

Quantum Mechanics, Quantum Information & Quantum Theory 2010

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

MURRAY GELL-MANN

Selected Papers

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

Murray Gell-Mann is one of the leading physicists in the world. He was awarded the Nobel Prize in Physics in 1969 for his work on the SU(3) symmetry. His list of publications, albeit relatively short, is highly impressive — he has written mainly papers, which have become landmarks in physics. In 1953, Gell-Mann introduced the strangeness quantum number. In 1954, he proposed, together with F Low, the idea of the renormalization group. In 1958, Gell-Mann wrote, together with R Feynman, an important paper on the V-A theory of weak interactions. In 1961, Gell-Mann published his ideas on the SU(3) symmetry. In 1964, he proposed the quark model for hadrons. In 1971, Gell-Mann, together with H Fritzsche, proposed the color quantum number; and in 1972, the theory of QCD. These major publications of Gell-Mann are collected in this volume, thus providing physicists with easy access to the important publications of Gell-Mann.

300pp

Dec 2009

978-981-283-684-7

US\$95 £71

978-981-4261-62-3(pbk)

US\$48 £36



Imperial College Press Advanced Physics Texts

SYMMETRY, GROUPS, AND REPRESENTATIONS IN PHYSICS

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

This book is an introduction to symmetry in physics based on discrete and continuous groups. No knowledge of algebra is assumed and the book is suitable for both beginning and advanced graduate students. In fact, at **Imperial College**, the notes on which this book is based have been thoroughly tested in the classroom by two lecturers with quite different backgrounds (condensed matter theory and field theory) to classes composed of third- and fourth-year undergraduate students as well as students from the MSc in Quantum Fields and Fundamental Forces program. Abundant exercises, all with detailed solutions that are available in a separate instructor's manual, are included to illustrate the concepts introduced in the main text, to extend some of the main results, and to introduce new ideas. One of the main themes in the book is the application of group theory to physical problems.

350pp

Mar 2010

978-1-84816-371-3

US\$68 £51

HIGHLIGHTS

FUNDAMENTALS AND NEW
FRONTIERS OF

BOSE-EINSTEIN CONDENSATION

by **Masahito Ueda** (*University of Tokyo, Japan*)

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PHYSICS AND RELATIVITY

by **Vlatko Vedral** (*University of Oxford, UK and
National University of Singapore, Singapore*) &
J A Dunningham (*University of Leeds, UK*)

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QUANTUM CRYPTOGRAPHY

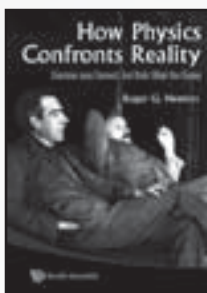
by **Gerald Gilbert**, **Yaakov S Weinstein** (*MITRE Quantum
Information Science Group, USA*) & **Michael Hamrick**
(*MITRE Integrated Communications Networks & Sensors
Department, USA*)

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HOW PHYSICS CONFRONTS REALITY

Einstein was Correct, but Bohr Won the Game
by **Roger G Newton** (*Indiana University, USA*)

This book recalls, for nonscientific readers, the history of quantum mechanics, the main points of its interpretation, and Einstein's objections to it, together with the responses engendered by his arguments. Most popular discussions on the strange aspects of quantum mechanics ignore the fundamental fact that Einstein was correct in his insistence that the theory does not directly describe reality. While that fact does not remove the theory's counterintuitive features, it casts them in a different light.



160pp	Jul 2009	
978-981-4277-02-0	US\$54	£41
978-981-4277-03-7(pbk)	US\$29.95	£22

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*)
foreword by **Sir Roger Penrose**

This book presents the hotly debated question of whether quantum mechanics plays a non-trivial role in biology. In a timely way, it sets out a distinct quantum biology agenda. The burgeoning fields of nanotechnology, biotechnology, quantum technology, and quantum information processing are now strongly converging. The acronym BINS, for Bio-Info-Nano-Systems, has been coined to describe the synergetic interface of these several disciplines. The living cell is an information replicating and processing system that is replete with naturally-evolved nanomachines, which at some level require a quantum mechanical description. As quantum engineering and nanotechnology meet, increasing use will be made of biological structures, or hybrids of biological and fabricated systems, for producing novel devices for information storage and processing and other tasks. An understanding of these systems at a quantum mechanical level will be indispensable.



468pp	Sept 2008	
978-1-84816-253-2	US\$104	£61
978-1-84816-267-9(pbk)	US\$58	£35

Bestseller

FEYNMAN'S THESIS — A NEW APPROACH TO QUANTUM THEORY

edited by **Laurie M Brown** (*Northwestern University, USA*)

"The path integral approach is now something that every graduate student in theoretical physics is supposed to know ... the thesis provides a very good background for the way these ideas came about. The two companion articles, although available in print, also gives a complete picture of the development of this line of thinking. The helpful introductory remarks by the editor also puts things in the proper historical perspective. This book would be very helpful to anyone interested in the development of modern ideas in physics."

Classical and Quantum Gravity

144pp	Aug 2005	
978-981-256-366-8	US\$37	£22
978-981-256-380-4(pbk)	US\$18	£10

FUNDAMENTALS AND NEW FRONTIERS OF BOSE-EINSTEIN CONDENSATION

by **Masahito Ueda** (*University of Tokyo, Japan*)

This book covers the fundamentals of and new developments in gaseous Bose-Einstein condensation. It begins with a review of fundamental concepts and theorems, and introduces basic theories describing Bose-Einstein condensation (BEC). It then discusses some recent topics such as fast-rotating BEC, spinor and dipolar BEC, low-dimensional BEC, balanced and imbalanced fermionic superfluidity including BCS-BEC crossover and unitary gas, and p-wave superfluidity.

350pp	Mar 2010	
978-981-283-959-6	US\$75	£56

World Scientific Lecture Notes in Physics – Vol. 78

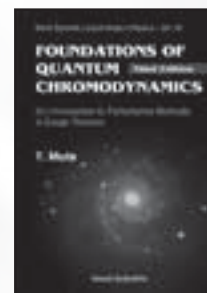
FOUNDATIONS OF QUANTUM CHROMODYNAMICS

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 also 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.



400pp (approx.)	Nov 2009	
978-981-279-353-9	US\$86	£65
978-981-279-354-6(pbk)	US\$55	£41

AN INTRODUCTION TO THE METHODS OF RELATIVISTIC MOLECULAR QUANTUM MECHANICS

by **Stephen Wilson** (*Rutherford Appleton Laboratory, England*)

Molecular electronic structure calculations have assumed increasing importance in a wide range of research fields. Applications abound in fields as diverse as molecular electronics and pharmacology, radioastronomy and organic synthesis. The vast majority of contemporary molecular electronic structure studies are performed within the framework of non-relativistic quantum mechanics. However, recent years have seen a growing recognition of the importance of relativistic effects in molecules, especially in systems containing heavy atoms. This has fuelled the development of methods for relativistic molecular electronic structure studies. This book describes the essential theoretical and computational apparatus for a relativistic quantum chemistry.

250pp (approx.)	Feb 2010	
978-981-02-2444-8	US\$68	£51

:: Bestseller

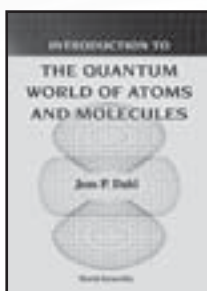
INTRODUCTION TO THE QUANTUM WORLD OF ATOMS AND MOLECULESby **Jens P Dahl** (Technical University of Denmark)

"The book is mathematically rigorous and the author has made a real effort to make what can be a difficult subject straightforward to understand. The mathematical parts are clearly presented with sufficiently detailed steps to maintain the flow, but also to make it understandable ... it would make an excellent source book for the library or for the book shelves of anyone teaching a course on quantum mechanics."

Contemporary Physics

This invaluable book provides a balanced and integrated introduction to the quantum world of atoms and molecules.

476pp	Jun 2001	
978-981-02-4565-8	US\$98	£78
978-981-4277-59-4 (pbk)	US\$51	£41

**ADVANCED QUANTUM MECHANICS**

by **Freeman Dyson** (Institute for Advanced Study, Princeton, USA)
transcribed by **David Derbes** (Laboratory Schools, University of Chicago, USA)

"This book is likely to be of interest mainly to historians of science ... one thing was done rather well was the relativistic treatment of the spectrum of the hydrogen atom, which is found algebraically and, rather elegantly and efficiently. The treatment of fluctuations in fields had some nice points ..."

CERN Courier

This invaluable volume comprises the legendary, never-before-published, lectures on quantum electrodynamics first given by Dyson at Cornell University in 1951. Future generations of physicists are bound to read these lectures with pleasure, benefiting from the lucid style that is so characteristic of Dyson's exposition.

236pp	Mar 2007	
978-981-270-622-5	US\$69	£40
978-981-270-661-4 (pbk)	US\$31	£20

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)

This invaluable textbook deals with elementary excitations in bulk and low-dimensional semiconductors, including quantum wells, quantum wires and quantum dots. The basic principles underlying optical nonlinearities are developed, including excitonic and many-body plasma effects. Fundamentals of optical bistability, semiconductor lasers, femtosecond excitation, the optical Stark effect, the semiconductor photon echo, magneto-optical effects, as well as bulk and quantum-confined Franz-Keldysh effects, are covered.



This fifth edition includes an additional chapter on 'Quantum Optical Effects' where the theory of quantum optical effects in semiconductors is detailed.

484pp	Jan 2009	
978-981-283-883-4	US\$91	£53
978-981-283-884-1 (pbk)	US\$51	£30

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

5th Edition

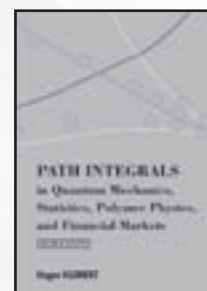
by **Hagen Kleinert** (Freie Universität Berlin, Germany)

"Kleinert's book presents the reader with a very complete and very thorough discussion of path integration ... a new extensive and, again, rather 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 ...

It profits from the clarity and conciseness that is also a hallmark of Kleinert's scientific papers ... this volume is highly recommendable for any student considering majoring in theoretical physics or chemistry, and an absolute must for any lecturer in this area ... 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



:: Bestseller

INTRODUCTION TO QUANTUM COMPUTATION AND INFORMATION

edited by **Hoi-Kwong Lo** (MagiQ Technologies, Inc., New York), **Tim Spiller** (Hewlett-Packard Laboratories, Bristol) & **Sandu Popescu** (University of Bristol & BRIMS, Hewlett-Packard Laboratories, Bristol)

Contents: Basic Elements of Quantum Information Technology (*T P Spiller*); The Joy of Entanglement (*S Popescu & D Rohrlich*); Quantum Information and Its Properties (*R Jozsa*); Quantum Cryptology (*H-K Lo*); Experimental Quantum Cryptography (*H Zbinden*); Quantum Computation: An Introduction (*A Barenco*); Quantum Error Correction (*A M Steane*); Fault-Tolerant Quantum Computation (*J Preskill*); Quantum Computers, Error-Correction and Networking: Quantum Optical Approaches (*T Pellizzari*); Quantum Computation with Nuclear Magnetic Resonance (*I L Chuang*); Future Directions for Quantum Information Theory (*C H Bennett*).

Readership: Graduate students and advanced researchers in quantum/classical mechanics, quantum information & computation, theoretical foundations of computer science and information science.

364pp	Oct 1998	
978-981-02-3399-0	US\$66	£45
978-981-02-4410-1 (pbk)	US\$40	£30

THE QUANTUM THEORY OF MAGNETISM

(Second Edition)

by **Norberto Majlis** (McGill University, Canada)

This advanced level textbook is devoted to the description of systems which show ordered magnetic phases. A wide selection of topics is covered, including a detailed treatment of the mean-field approximation as the main paradigm for the phenomenological description of phase transitions. A thorough presentation of the RKKY and related models of indirect exchange is also featured, and a chapter on surface magnetism, rarely found in other textbooks, adds to the uniqueness of this book. For the second edition, three new chapters have been added, namely on magnetic anisotropy, on coherent magnon states and on local moments.

392pp	Sep 2007	
978-981-256-792-5	US\$83	£48

:: Bestseller

Series on Knots and Everything – Vol. 18

THE SELF-EVOLVING COSMOSA Phenomenological Approach to Nature's Unity-in-Diversity
by **Steven M Rosen** (City University of New York, USA)

"The Self-Evolving Cosmos is an exciting, creative, interdisciplinary, and scholarly work recalling the collaboration between Hermann Weyl and Edmund Husserl on the function of mathematical intuition in cosmological physics ... It is a major, ground-breaking, poetic work of powerful intelligence illustrating the use of a promising new research tool in the challenging areas of quantum and cosmological physics."

Patrick A Heelan, PhD
William A Gaston Professor of Philosophy,
Georgetown University
author of *Space-Perception and the Philosophy of Science*



This unique book offers an original way of thinking about two of the most significant problems confronting modern theoretical physics: the unification of the forces of nature and the evolution of the universe.

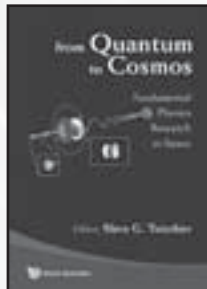
292pp	Feb 2008	
978-981-277-173-5	US\$93	£55
978-981-283-581-9(pbk)	US\$51	£30

FROM QUANTUM TO COSMOS

Fundamental Physics Research in Space

edited by **Slava G Turyshev** (NASA Jet Propulsion Laboratory, California Institute of Technology, USA)

Space-based laboratory research in fundamental physics is an emerging research discipline that offers great discovery potential and at the same time could drive the development of technological advances which are likely to be important to scientists and technologists in many other different research fields. 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, variations of fundamental constants, and attempts at unification of the fundamental interactions. The book also encompasses experiments aimed at the discovery of novel phenomena, including dark matter candidates, and studies of dark energy.



764pp	May 2009	
978-981-4261-20-3	US\$142	£107

LET THERE BE LIGHT

The Story of Light from Atoms to Galaxies

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

This book is the first of its kind to devote itself at this level to the key role played by light and electromagnetic radiation in the universe. Readers are introduced to philosophical hypotheses such as the economy, symmetry, and universality of natural laws, and are then guided to practical consequences such as the rules of geometrical optics and even Einstein's well-known but mysterious relationship, $E = mc^2$. Most chapters feature a pen picture of the life and character of a relevant scientific figure. These "Historical Interludes" include, among others, Galileo's conflicts with the Inquisition, Fourier's taunting of the guillotine, Neils Bohr and World War II, and the unique character of Richard Feynman.

632pp	Oct 2008	
978-1-86094-850-3	US\$80	£47
978-1-84816-328-7(pbk)	US\$45	£26

COSMIC SECRETS

Fundamental Processes of Nature

by **Wolfram Schommers** (Institute for Scientific Computing, Germany)

We see objects in front of us, and experience a real material effect when we approach and touch them. Thus, we conclude that all objects are embedded in space and exist objectively. However, such experiences in everyday life cannot be transferred to the atomic level: within standard quantum theory, the material world is still embedded in space, but it no longer has an objective existence. How can objects be embedded in space without existing objectively?

This book addresses this and similar issues in an illustrative and non-conventional way.

300pp (approx.)	Dec 2010	
978-981-283-643-4	US\$58	£44

QUANTUM THEMES

The Charms of the Microworld

by **Thanu Padmanabhan** (The Inter-University Centre for Astronomy and Astrophysics, Pune, India)

Quantum theory is one of the more abstract branches of theoretical physics, yet it makes clear and concrete predictions which are repeatedly verified experimentally. More recently, there has been some confluence between the concepts of microphysics and those of macrophysics. Currently fashionable ideas in cosmology are also deeply linked to concepts from quantum theory, thus piquing greater interest in this subject. This timely book takes stock of what quantum theory has achieved and where it is leading to at present, in a manner understandable to an educated layman. Emphasis is given to the specific aspects of quantum theory that interface with gravity and cosmology, so as to keep the book reasonably up to date and focused on a key underlying theme.



240pp	Mar 2009	
978-981-283-545-1	US\$47	£38

Series on Knots and Everything – Vol. 42

THE ORIGIN OF DISCRETE PARTICLESby **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).

Contents: Combinatorial Space; The Story of the Particle Concept; Dimensionality; The Simple Bit-String Picture; The Fine Structure Constant Calculated; Process and Interaction; Pre-Space, High Energy Particles: Nonlocality; Space: Relativity and Classical Space; Perception: Current Quantum Physics — The State-Observer Philosophy; Just Six Numbers; Quantum or Gravity?.

196pp	Aug 2009	
978-981-4261-67-8	US\$68	£51

QUANTUM MECHANICS

Its Early Development and the Road to Entanglement
by **Edward G Steward** (*Emeritus Professor, City University, London*)

This book provides the reader with an explanation of the origin and establishment of quantum mechanics, with the mathematics in a digestible form, together with a descriptive survey of later developments up to the present day. The mathematical treatment closely follows the original treatment, but in modern terms, using uniform symbolism as much as possible and with simplifications (e.g. the use of one dimension instead of three) to avoid unnecessarily complicated-looking mathematics.



280pp	Mar 2008	
978-1-86094-977-7	US\$80	£45
978-1-86094-978-4(pbk)	US\$58	£33

PRINCIPLES OF QUANTUM COMPUTATION AND INFORMATION

Volume II: Basic Tools and Special Topics

by **Giuliano Benenti, Giulio Casati** (*Università degli Studi dell'Insubria, Italy & Istituto Nazionale per la Fisica della Materia, Italy*) & **Giuliano Strini** (*Università di Milano, Italy*)

Building on the basic concepts introduced in Vol I, this second volume deals with various important aspects, both theoretical and experimental, of quantum computation and information in depth. The areas include quantum data compression, accessible information, entanglement concentration, limits to quantum computation due to decoherence, quantum error-correction, and the first experimental implementations of quantum information protocols. This volume also includes a selection of special topics: chaos and quantum to classical transition, quantum trajectories, quantum computation and quantum chaos, and the Zeno effect.

444pp	Mar 2007	
978-981-256-345-3	US\$69	£41
978-981-256-528-0(pbk)	US\$45	£29

INTRODUCTORY QUANTUM PHYSICS AND RELATIVITY

by **Vlatko Vedral** (*University of Oxford, UK and National University of Singapore, Singapore*) & **J A Dunningham** (*University of Leeds, UK*)

This book is based on the lecture courses taught by Dunningham and Vedral at the University of Leeds. The book contains all the necessary material for quantum physics and relativity in the first two years of a typical physics degree course. The choice of topics complies fully with the Institute of Physics guidelines, but the coverage also includes more interesting and up-to-date applications, such as Bose condensation and global positioning system (GPS).

Contents: Old Quantum Theory; Quantum Mechanics; Applications of Quantum Mechanics; The Schrödinger Equation in Three-Dimensions; Spin and Statistics; Atoms and Molecules; Formal Structure of Quantum Mechanics; Perturbation Theory; Second Revolution: Relativity; Combining Quantum Mechanics and Relativity; Problems and Solutions.

200pp	Jul 2010	
978-1-84816-514-4	US\$68	£51
978-1-84816-515-1(pbk)	US\$38	£29

PRINCIPLES OF QUANTUM COMPUTATION AND INFORMATION

Volume I: Basic Concepts

by **Giuliano Benenti, Giulio Casati** (*Università degli Studi dell'Insubria, Italy & Istituto Nazionale per la Fisica della Materia, Italy*) & **Giuliano Strini** (*Università di Milano, Italy*)

Volume I may be used as a textbook for a one-semester introductory course in quantum information and computation, both for upper-level undergraduate students and for graduate students. It contains a large number of solved exercises, which are an essential complement to the text, as they will help the student to become familiar with the subject. No previous knowledge of quantum mechanics or classical computation is required.

272pp	Apr 2004	
978-981-238-830-8	US\$73	£45
978-981-238-858-2(pbk)	US\$41	£29

QUANTUM PROCESSES

by **Wolfram Schommers** (*Institute for Scientific Computing, Germany*)

This book deals mainly with the nature of physical laws, their origin and their possible future evolution. The most direct application of the basic laws of physics is given in nanotechnology. New aspects in connection with basic physical laws are not only of direct epistemological interest, but are also related to nanotechnological developments — the key technology of this century.

The book also deals with the nature of time, the meaning of wave function and its behavior within a non-linear theory, and other relevant facts and mysteries in (quantum) reality.

350pp	May 2010	
978-981-279-656-1	US\$72	£39

**INTERNATIONAL JOURNAL OF MODERN PHYSICS B (IJMPB)**

<http://www.worldscinet.com/ijmpb>

AN APPROACH TO DEFORMATION THEORY BASED ON THERMODYNAMIC PRINCIPLES

Author(s): **Falk H. Koenemann** (*Aachen, Germany*)

Abstract: A new physical approach to deformation theory is presented, which is based on the balance of externally applied forces and material forces. The equation of state is generalized to apply to solids, and transformed into vector form. By taking the derivatives of an external potential and the material internal energy with respect to the coordinates, two vector fields are defined for the forces exerted by surrounding the system, subject to the boundary conditions, and vice versa, subject to the material properties. These vector fields are then merged into a third one that represents the properties of the loaded state. Through the work function, the force field is then directly transformed into the displacement field. The approach permits fully satisfactory prediction of all geometric and energetic properties of elastic and plastic simple shear. It predicts the existence of a bifurcation at the transition from reversible to irreversible behavior whose properties permit correct prediction of cracks in solids. It also offers a mechanism for the generation of sheath folds in plastic shear zones and for turbulence in viscous flow.

Source: International Journal of Modern Physics B (Condensed Matter Physics; Statistical Physics; Applied Physics)
Vol.22, Issue: 17 (2008), Page: 2617-2673

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please email trail@wspc.com

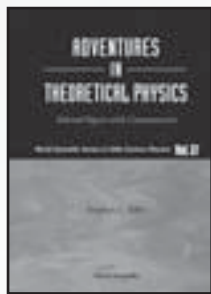
World Scientific Series in 20th Century Physics – Vol. 37

ADVENTURES IN THEORETICAL PHYSICS

Selected Papers with Commentaries

by **Stephen L Adler** (*Institute for Advanced Study, Princeton*)

This book will be a valuable resource for graduate students and researchers in the fields in which Dr Adler has worked, and for historians of science studying physics in the final third of the twentieth century, a period in which an enduring synthesis was achieved.



Contents: Early Years, and Condensed Matter Physics; High Energy Neutrino Reactions, PCAC Relations, and Sum Rules; Anomalies: Chiral Anomalies and Their Nonrenormalization, Perturbative Corrections to Scaling, and Trace Anomalies to All Orders; Quantum Electrodynamics; Particle Phenomenology and Neutral Currents; Gravitation; Non-Abelian Monopoles, Confinement Models, and Chiral Symmetry Breaking; Overrelaxation for Monte Carlo and Other Algorithms; Quaternionic Quantum Mechanics, Trace Dynamics, and Emergent Quantum Theory; Where Next?.

760pp	Jan 2006	
978-981-256-370-5	US\$154	£87
978-981-256-522-8(pbk)	US\$82	£45

MANY-BODY THEORY EXPOSED!

Propagator Description of Quantum Mechanics in Many-Body Systems

2nd Edition

by **Willem H Dickhoff** (*Washington University in St Louis, USA*) & **Dimitri Van Neck** (*Ghent University, Belgium*)

This comprehensive textbook on the quantum mechanics of identical particles includes a wealth of valuable experimental data, in particular recent results from direct knockout reactions directly related to the single-particle propagator in many-body theory. This book emphasizes finite systems as well and should be of considerable interest to researchers in nuclear, atomic, and molecular physics.

852pp	May 2008	
978-981-281-379-4	US\$104	£64
978-981-281-380-0(pbk)	US\$80	£45

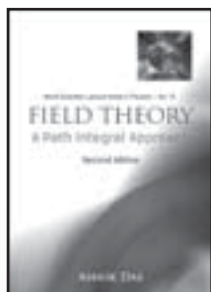
World Scientific Lecture Notes in Physics – Vol. 75

FIELD THEORY

A Path Integral Approach
(Second Edition)

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

This unique book describes quantum field theory completely within the context of path integrals. With its utility in a variety of fields in physics, the subject matter is primarily developed within the context of quantum mechanics before going into specialized areas.



Adding new material keenly requested by readers, this second edition is an important expansion of the popular first edition. Two extra chapters cover path integral quantization of gauge theories and anomalies, and a new section extends the supersymmetry chapter, where singular potentials in supersymmetric systems are described.

376pp	Jun 2006	
978-981-256-847-2	US\$91	£56
978-981-256-848-9(pbk)	US\$58	£33

:: Bestseller

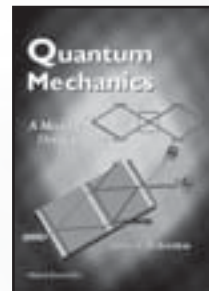
QUANTUM MECHANICS

A Modern Development

by **Leslie E Ballentine** (*Simon Fraser University*)

“This book is of greatest benefit to students of quantum mechanics who want to learn more than solely computational recipes and predictive tools of the theory, and, in this sense, the book really fills a gap in the literature.”

Mathematical Reviews



Although there are many textbooks that deal with the formal apparatus of quantum mechanics (QM) and its application to standard problems, none take into account the developments in the foundations of the subject which have taken place in the last few decades. This book aims to remove that unfortunate dichotomy, which has divorced the practical aspects of the subject from the interpretation and broader implications of the theory.

672pp	Mar 1998	
978-981-02-2707-4	US\$61	£47
978-981-02-4105-6(pbk)	US\$45	£30

PRIMORDIAL COSMOLOGY

by **Giovanni Montani** (*ENEA & ICRANet, University of Rome “Sapienza”, Italy*), **Marco Valerio Battisti**, **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 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	Mar 2010	
978-981-4271-00-4	US\$95	£71

LECTURES ON QUANTUM MECHANICS

(In 3 Companion Volumes)

Volume 1: Basic Matters

Volume 2: Simple Systems

Volume 3: Perturbed Evolution

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

Note: *The three volumes are not sequential but rather independent of each other and largely self-contained.

Contents: Basic Matters: A Brutal Fact of Life; Kinematics: How Quantum Systems are Described; Dynamics: How Quantum Systems Evolve; Motion along the x Axis; Elementary Examples; Simple Systems: Quantum Kinematics Reviewed; Quantum Dynamics Reviewed; Examples; Orbital Angular Momentum; Hydrogen-like Atoms; Approximation Methods; Perturbed Evolution: Basics of Kinematics and Dynamics; Time-Dependent Perturbations; Scattering; Angular Momentum; External Magnetic Field; Indistinguishable Particles.

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INTRODUCTION TO QUANTUM MECHANICS

Schrödinger Equation and Path Integral
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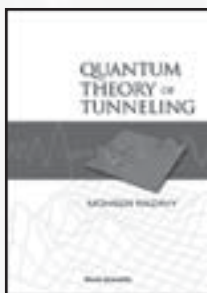


828pp **Mar 2006**
978-981-256-691-1 **US\$114 £71**
978-981-256-692-8(pbk) **US\$69 £41**

QUANTUM THEORY OF TUNNELING

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

This book provides a comprehensive introduction to the theoretical foundations of quantum tunneling, stressing the basic physics underlying the applications. The topics addressed include exponential and nonexponential decay processes and the application of scattering theory to tunneling problems. In addition to the Schrödinger equation approach, the path integral, Heisenberg's equations and the phase space method are all used to study the motion of a particle under the barrier. Extensions to the multidimensional cases and tunneling of particles with internal degrees of freedom are also considered. Furthermore, recent advances concerning time delay and tunneling times and some of the problems associated with their measurement are also discussed. Finally, some examples of tunneling in atomic, molecular, nuclear and condensed matter physics are presented.



572pp **Feb 2003**
978-981-238-018-0 **US\$135 £102**
978-981-238-019-7(pbk) **US\$73 £56**

Series in Modern Condensed Matter Physics – Vol. 13

QUANTUM DISSIPATIVE SYSTEMS

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

Major advances in the quantum theory of macroscopic systems, in combination with stunning experimental achievements, have brightened the field and brought it to the attention of the general community in natural sciences. Today, working knowledge of dissipative quantum mechanics is an essential tool for many physicists. This book — originally published in 1990 and republished in 1999 as an enlarged second edition — delves much deeper than ever before into the fundamental concepts, methods, and applications of quantum dissipative systems, including the most recent developments.



In this third edition, 26 chapters from the second edition contain additional material and several chapters are completely rewritten.

528pp **Mar 2008**
978-981-279-162-7(pbk) **US\$69 £40**

APPLIED QUANTUM MECHANICS

by **Walter A Harrison** (*Stanford University*)

The book covers those parts of quantum theory which may be necessary for a modern engineer. It focuses on the approximations and concepts which allow estimates of the entire range of properties of nuclei, atoms, molecules, and solids, as well as the behavior of lasers and other quantum-optic devices. It may well prove useful also to graduate students in physics, whose courses on quantum theory tend not to include any of these applications. The material has been the basis of a course taught to graduate engineering students for the past four years at Stanford University.

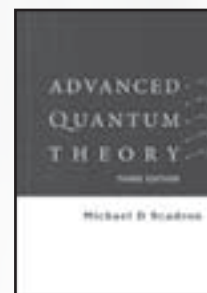


372pp **Jul 2000**
978-981-02-4375-3 **US\$61 £45**
978-981-02-4394-4(pbk) **US\$19 £13**

ADVANCED QUANTUM THEORY

(Third Edition)
by **Michael D Scadron** (*University of Arizona, USA*)

Advanced Quantum Theory is a concised, comprehensive, well-organized text based on the techniques used in theoretical elementary particle physics and extended to other branches of modern physics as well. While it is especially valuable reading for students and professors of physics, a less cursory survey should aid the nonspecialist in mastering the principles and calculational tools that probe the quantum nature of the fundamental forces.



444pp **Nov 2006**
978-981-270-050-6 **US\$103 £64**

CLASSICAL AND QUANTUM DISSIPATIVE SYSTEMS

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

This book discusses issues associated with the quantum mechanical formulation of dissipative systems. It begins with an introductory review of phenomenological damping forces, and the construction of the Lagrangian and Hamiltonian for the damped motion. The second part of this book investigates the use of classical formulation in the quantization of dynamical systems under the influence of dissipative forces. The third and final part of the book focuses on the problem of dissipation in interacting quantum mechanical systems, as well as the connection of some of these models to their classical counterparts. A number of important applications, such as the theory of heavy-ion scattering and the motion of a radiating electron, are also discussed.



352pp **Jan 2006**
978-1-86094-525-0 **US\$125 £75**
978-1-86094-530-4(pbk) **US\$71 £40**

ON THE EMERGENCE THEME OF PHYSICS

by **Robert Carroll** (*University of Illinois at Urbana-Champaign, USA*)

The book surveys mathematical relations between classical and quantum mechanics, gravity, time and thermodynamics from various points of view and many sources (with appropriate attribution). The emergence theme is developed with an emphasis on the meaning via mathematics. A background theme of Bohemian mechanics and connections to the quantum equivalence principle of Matone et al. is also developed in great detail. Some original work relating the quantum potential and Ricci flow is also included.

Contents: Some Quantum Background; Some Geometric Aspects; Aspects of Emergence; Kaluza–Klein and Cosmology; Remarks on Thermodynamics and Gravity; Geometry and Mechanics; On Time and the Universe; Gravity and the Quantum Potential.

290pp Apr 2010
978-981-4291-79-8 US\$78 £59

SELECTED PAPERS OF M OHYA

edited by **N Watanabe** (*Tokyo University of Science, Japan*)

This volume is a collection of articles written by Professor M Ohya over the past three decades in the areas of quantum teleportation, quantum information theory, quantum computer, etc. By compiling Ohya's important works in these areas, the book serves as a useful reference for researchers who are working in these fields.



Readership: Researchers in quantum entropy, quantum information theory and mathematical physics.

488pp Feb 2008
978-981-279-419-2 US\$164 £91

FROM MICRO TO MACRO QUANTUM SYSTEMS

A Unified Formalism with Superselection Rules and Its Applications

by **K Kong Wan** (*University of St Andrews, Scotland, UK*)

This book presents a flexible and unified theory for physical systems, from micro and macro quantum to classical. It also discusses various topics of interest such as the asymptotic treatment of quantum state preparation and quantum measurement, local observables and local values, Schrödinger's cat states in superconducting systems, and a path space formulation of quantum mechanics.

This self-contained book is complete with a review of relevant geometric and operator theories, for example, vector fields and operators, symmetric operators and their maximal symmetric extensions, direct integrals of Hilbert spaces and operators.

708pp Mar 2006
978-1-86094-625-7 US\$137 £79

JOHN S BELL ON THE FOUNDATIONS OF QUANTUM MECHANICS

edited by **M Bell** (*CERN*), **K Gottfried** (*Cornell University*) & **M Veltman** (*University of Michigan, Ann Arbor*)

This book is the most complete collection of John S Bell's research papers, review articles and lecture notes on the foundations of quantum mechanics. Some of this material has hitherto been difficult to access. The book also appears in a paperback edition, aimed at students and young researchers. This volume will be very useful to researchers in the foundations and applications of quantum mechanics.

248pp Aug 2001
978-981-02-4687-7 US\$61 £49
978-981-02-4688-4 (pbk) US\$31 £24



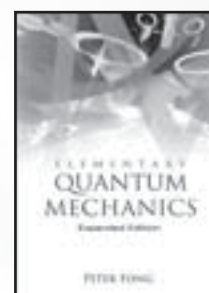
ELEMENTARY QUANTUM MECHANICS

(Expanded Edition)

by **Peter Fong** (*Emory University, USA*)

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396pp Jun 2005
978-981-256-292-0 US\$103 £68
978-981-256-351-4 (pbk) US\$58 £37



Series on Knots and Everything – Vol. 41

ZERO TO INFINITY

The Foundations of Physics

by **Peter Rowlands** (*University of Liverpool, UK*)

Unique in its field, this book uses a methodology that is entirely new, creating the simplest and most abstract foundations for physics to date.

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740pp Oct 2007
978-981-270-914-1 US\$104 £64

NANO

LARGE-AREA GRAPHENE-BASED FLEXIBLE TRANSPARENT CONDUCTING FILMS

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Author(s): **Fethullah Güneş, Gang Hee Han** (*Advanced Institute of Nanotechnology, Center for Nanotubes and Nanostructured Composites, Sungkyunkwan University Korea*) et al

Abstract: A simple approach by direct synthesis of few-layer graphene sheets and transferring them onto flexible substrate is demonstrated. It is found that the condition of graphene transfer strongly relies on the cooling rate of the film during CVD synthesis. The sheet resistance of the film decreases as the film thickness increases. A sheet resistance of 233 Ω /sq is obtained at a transmittance of 62%.

Source: Vol.4, Issue: 2 (2009), Page: 83-90

A STORY OF LIGHT

A Short Introduction to Quantum Field Theory of Quarks and Leptons

by **MY Han** (*Duke University, USA*)

This book presents the essential aspects of relativistic quantum field theory, with minimal use of mathematics. It covers the development of quantum field theory from the original quantization of electromagnetic field to the gauge field theory of interactions among quarks and leptons.

Aimed at both scientists and non-specialists, it requires only some rudimentary knowledge of the Lagrangian and Hamiltonian formulation of Newtonian mechanics and a basic understanding of the special theory of relativity and quantum mechanics.

116pp **Dec 2004**
978-981-256-034-6 **US\$49** **£31**



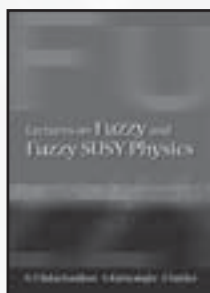
LECTURES ON FUZZY AND FUZZY SUSY PHYSICS

by **A P Balachandran** (*Syracuse University, USA*), **S Kürkcüoğlu** (*Dublin Institute for Advanced Studies, Ireland*) & **S Vaidya** (*Indian Institute of Science, India*)

Noncommutative geometry provides a powerful tool for regularizing quantum field theories in the form of fuzzy physics. Fuzzy physics maintains symmetries, has no fermion-doubling problem and represents topological features efficiently. These lecture notes provide a comprehensive introduction to the field.

Contents: Fuzzy Spaces; Star Products; Scalar Fields on the Fuzzy Sphere; Instantons, Monopoles and Projective Modules; Fuzzy Nonlinear Sigma Models; Fuzzy Gauge Theories; The Dirac Operator and Axial Anomaly; Fuzzy Supersymmetry; SUSY Anomalies on the Fuzzy Supersphere; Fuzzy Spaces as Hopf Algebras.

196pp **Feb 2007**
978-981-270-466-5 **US\$69** **£40**

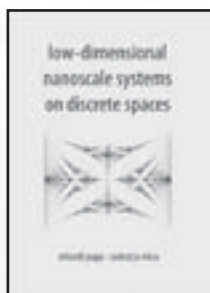


LOW-DIMENSIONAL NANOSCALE SYSTEMS ON DISCRETE SPACES

by **Erhardt Papp** (*West University of Timisoara, Romania*) & **Codrutza Micu** (*North University of Baia Mare, Romania*)

The area of low-dimensional quantum systems on discrete spaces is a rapidly growing research field lying at the interface between quantum theoretical developments, like discrete and q-difference equations, and tight binding superlattice models in solid-state physics. Systems on discrete spaces are promising candidates for applications in several areas. Indeed, the dynamic localization of electrons on the 1D lattice under the influence of an external electric field serves to describe time-dependent transport in quantum wires, linear optical absorption spectra, and the generation of higher harmonics. Technological developments are then provided by conductance calculations characterizing 1D conductors, junctions between rings and leads or rings and dots, and by quantum LC-circuits. Accordingly, the issues presented in this book are important starting points for the design of novel nanodevices.

276pp **Apr 2007**
978-981-270-638-6 **US\$90** **£53**



SPACE-TIME-MATTER

Modern Higher-Dimensional Cosmology (Second Edition)

by **Paul S Wesson** (*University of Waterloo, Canada & Stanford University, USA*)

Albert Einstein, together with Theodor Kaluza and Oskar Klein, realized that extra dimensions can be used to unify the different fields of physics, as well as unifying the fields with their material sources. In fact, it was Einstein's dream to transpose the "base wood" of the matter term in his field equations to the "marble" of the geometrical term. During his lifetime, this kind of unified theory achieved only partial success. But the modern approach, outlined in this bestseller, is elegant and agrees with all the classical tests. The basic idea is to unify the source and its field using the rich algebra of higher-dimensional Riemannian geometry. In other words, space, time and matter become parts of geometry.

264pp **May 2007**
978-981-270-632-4 **US\$69** **£40**



:: Notable

LECTURES ON QUANTUM FIELD THEORY

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

"Ashok Das has written an excellent, comprehensive introduction to modern quantum field theory, covering both its theoretical underpinnings and basic computational methods. It will be very useful to students, teachers, and researchers as a course text, and as a volume for self-study and reference."

Professor Stephen L Adler
Institute for Advanced Study, Princeton

Contents: Relativistic Equations; Solutions of the Dirac Equation; Properties of the Dirac Equation; Representations of Lorentz and Poincaré Groups; Free Klein-Gordon Field Theory; Self-Interacting Scalar Field Theory; Complex Scalar Field Theory; Dirac Field Theory; Maxwell Field Theory; Dirac Method for Constrained Systems; Discrete Symmetries; Yang-Mills Theory; BRST Invariance and Its Consequences; Higgs Phenomenon and the Standard Model; Regularization of Feynman Diagrams; Renormalization Theory; Renormalization Group and Equation.

792pp **Sept 2008**
978-981-283-285-6 **US\$104** **£61**
978-981-283-286-3(pbk) **US\$72** **£43**

Series on Stability, Vibration and Control of Systems,
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THE QUANTUM WORLD OF NUCLEAR PHYSICS

by **Yuri A Berezhtnoy** (*Kharkov National University, Ukraine*)

This book presents a comprehensive explanation of the main ideas and principles of atomic and nuclear physics and quantum mechanics. The author invites readers to plunge into the physics of micro-objects and to take a fascinating tour of the world of atoms and nuclei.

Contents: Quantum Mechanics; Fundamental Interactions; Structure of Atomic Nuclei; Radioactivity of Atomic Nuclei; Nuclear Reactions; Fission of Atomic Nuclei; Nuclear Astrophysics and Controlled Nuclear Fusion.

200pp **Jul 2005**
978-981-256-387-3 **US\$58** **£33**

PROBLEMS AND SOLUTIONS IN THEORETICAL AND MATHEMATICAL PHYSICS

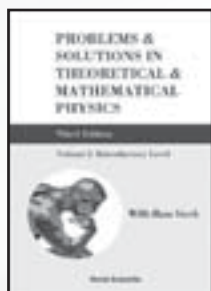
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Vol. I 260pp Jul 2009
 978-981-4282-14-7 US\$59 £44
 978-981-4282-15-4(pbk) US\$35 £26

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

DIAGRAMMATICS

Lectures on Selected Problems in Condensed Matter Theory
 by **Michael V Sadovskii** (*Russian Academy of Sciences, Russia*)

The introduction of quantum field theory methods has led to a kind of “revolution” in condensed matter theory. This resulted in the increased importance of Feynman diagrams or diagram technique. It has now become imperative for professionals in condensed matter theory to have a thorough knowledge of this method.



The aim of these lectures is to demonstrate the application of the diagram technique to different problems of condensed matter theory. Some of these problems are not “finally” solved. But the development of results from any section of this book may serve as a starting point for a serious theoretical study.

360pp Mar 2006
 978-981-256-639-3 US\$104 £63

STRONGLY CORRELATED SYSTEMS, COHERENCE AND ENTANGLEMENT

edited by **J M P Carmelo** (*Universidade do Minho, Portugal*), **J M B Lopes dos Santos** (*Universidade do Porto, Portugal*), **V Rocha Vieira & P D Sacramento** (*Instituto Superior Técnico, Portugal*)

This volume presents a collection of review papers on recent work in the connected areas of strongly correlated systems, the effects of coherence on macroscopic systems, and entanglement in quantum systems. These areas have attracted considerable interest due to their complexity and associated unexpected nontrivial phenomena, and also due to their potential applications in various fields, from materials science to information technology. The coverage includes strongly correlated electronic systems such as low-dimensional complex materials, ordered and disordered spin systems, and aspects of the physics of manganites and graphene, both in equilibrium and far from equilibrium.

612pp Jul 2007
 978-981-270-572-3 US\$165 £94

Advanced Series in Mathematical Physics – Vol. 28

AN INTRODUCTION TO THE MATHEMATICAL STRUCTURE OF QUANTUM MECHANICS

A Short Course for Mathematicians

(Second Edition)

by **F Strocchi** (*Scuola Normale Superiore, Italy*)

This book arises out of the need for Quantum Mechanics (QM) to be part of the common education of mathematics students. The mathematical structure of QM is formulated in terms of the C^* -algebra of observables, which is argued on the basis of the operational definition of measurements and the duality between states and observables, for a general physical system.



192pp Oct 2008
 978-981-283-522-2 US\$51 £30

MODERN FOUNDATIONS OF QUANTUM OPTICS

by **Vlatko Vedral** (*University of Leeds, UK*)

“... It is beautifully laid out and written in a manner that makes one just want to go on reading. The footnotes are a joy – they offer wonderful insights, additional information, alternative scenarios and sometimes humorous comments.”

Karen Kirkby

Times Higher Education Supplement

This textbook offers a comprehensive and up-to-date overview of the basic ideas in modern quantum optics, beginning with a review of the whole of optics, and culminating in the quantum description of light.



236pp Feb 2005
 978-1-86094-531-1 US\$80 £52
 978-1-86094-553-3(pbk) US\$37 £25

INTERNATIONAL JOURNAL OF QUANTUM INFORMATION (IJQI)

www.worldscinet.com/ijqi

A NEW QUANTUM ALGORITHM FOR SOLVING THE MINIMUM SEARCHING PROBLEM

Author(s): Luis Antonio Brasil Kowada (*Fluminense Federal University*), **Carlile Lavor** (*State University of Campinas*), et al

Abstract: In this paper, we propose a new quantum algorithm for solving the minimum searching problem. In addition to the correctness and complexity analysis of the algorithm, we present simulation results considering an NP-hard problem.

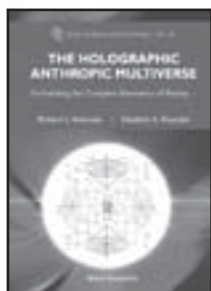
Source: International Journal of Quantum Information
 Vol.6, Issue: 3 (2008), Page: 427-436

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Series on Knots and Everything

THE HOLOGRAPHIC ANTHROPIC MULTIVERSEFormalizing the Complex Geometry of Reality
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512pp Jul 2009
978-981-283-930-5 US\$115 £86

GENERALIZED STURMIANS AND ATOMIC SPECTRAby **James Avery & John Avery** (University of Copenhagen, Denmark)

"The text is ideal for graduate students ... The book is detailed and well-organised, and I have no hesitation in recommending it to anyone interested in a rigorous, computationally oriented approach to atomic and molecular structure and dynamics."

Australian Physics

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256pp Nov 2006
978-981-256-806-9 US\$94 £55

QUANTUM INFORMATION WITH CONTINUOUS VARIABLES OF ATOMS AND LIGHTedited by **N J Cerf** (Université Libre de Bruxelles, Belgium), **G Leuchs** (Universität Erlangen-Nürnberg, Germany) & **ES Polzik** (Niels Bohr Institute, Denmark)

Quantum information describes the new field which bridges quantum physics and information science. The quantum world allows for completely new architectures and protocols. While originally formulated in continuous quantum variables, the field worked almost exclusively with discrete variables, such as single photons and photon pairs. The renaissance of continuous variables came with European research consortia such as ACQUIRE (Advanced Coherent Quantum Information Research) in the late 1990s, and QUICOV (Quantum Information with Continuous Variables) from 2000–2003. The encouraging research results of QUICOV and the new conference series CVQIP (Continuous Variable Quantum Information Processing) triggered the idea for this book.

632pp Feb 2007
978-1-86094-760-5 US\$164 £91
978-1-86094-776-6(pbk) US\$101 £56

GEOMETRIC AND ALGEBRAIC TOPOLOGICAL METHODS IN QUANTUM MECHANICSby **Giovanni Giachetta, Luigi Mangiarotti** (University of Camerino, Italy) & **Gennadi Sardanashvily** (Moscow State University, Russia)

"With respect to a prospective reader having a reasonably good background in mathematics, the notions, concepts, etc, are introduced in a self-contained but condensed manner ... The book gives a very helpful supply of mathematical tools needed by a theoretical or mathematical physicist to effect entry into some of the new directions in theoretical physics."

Mathematical Reviews

720pp Jan 2005
978-981-256-129-9 US\$119 £68

**LATEST ADVANCES IN ATOMIC CLUSTER COLLISIONS**Fission, Fusion, Electron, Ion and Photon Impact
edited by **Jean-Patrick Connerade** (Imperial College London, UK) & **Andrey Solov'yov** (Russian Academy of Sciences, Russia)

This comprehensive volume surveys the general aspects of atomic cluster science and outlines some of its important new challenges. It begins by detailing the recent advances in the understanding of structure and the essential properties of selected atomic cluster systems, fullerenes and confined atoms. Recent advances in the field of photo processes involving atomic clusters and fullerenes are discussed, and an entire chapter is devoted to the problem of fission dynamics of atomic clusters, presenting parallels with similar processes in nuclear physics.

396pp Nov 2004
978-1-86094-495-6 US\$87 £55

NON-RELATIVISTIC QUANTUM THEORYDynamics, 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.

400pp Aug 2009
978-981-4271-79-0 US\$72 £54

:: Free Online Issue

INTERNATIONAL JOURNAL OF MODERN PHYSICS B (IJMPB)
www.worldscinet.com/ijmpb**QUANTUM GLASSINESS AND SUPERCONDUCTIVITY IN DOPED LOW DIMENSIONAL ANTIFERROMAGNETS**Author(s): **Christos Panagopoulos****TRANSPORT IN A CLEAN GRAPHENE SHEET AT FINITE TEMPERATURE AND FREQUENCY**Author(s): **N. M. R. Peres** and **T. Stauber**

Source: International Journal of Modern Physics B
(Condensed Matter Physics; Statistical Physics; Applied Physics)
Vol.22, No.16 (30 June 2008)

THE "THERMODYNAMIC" UNIVERSE

Exploring the Limits of Physics

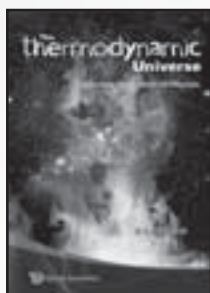
by **B G Sidharth** (*International Institute of Applicable Mathematics & Information Sciences, India*)

"... a topic of significant current interest and one about which the author is superbly qualified to opine."

Prof. A van der Merwe

Former Editor, *Foundations of Physics*

Presenting the new paradigm in fuzzy spacetime, this book is based on some 100 papers published in peer-reviewed journals including *Foundations of Physics*, *Nuovo Cimento* and *The International Journal of Modern Physics (A&E)*, as well as two recently published books, *The Chaotic Universe* (Nova Science, New York) and *The Universe of Fluctuations* (Springer). The work had predicted that the Universe is accelerating with a small cosmological constant driven by dark energy when the prevalent line of thinking was the exact opposite. Similarly, the prediction of a minimum thermodynamic residual energy in the Universe has also been realized more recently.



304pp May 2008
978-981-281-234-6 US\$61 £33

MAGNETIC RESONANCE FORCE MICROSCOPY AND A SINGLE-SPIN MEASUREMENT

by **Gennady P Berman** (*Los Alamos National Laboratory, USA*), **Fausto Borgonovi** (*Università Cattolica, Italy & Istituto Nazionale di Fisica Nucleare, Italy*), **Vyacheslav N Gorshkov** (*Institute of Physics, Ukraine & Los Alamos National Laboratory, USA*) & **Vladimir I Tsifrinovich** (*Polytechnic University, New York, USA*)

Magnetic resonance force microscopy (MRFM) is a rapidly evolving field which originated in 1990s and matured recently with the first detection of a single electron spin below the surface of a non-transparent solid. The objective of this "multi-level" book is to describe the basic principles, applications, and the advanced theory of MRFM. Focusing on the experimental oscillating cantilever-driven adiabatic reversals (OSCAR) detection technique for single electron spin, this book contains valuable research data for scientists working in the field of quantum physics or magnetic resonance.

236pp Sept 2006
978-981-256-693-5 US\$69 £40

World Scientific Series in Contemporary Chemical Physics
– Vol. 24

DYNAMICS OF PARTICLES AND THE ELECTROMAGNETIC FIELD

(With CD-ROM)

by **Slobodan Danko Bosanac** (*Rudjer Boškovic Institute, Zagreb, Croatia*)

Contents: Newtonian Dynamics; Simple Systems; Central Force; Angular Momentum; Special Phase Space Densities; Interaction of Two Particles; Examples of Lorentz Invariant Dynamics; Lorentz Invariant Liouville Equation; Non-Uniform Motion; Field and Its Source; Implementation of Uncertainty Principle; Typical Solutions; Impulsive Force; Inelastic Scattering; Dynamics in Electromagnetic Field; Radiation by Charge; Particle Manifestation of Electromagnetic Field; Spin; Arbitrary Potential.

The book is accompanied by a CD-ROM featuring various illustrative examples.

496pp Sept 2005
978-981-256-396-5 US\$84 £54

STATISTICAL DYNAMICS

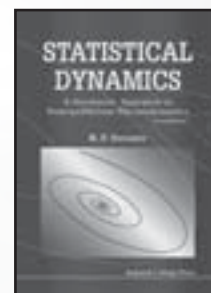
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392pp Apr 2009
978-1-84816-244-0 US\$83 £68
978-1-84816-250-1 (pbk) US\$51 £41

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204pp Oct 2008
978-981-281-386-2 US\$73 £41

ELECTROMAGNETISM AND THE STRUCTURE OF MATTERby **Daniele Funaro** (*Università di Modena e Reggio Emilia, Italy*)

The classical theory of electromagnetism is entirely revised in this book by proposing a variant of Maxwell equations that allows solitonic solutions (photons). Exact solutions are explicitly shown; this opens a completely new perspective for the study of light wave phenomena. In the framework of general relativity, the equations are written in covariant form. A coupling with the metric is obtained through the Einstein equation, whose solutions are computed exactly in a lot of original situations. Finally, the explicit construction of elementary particles, consisting of rotating photons, is indicated. The results agree qualitatively and quantitatively with what it is actually observed. This opens the path to an understanding of the structure of matter and its properties, also aimed to provide a causal explanation to quantum phenomena.

200pp Jun 2008
978-981-281-451-7 US\$101 £56

MODERN PHYSICS LETTER B (MPLB)<http://www.worldscinet.com/mplb>**QUANTUM DEVICES BASED ON MODERN BAND STRUCTURE ENGINEERING AND EPITAXIAL TECHNOLOGY**Author(s): **Manijeh Razeghi** (*Northwestern University, Evanston*)

Source: Modern Physics Letter B (Condensed Matter Physics; Statistical Physics and Applied Physics)
Vol.22, Issue: 24 (2008), Page: 2343-2371

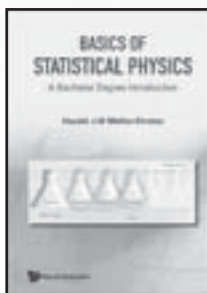
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A Bachelor Degree Introduction

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This introduction to statistical physics concentrates on the basic principles, and attempts to explain these in simple terms supplemented by numerous examples. The basic principles concentrated on are the difference between classical and quantum statistics, the *a priori* probabilities as related to degeneracies, the vital aspect of indistinguishability as compared with distinguishability in classical physics, the differences between conserved and nonconserved elements (the latter including photons and phonons), the different ways of counting arrangements in the three statistics (Maxwell–Boltzmann, Fermi–Dirac, Bose–Einstein), the difference between maximization of the number of arrangements of elements in these and averaging in the Darwin–Fowler method. Significant applications to solids, radiation and to electrons in metals are treated in separate chapters. Finally the Bose–Einstein distribution is rederived under condensation conditions. Each chapter concludes with examples and exercises.



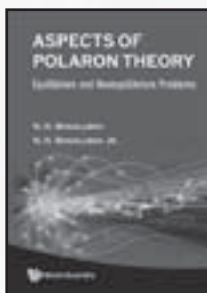
224pp **Aug 2009**
978-981-4287-22-7 **US\$58** **£44**

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Equilibrium and Nonequilibrium Problems

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180pp **Sep 2008**
978-981-283-398-3 **US\$53** **£31**

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Selected Works (With Commentary)

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Satyendra Nath Bose became a legendary figure of science in the 20th century in India with his revolutionary discovery on the nature of radiation. Despite the association with Einstein, however, little is known about him outside of India. This book highlights the remarkable intellect and the extraordinary personality of Bose set against the backdrop of a rich Bengali cultural tradition and British-Indian politics. Unlike other books covering the significance of Bose's discovery, this book describes his diverse scientific contributions to India's scientific community by bringing together selected articles and addresses by Bose as well as contributions from some well-known scientists on the many-faceted life of Bose, thus making it a truly unique volume.



300pp (approx.) **Apr 2009**
978-981-279-070-5 **US\$83** **£68**
978-981-279-071-2(pbk) **US\$51** **£41**

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Contents: Hypothesis Testing; Quantum Cramér–Rao Bound in Mixed States Model; Quantum Cramér–Rao Bound in Pure States Model; Group Symmetric Approach to Pure States Model; Large Deviation Theory in Quantum Estimation; Further Topics on Quantum Statistical Inference.

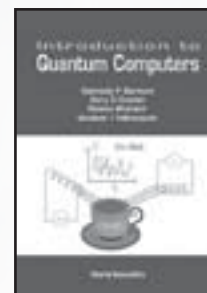


560pp **Feb 2005**
978-981-256-015-5 **US\$125** **£75**

:: Bestseller

INTRODUCTION TO QUANTUM COMPUTERSby **Gennady P Berman, Gary D Doolen, Ronnie Mainieri** (*Los Alamos National Laboratory*) & **Vladimir I Tsifrinovich** (*Polytechnic University, New York*)

This important book explains how quantum computers can do these amazing things. Several algorithms are illustrated: the discrete Fourier transform, Shor's algorithm for prime factorization; algorithms for quantum logic gates; physical implementations of quantum logic gates in ion traps and in spin chains; the simplest schemes for quantum error correction; correction of errors caused by imperfect resonant pulses; correction of errors caused by the nonresonant actions of a pulse; and numerical simulations of dynamical behavior of the quantum Control-Not gate. An overview of some basic elements of computer science is presented, including the Turing machine, Boolean algebra, and logic gates. The required quantum ideas are explained.



196pp **Jul 1998**
978-981-02-3490-4 **US\$39** **£26**
978-981-02-3549-9(pbk) **US\$22** **£15**

INTERNATIONAL JOURNAL OF QUANTUM INFORMATION (IJQI)www.worldscinet.com/ijqi**ENTANGLEMENT MODULATION IN A SPIN CHAIN BY A LOCAL IMPURITY**

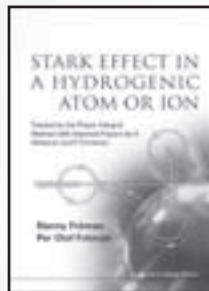
Author(s): **Francesco Plastina** (*Universita della Calabria*), **Paola Verrucchi**, **Tony J. G. Apollardo**, **Alessandro Cuccoli** and **Andrea Fubini** (*Universita di Firenze*)

Source: International Journal of Quantum Information
 Vol.6, Supplementary Issue: 1 (2008), Page: 567-573

STARK EFFECT IN A HYDROGENIC ATOM OR ION

Treated by the Phase-Integral Method with Adjoined Papers by A Hökback and P O Fröman by **Nanny Fröman & Per Olof Fröman** (University of Uppsala, Sweden)

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164pp Mar 2008
978-1-86094-924-1 US\$83 £48

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144pp Oct 2007
978-1-86094-821-3 US\$61 £33
978-1-86094-822-0(pbk) US\$31 £18

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This book deals with the history of physics, covering important developments in physics from the end of the nineteenth century to about 1930. Major topics include relativity theory (both special and general) and quantum mechanics.

208pp Sep 2007
978-981-270-919-6 US\$63 £37
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740pp Jan 2008
978-981-270-032-2 US\$113 £71

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204pp Sep 2008
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INTERNATIONAL JOURNAL OF QUANTUM INFORMATION (IJQI)

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Author(s): **Renato Renner** (Swiss Federal Institute of Technology)

Source: International Journal of Quantum Information
Vol.6, Issue: 1 (2008), Page: 1-127

MATHEMATICAL FEYNMAN PATH INTEGRALS AND THEIR APPLICATIONS

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

This volume provides a detailed, self-contained description of the mathematical difficulties as well as the possible techniques used to solve these difficulties. In particular, it gives a complete overview of the mathematical realization of Feynman path integrals in terms of well-defined functional integrals, that is, the infinite dimensional oscillatory integrals. It contains the traditional results on the topic as well as the more recent developments obtained by the author.



Mathematical Feynman Path Integrals and Their Applications is devoted to both mathematicians and physicists, graduate students and researchers who are interested in the problem of mathematical foundations of Feynman path integrals.

224pp (approx.) **May 2009**
978-981-283-690-8 **US\$42** **£32**

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250pp **Jun 2010**
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856pp **Oct 2008**
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World Scientific Lecture Notes in Physics – Vol. 74

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608pp **Jun 2005**
978-981-256-062-9 **US\$98** **£64**
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978-981-277-135-3 **US\$104** **£63**

JOURNAL OF PORPHYRINS AND PHTHALOCYANINES (JPP)

<http://www.worldscinet.com/jpp>

Voltammetric and spectroelectrochemical characterization and electrocatalytic application of metallophthalocyanines carrying pendant bulky units

Author(s): Atif Koca (Marmara University), Hatice A. Dinçer (Technical University of Istanbul)et,al

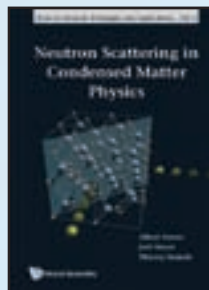
Abstract: In this work, voltammetric, spectroelectrochemical, and electrocatalytic properties of the metallophthalocyanines bearing four chloro and four biphenyl-malonic ester bulky groups were investigated.

Source: Vol.13, Issue: 6 (2009) Page: 669-680

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