-62-7(ebk)

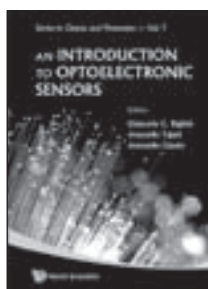
Nov 2009
US\$70 £53
US\$91

Series in Optics and Photonics - Vol. 7

AN INTRODUCTION TO OPTOELECTRONIC SENSORS

edited by **Giancarlo C Righini** (*CNR, Italy*), **Antonella Tajani** (*CNR, Italy*), & **Antonello Cutolo** (*University of Sannio, Italy*)

This invaluable book offers a comprehensive overview of the technologies and applications of optoelectronic sensors. Based on the R&D experience of more than 70 engineers and scientists, highly representative of the Italian academic and industrial community in this area, this book provides a broad and accurate description of the state-of-the-art optoelectronic technologies for sensing. The most innovative approaches, such as the use of photonic crystals, squeezed states of light and microresonators for sensing, are considered. Application areas range from environment to medicine and healthcare, from aeronautics, space, and defence to food and agriculture.



584pp
978-981-283-412-6
978-981-283-413-3(ebk)

Jan 2009
US\$110 £61
US\$127

Advanced Series in Applied Physics - Vol. 6

OPTICAL PROCESSES IN MICROPARTICLES AND NANOSTRUCTURES

A Festschrift Dedicated to Richard Kounai Chang on His Retirement from Yale University

edited by **Ali Serpengüzel** (*Koç University, Turkey*) & **Andrew W Poon** (*The Hong Kong University of Science & Technology, China*)

This Festschrift is a tribute to the eminent scholar, Professor Richard Kounai Chang, on his retirement from Yale University on June 12, 2008. During his over four decades of scientific exploration, Professor Chang has made a lasting contribution to the development of linear and nonlinear optics and devices in confined geometries, of surface second-harmonic generation and surface-enhanced Raman scattering, and of novel methods for detecting airborne aerosol pathogens. This volume assembles a collection of articles contributed by former students, collaborators, and colleagues of Professor Chang all over the world.

500pp
978-981-4295-77-2
978-981-4295-78-9(ebk)

May 2010
US\$88 £58
US\$114

METHODS OF WAVE THEORY IN DISPERSIVE MEDIA

by **M V Kuzelev** (*Moscow State University, Russia*) & **A A Rukhadze** (*Russian Academy of Sciences, Russia*)

This book presents the main mathematical methods of description and general problems in the theory of linear waves in dispersive systems and media, including equilibrium and nonequilibrium waves. To show how the general theory can be applied in practice, the authors give a unified description of the waves in all important physical systems which are traditionally studied in the mechanics of continuous media, electrodynamics, plasma physics, electronics and physical kinetics. Consideration is also given to the interaction of waves in coupled systems, the propagation and evolution of localized wave perturbations, and the emission of waves from dispersive media under the action of external sources moving in a prescribed manner. A general theory of instabilities of linear systems is given. Special attention is paid to problems in the theory of linear electromagnetic waves in plasmas and plasma-like media. The book also contains a number of original results of the present-day wave theory that have thus far been published in scientific journals only.



272pp
978-981-4261-69-2
978-981-4261-70-8(ebk)

Oct 2009
US\$95 £71
US\$124

:: Textbook

WAVES AND RAYS IN ELASTIC CONTINUA

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

The present book emphasizes the interdependence of mathematical formulation and physical meaning in the description of seismic phenomena. Herein, we use aspects of continuum mechanics, wave theory and ray theory to explain phenomena resulting from the propagation of seismic waves.



Contents: *Elastic Continua:* Deformations; Forces and Balance Principles; Stress-Strain Equations; Strain Energy; Material Symmetry;; *Waves and Rays:* Equations of Motion: Isotropic Homogeneous Continua; Equations of Motion: Anisotropic Inhomogeneous Continua; Hamilton's Ray Equations; Christoffel's Equations; Reflection and Transmission; Lagrange's Ray Equations;; *Variational Formulation of Rays:* Euler's Equations; Variational Principles; Ray Parameters;; *Appendices:* Euler's Homogeneous-Function Theorem; Legendre's Transformation; List of Symbols,.

460pp
978-981-4289-00-9

Apr 2010
US\$88 £58

GENERAL PHYSICS

PHYSICS OVER EASY

Breakfasts with Beth and Physics

(2nd Edition)

by **Leonid V Azároff** (*University of Connecticut, USA*)

The second edition similarly recounts the more recent application of these theories to nanoparticles, Bose–Einstein condensates, quantum entanglement and quantum computers. By including accurate measurements of the Cosmic Microwave Background and supernovae in near and distant galaxies, an understanding of how the universe was formed in an Inflationary Big Bang is now possible. We've also gained a much better picture of the life of stars and how they may turn into red giants, white dwarfs, black holes, neutron stars or pulsars.

300pp	Jul 2010	
978-981-4295-44-4	US\$54	£36
978-981-4295-45-1 (pbk)	US\$24	£16
978-981-4295-46-8 (ebk)	US\$70	

CREMONA VIOLINS

A Physicist's Quest for the Secrets of Stradivari

(With DVD-ROM)

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

This book contains a brief account of that history — the rise and fall of the Cremonese art of violin making that dominated over two centuries. It is primarily devoted, however, to the physics behind violin acoustics, specifically the research of William F “Jack” Fry over the past several decades. The gradual evolution of his ideas leading to a holistic approach is chronicled, in sharp contrast to the conventional “reductionist” analysis. With rare insights, he has come closer than anyone before in reproducing the tonal qualities of the great Italian masters. This historic achievement makes the book extremely valuable for violin makers and violin researchers.



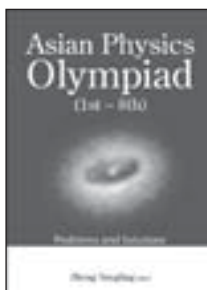
176pp	Nov 2009	
978-981-279-109-2	US\$49	£27
978-981-279-110-8 (pbk)	US\$35	£18
978-981-279-111-5 (ebk)	US\$66	

ASIAN PHYSICS OLYMPIAD (1ST-8TH)

Problems and Solutions

edited by **Yongling Zheng** (*Fudan University, China*)

This book compiles all of the test problems and solutions from the 1st through the 8th Asian Physics Olympiad. Test questions of every paper consist of two parts, a theory section and an experiment section, before which minutes of teams and results of each competition are introduced. It is a rather desirable reference book for both students and teachers of international competition training as well as middle school student contestants.

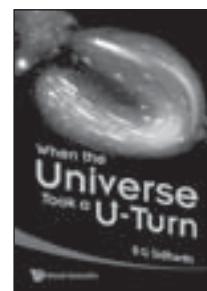


320pp	Oct 2009	
978-981-4271-43-1 (pbk)	US\$45	£34
978-981-4271-44-8 (ebk)	US\$59	

WHEN THE UNIVERSE TOOK A U-TURN

by **B G Sidharth** (*B M Birla Science Centre, Hyderabad, India*)

This book addresses some of the baffling questions encountered at the final frontier of space and time related to particle physics and cosmology in the context of recent iconoclastic observations and developments.



Contents: The Lord is Subtle, But Defies Commonsense!; You Can Be Younger Than Your Grandson; God Does Not Play Dice, or Does He?; Time is Running Backwards Isn't It?; On a Collision Course; Law Without Law; When the Universe Took a U Turn.

200pp	Sep 2009	
978-981-4277-81-5	US\$58	£44
978-981-4277-82-2 (ebk)	US\$75	

:: Bestseller

THE FUNDAMENTAL CONSTANTS

A Mystery of Physics

by **Harald Fritzscht** (*University of Munich, Germany*) &

translated by **Gregory Stodolsky**

The speed of light, the fine structure constant, and Newton's constant of gravity — these are just three among the many physical constants that define our picture of the world. In this book, physicist and author Harald Fritzscht invites the reader to explore the mystery of the fundamental constants of physics in the company of Isaac Newton, Albert Einstein, and a modern-day physicist. The conversation that the three scientists are imagined to have provides an entertaining introduction to the constants and covers topics ranging from atomic, nuclear, and particle physics to astrophysics and cosmology.



216pp	Mar 2009	
978-981-281-819-5	US\$76	£43
978-981-283-432-4 (pbk)	US\$38	£30
978-981-281-820-1 (ebk)	US\$88	

:: Bestseller

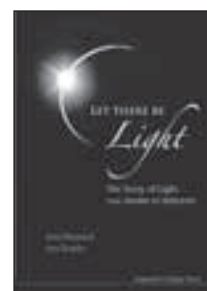
LET THERE BE LIGHT

The Story of Light from Atoms to Galaxies

by **Alex Montwill** (*University College Dublin, Ireland*) &

Ann Breslin (*University College Dublin, Ireland*)

Contents: Introducing Light; Geometrical Optics: Reflection; Geometrical Optics; Refraction; Light from Afar — Astronomy; Light from the Past — Astrophysics; Introducing Waves; Sound Waves; Light as a Wave; Making Images; There Was Electricity, There Was Magnetism, and Then There Was Light; 'Atoms of Light' — The Birth of Quantum Theory; The Development of Quantum Mechanics; Atoms of Light Acting as Particles; Atoms of Light Behaving as Waves; Relativity Part 1: How It Began; Relativity Part 2: Verifiable Predictions; Epilogue.



632pp	Sep 2008	
978-1-86094-850-3	US\$85	£47
978-1-84816-328-7 (pbk)	US\$48	£26

THEORETICAL PHYSICS

:: Bestselling Textbook

INTRODUCTION TO MODERN PHYSICS

Theoretical Foundations

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

"The author is obviously well versed in both teaching and writing about the topics covered, and the presentation is mostly clear and concise ... the text is complemented and expanded by numerous well-chosen exercises."

Physics Today

Contents: Classical Physics; Some Contradictions; Quantum Mechanics; Atomic Physics; Nuclear Physics; Particle Physics; Special Relativity; Relativistic Quantum Mechanics; General Relativity; Quantum Fields; Quantum Fields; Problems.



496pp	Jul 2008	
978-981-281-224-7	US\$99	£54
978-981-281-225-4(pbk)	US\$73	£40

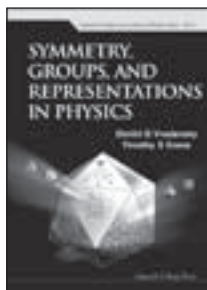
:: Textbook

Imperial College Press Advanced Physics Texts

SYMMETRY, GROUPS, AND REPRESENTATIONS IN PHYSICS

by **Dimitri D Vvedensky** (*Imperial College London, UK*) & **Timothy S Evans** (*Imperial College London, UK*)

Contents: Symmetry in Science; Elements of Abstract Group Theory; Representations of Groups; The Fundamental Theorems of Irreducible Representations; Characters and Character Tables; Basis Functions of Irreducible Representations; Symmetry and Ordinary Differential Equations in Classical Physics; Symmetry and Partial Differential Equations in Quantum Physics; Symmetry in Quantum Mechanical Problems; Continuous Groups and Lie Groups; Irreducible Representations of $SO(2)$ and $SO(3)$; From Lie Groups to Lie Algebras; Unitary Groups and $SU(N)$; The Group $SU(2)$; Irreducible Representations of $SU(3)$; Young Tableaux and Irreducible Representations of $SU(N)$.



350pp	Jun 2010	
978-1-84816-371-3	US\$68	£45

LECTURES ON ADVANCED MATHEMATICAL METHODS FOR PHYSICISTS

by **Sunil Mukhi** (*Tata Institute of Fundamental Research, India*) & **N Mukunda** (*formerly of Indian Institute of Science, India*)

This book presents a survey of Topology and Differential Geometry and also, Lie Groups and Algebras, and their Representations. The first topic is indispensable to students of gravitation and related areas of modern physics, (including string theory) while the second has applications in gauge theory and particle physics, integrable systems and nuclear physics. The style of presentation is succinct and precise. The book aims to provide the reader access to a wide variety of sources in the current literature, in addition to being a textbook of advanced mathematical methods for physicists.

280pp	Feb 2010	
978-981-4299-73-2	US\$78	£51
978-981-4299-74-9(ebk)	US\$101	

Series on Knots and Everything - Vol. 42

THE ORIGIN OF DISCRETE PARTICLES

by **T Bastin** & **C W Kilmister**

This book is a unique summary of the results of a long research project undertaken by the authors on discreteness in modern physics. In contrast with the usual expectation that discreteness is the result of mathematical tools for insertion into a continuous theory, this more basic treatment builds up the world from the discrimination of discrete entities. This gives an algebraic structure in which certain fixed numbers arise. As such, one agrees with the measured value of the fine-structure constant to one part in 10,000,000 (107).

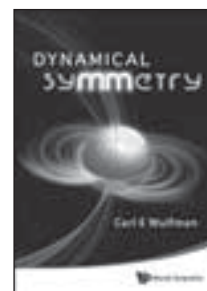


196pp	Aug 2009	
978-981-4261-67-8	US\$68	£51
978-981-4261-68-5(ebk)	US\$88	

DYNAMICAL SYMMETRY

by **Carl E Wulfman** (*University of the Pacific, USA*)

Contents: Physical Symmetry and Geometrical Symmetry; On Symmetries Associated With Hamiltonian Dynamics; One-Parameter Transformation Groups; Everywhere Local Invariance; Lie Transformation Groups and Lie Algebras; Dynamical Symmetry in Hamiltonian Mechanics. Symmetry in Phase Space; Symmetries of Classical Kepler Motion; Dynamical Symmetry in Schrödinger Quantum Mechanics; Spectrum Generating Groups; Dynamical Symmetry of Regularized Hydrogen-Like Atoms; Approximate Atomic and Molecular Calculations; Rovibronic Systems; Symmetry of Maxwell's Equations.



450pp	Jul 2010	
978-981-4291-36-1	US\$97	£64
978-981-4291-37-8(ebk)	US\$126	

IN CELEBRATION OF K C HINES

edited by **Bruce H J McKellar** (*University of Melbourne, Australia*) & **Ken Amos** (*University of Melbourne, Australia*)

This book presents a comprehensive review of a diverse range of subjects in physics written by physicists who have all been taught by or are associated with K C Hines. Ken Hines was a great mentor with far-reaching influence on his students who later went on to make outstanding contributions to physics in their careers. The papers provide significant insights into statistical physics, plasma physics from fluorescent lighting to quantum pair plasmas, cosmic ray physics, nuclear reactions, and many other fields.



240pp	Dec 2009	
978-981-4293-65-5	US\$72	£54
978-981-4293-66-2(ebk)	US\$94	

:: Study Guide

Statistical Science and Interdisciplinary Research - Vol. 9

RECENT DEVELOPMENTS IN THEORETICAL PHYSICS

edited by **Subir Ghosh** (*Indian Statistical Institute, India*) & **Guruprasad Kar** (*Indian Statistical Institute, India*)

This volume covers recent developments in the major areas of theoretical physics. The scope of the book ranges from small length scale (High Energy Physics, Neutrinos ...) through medium scale (Nuclear Physics) to large length scale (Condensed Matter Physics) up to classical and quantum Black Hole Physics. It also deals with topics in nonlinear physics, econophysics, new ideas in quantum mechanics, quantum information and quantum computation.

440pp Nov 2009
978-981-4287-32-6 US\$95 £71



:: Textbook

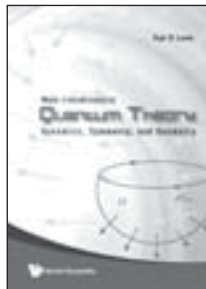
NON-RELATIVISTIC QUANTUM THEORY

Dynamics, Symmetry, and Geometry

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

This textbook is mainly for physics students at the advanced undergraduate and beginning graduate levels, especially those with a theoretical inclination. Its chief purpose is to give a systematic introduction to the main ingredients of the fundamentals of quantum theory, with special emphasis on those aspects of group theory (spacetime and permutational symmetries and group representations) and differential geometry (geometrical phases, topological quantum numbers, and Chern–Simons Theory) that are relevant in modern developments of the subject. It will provide students with an overview of key elements of the theory, as well as a solid preparation in calculational techniques.

460pp Aug 2009
978-981-4271-79-0 US\$72 £54



:: Study Guide

PROBLEMS AND SOLUTIONS IN THEORETICAL AND MATHEMATICAL PHYSICS

Third Edition

Volume I: Introductory Level

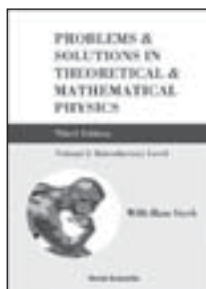
Volume II: Advanced Level

by **Willi-Hans Steeb** (*University of Johannesburg, South Africa*)

This book provides a comprehensive collection of problems together with their detailed solutions in the field of Theoretical and Mathematical Physics. All modern fields in Theoretical and Mathematical Physics are covered. It is the only book which covers all the new techniques and methods in theoretical and mathematical physics. Third edition updated with: Exercises in: Hilbert space theory, Lie groups, Matrix-valued differential forms, Bose-Fermi operators and string theory. All other chapters have been updated with new problems and materials.

Vol. I 260pp Jul 2009
978-981-4282-14-7 US\$59 £44
978-981-4282-15-4(pbk) US\$35 £26

Vol. II 428pp Jul 2009
978-981-4282-16-1 US\$59 £44
978-981-4282-17-8(pbk) US\$35 £26



SEMICONDUCTORS

:: Textbook

QUANTUM THEORY OF THE OPTICAL AND ELECTRONIC PROPERTIES OF SEMICONDUCTORS

(Fifth Edition)

by **Hartmut Haug** (*Goethe-Universität Frankfurt, Germany*) & **Stephan W Koch** (*Philipps-Universität Marburg, Germany*)

Contents: Oscillator Model; Atoms in a Classical Light Field; Periodic Lattice of Atoms; Mesoscopic Semiconductor Structures; Free Carrier Transitions; Ideal Quantum Gases; Interacting Electron Gas; Plasmons and Plasma Screening; Retarded Green's Function for Electrons; Excitons; Polaritons; Semiconductor Bloch Equations; Excitonic Optical Stark Effect; Wave-Mixing Spectroscopy; Optical Properties of a Quasi-Equilibrium Electron–Hole Plasma; Optical Bistability; Semiconductor Laser; Electroabsorption; Magneto-Optics; Quantum Dots; Coulomb Quantum Kinetics; Quantum Optical Effects.

484pp Jan 2009
978-981-283-883-4 US\$96 £53
978-981-283-884-1(pbk) US\$54 £30



SUPERCONDUCTIVITY

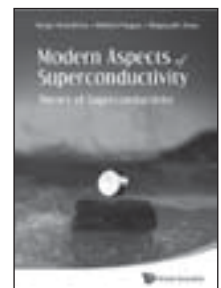
MODERN ASPECTS OF SUPERCONDUCTIVITY

Theory of Superconductivity

by **Sergei Kruchinin** (*Bogolyubov Institute for Theoretical Physics, Kiev, Ukraine*) , **Hidemi Nagao** (*Kanazawa University, Japan*) , & **Shigeyuki Aono** (*Kanazawa University, Japan*)

This book, written for graduate students and researchers in the field of superconductivity, discusses important aspects of the experiment and theory surrounding superconductivity. Contents: Theory of Superconductivity; High-Tc Superconductivity; Mechanism of Pairing; Symmetry of Pairing; Multiband Superconductivity; Two-Gap Superconductivity; Room Temperature Superconductivity; Mesoscopic Superconductivity; Nanosize Two-Gap Superconductivity; Theory of Hybrid Ferromagnetic–Superconducting Nanosystems.

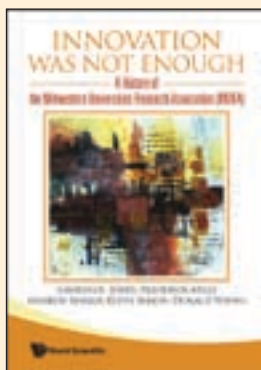
220pp Jul 2010
978-981-4261-60-9 US\$80 £53
978-981-4261-61-6(ebk) US\$104



ACCELERATOR PHYSICS/EXPERIMENTAL PHYSICS

INNOVATION WAS NOT ENOUGH

A History of the Midwestern Universities Research Association (MURA) during its lifetime from the early 1950s to the late 1960s. MURA was responsible for a number of important contributions to the science of particle accelerators, including the invention of fixed field alternating gradient accelerators (FFAG), as well as contributions to accelerator orbit theory, radio frequency acceleration techniques, colliding beams technology, orbit instabilities, computation methods, and designs of accelerator magnets and linear accelerator cavities. The authors were all members of the MURA staff and themselves made many contributions to the field.



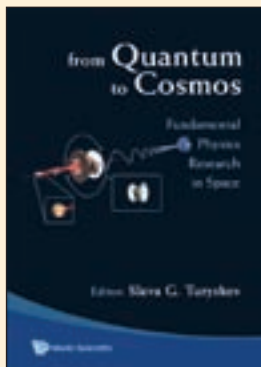
268pp
978-981-283-283-2
978-981-283-284-9(ebk)

Oct 2009
US\$38 £21
US\$49

FROM QUANTUM TO COSMOS

Fundamental Physics Research in Space
edited by **Slava G Turyshev**
(NASA Jet Propulsion Laboratory, California Institute of Technology, USA)

This unique volume discusses the advances in our understanding of fundamental physics that are anticipated in the near future, and evaluates the discovery potential of a number of recently proposed space-based gravitational experiments. Specific research areas covered include various tests of general relativity and alternative theories, search of physics beyond the Standard Model, investigations of possible violations of the equivalence principle, search for new hypothetical long- and short-range forces, variations of fundamental constants, tests of Lorentz invariance and attempts at unification of the fundamental interactions. The book also encompasses experiments aimed at the discovery of novel phenomena.



764pp
978-981-4261-20-3
978-981-4261-21-0(ebk)

May 2009
US\$142 £107
US\$185

REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

Volume 1
edited by **Alexander W Chao** (SLAC National Accelerator Laboratory, USA) & **Weiren Chou** (Fermi National Accelerator Laboratory, USA)

Particle accelerators are a major invention of the 20th century. In the last eight decades, they have evolved enormously and have fundamentally changed the way we live, think and work.

Contents: Early Milestones in the Evolution of Accelerators (*E D Courant*); Electron Linacs for High Energy Physics (*P B Wilson*); The Development of High Power Hadron Accelerators (*G H Rees*); Cyclotrons and Fixed-Field Alternating-Gradient Accelerators (*M K Craddock & K R Symon*); Particle Colliders for High Energy Physics (*D A Edwards & H T Edwards*); Synchrotron Radiation (*A Hofmann*); Medical Applications of Accelerators (*H Eickhoff & U Linz*); Industrial Accelerators (*R W Hamm*); The Development of Superconducting Magnets for Use in Particle Accelerators: From the Tevatron to the LHC (*A Tollestrup & E Todesco*); Development of Superconducting RF Technology (*T Furuya*); Cooling Methods for Charged Particle Beams (*V V Parkhomchuk & A N Skrinsky*); The Supercollider: the Pre-Texas Days — A Personal Recollection of Its Birth and Berkeley Years (*S Wojcicki*); Accelerators and the Accelerator Community (*A Sessler & E Malamud*); Book Review: Panofsky on Physics, Politics, and Peace: Pief Remembers (*G Loew*); A Brief History of Particle Accelerators (Poster).



340pp
978-981-283-520-8
978-981-4289-19-1(posterior)
978-981-283-521-5(ebk)

Dec 2008
US\$99 £55
US\$15 £11
US\$114

For orders or enquiries, please contact any of our offices below or visit us at: www.worldscientific.com

- **NORTH & SOUTH AMERICA** **World Scientific Publishing Co. Inc.**
27 Warren Street, Suite 401-402, Hackensack, NJ 07601, USA Toll-free fax: 1 888 977 2665 Toll-free: 1 800 227 7562 Email: sales@wspc.com
- **EUROPE & THE MIDDLE EAST** **World Scientific Publishing (UK) Ltd.**
c/o Marston Book Services, P O Box 269, Abingdon, Oxon OX14 4YN, UK Fax: 44 (0) 123 546 5555 Tel: 44 (0) 123 546 5500 Email: direct.orders@marston.co.uk
- **ASIA & THE REST OF THE WORLD** **World Scientific Publishing Co. Pte. Ltd.**
Farrer Road, P O Box 128, SINGAPORE 912805 Fax: 65 6467 7667 Tel: 65 6466 5775 Email: sales@wspc.com.sg

* Prices subject to change without prior notice