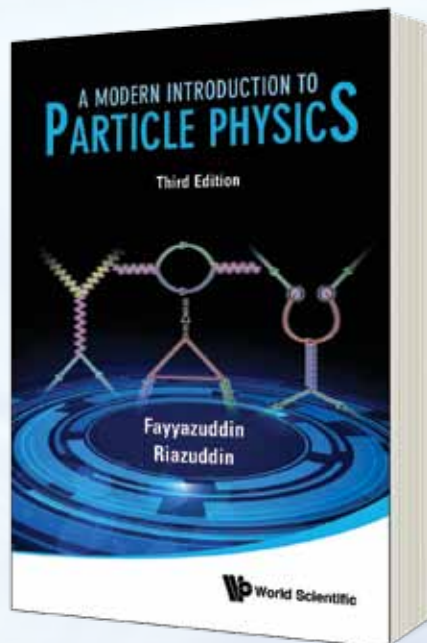
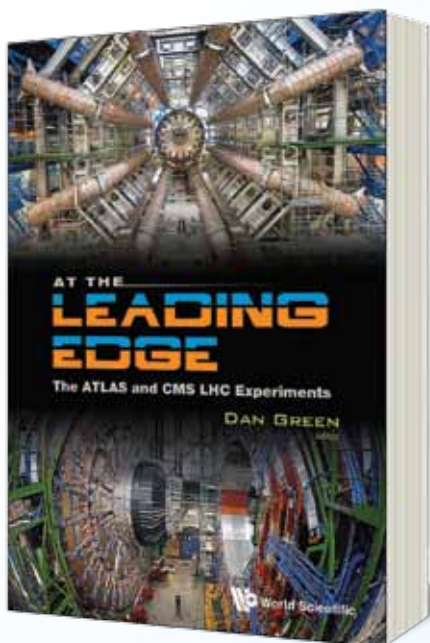


# Accelerator Physics 2012



## AT THE LEADING EDGE

The ATLAS and CMS LHC Experiments

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

“This book follows a new concept, which makes it unique and interesting to read ... The actual technological choices made by the collaborations to address the physics at the LHC are outlined by subsequent well-written and illustrated contributions from 22 prominent scientists, engineers, experts and leaders responsible for the detector subsystems of ATLAS and CMS. The book contributes in an impressive way towards understanding the motivation behind specific choices, and towards learning about the risks and the courage required to tackle necessary technological developments ... this book should be on the shelf of all friends of the LHC.”

CERN Courier

448pp	Feb 2010	
978-981-4277-61-7	US\$120	£79
978-981-4304-67-2(pbk)	US\$58	£38
978-981-4277-62-4(ebook)	US\$156	

## New Textbook

## A MODERN INTRODUCTION TO PARTICLE PHYSICS

Third Edition

by **Fayyazuddin & Riazuddin** (*National Centre for Physics, Pakistan*)

“It is well written and up to date ... I can recommend this book to those aiming for a broad working knowledge of the essentials of particle theory. It is a book to which I shall continue to refer for a long time.”

Contemporary Physics

**Contents:** Introduction; Scattering and Particle Interactions; Space-Time Symmetries; Internal Symmetries; Unitary Groups and SU(3); SU(6) and Quark Model; Colors, Gauge Principle and Quantum Chromodynamics; Heavy Flavor Physics; Heavy Quark Effective Theory; Neutrinos; Weak Interactions; Properties of Weak Hadronic Currents and Chiral Symmetry; Electroweak Unification; Deep Inelastic Scattering; Weak Decays of Heavy Flavor; Particle Mixing and CP-Violation; Grand Unification; Supersymmetry and Strings; Astroparticle Physics.

**Readership:** Graduates and researchers in high energy physics, particle physics, nuclear physics, astronomy and astroparticle physics.

750pp	Aug 2011	
978-981-4338-83-7	US\$90	£56

## HIGHLIGHTS

### THE NEUTRON

A Tool and an Object in Nuclear and Particle Physics

by **Hans G Börner** (*Institut Laue Langevin*) & **Friedrich Gönnenwein** (*University Tübingen*)

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### ADVANCES IN ATOMIC PHYSICS

An Overview

by **Claude Cohen-Tannoudji** (*Collège de France & Laboratoire Kastler Brossel*) & **David Guéry-Odelin** (*Laboratoire Collisions Agrégats Réactivité*)

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### ACCELERATOR PHYSICS

(Second Edition)

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

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## REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

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



Vol. 1

"This volume transmits the spirit of this truly multidisciplinary and international field. With an excellent bibliography for each chapter, together with the historical development of the science of accelerators and the contributions by key figures in the field, it succinctly describes the overall history and future prospects of accelerators."

CERN Courier



340pp	Dec 2008	
978-981-283-520-8	US\$99	£55
978-981-4289-19-1(poster)	US\$15	£11
978-981-283-521-5(ebook)	US\$129	

## REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

**Medical Applications of Accelerators**  
edited by **Alexander W Chao** (SLAC National Accelerator Laboratory) & **Weiren Chou** (Fermi National Accelerator Laboratory)



Vol. 2

"Volume 2 in particular comes at an auspicious moment because the synergies between the science behind accelerators and the related spin-offs, such as the applications of accelerators to fight disease, are of great importance to human health — with a profound impact on our society."

CERN Courier



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

## REVIEWS OF ACCELERATOR SCIENCE AND TECHNOLOGY

**Accelerators as Photon Sources**  
edited by **Alexander W Chao** (SLAC National Accelerator Laboratory) & **Weiren Chou** (Fermi National Accelerator Laboratory)



Vol. 3

**Contents:** Invention of the Free Electron Laser (*J M J Madey*); Photon Science at Accelerator-Based Light Sources (*J R Schneider*); Electromagnetic Radiation in Accelerator Physics (*G Stupakov*); Storage Ring Light Sources (*Z T Zhao*); Low-Gain Free Electron Lasers (*N Vinokurov*); Soft and Hard X-Ray SASE Free Electron Lasers (*S Schreiber*); Energy Recovery Linacs for Light Sources (*R Hajima*); Compton Sources of Electromagnetic Radiation (*G A Krafft & G Priebe*); Accelerator-Based Sources of Infrared and Terahertz Radiation (*A-S Müller*); The Next Generation of X-Ray Sources (*C Pellegrini*).



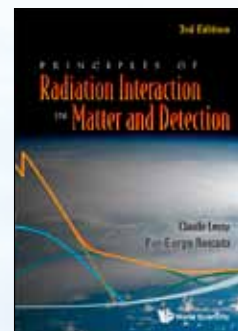
300pp	Jan 2011	
978-981-4340-38-0	US\$138	£86
978-981-4340-39-7(ebook)	US\$179	

New

## PRINCIPLES OF RADIATION INTERACTION IN MATTER AND DETECTION

**3rd Edition**  
by **Claude Leroy** (Université de Montréal) & **Pier-Giorgio Rancoita** (Istituto Nazionale di Fisica Nucleare, Milan)

This book, like the first and second editions, addresses the fundamental principles of interaction between radiation and matter and the principles of particle detection and detectors in a wide scope of fields, from low to high energy, including space physics and medical environment. It provides abundant information about the processes of electromagnetic and hadronic energy deposition in matter, detecting systems, performance of detectors and their optimization. The third edition includes additional material covering, for instance: mechanisms of energy loss like the inverse Compton scattering, corrections due to the Landau-Pomeranchuk-Migdal effect, an extended relativistic treatment of nucleus-nucleus screened Coulomb scattering, and transport of charged particles inside the heliosphere. Furthermore, the displacement damage (NIEL) in semiconductors has been revisited to account for recent experimental data and more comprehensive comparisons with results previously obtained.



1038pp	Fall 2011	
978-981-4360-51-7	US\$232	£153
978-981-4360-52-4(ebook)	US\$302	

Forthcoming

## HIGH-ENERGY NUCLEAR OPTICS OF POLARIZED PARTICLES

by **Vladimir G Baryshevsky** (Research Institute for Nuclear Problems, Belarus)

The various phenomena caused by refraction and diffraction of polarized elementary particles in matter have opened up a new research area in the particle physics: nuclear optics of polarized particles. Effects similar to the well-known optical phenomena such as birefringence and Faraday effects, exist also in particle physics, though the particle wavelength is much less than the distance between atoms of matter. Current knowledge of the quasi-optical effects, which exist for all particles in any wavelength range (and energies from low to extremely high), will enable us to investigate different properties of interacting particles (nuclei) in a new aspect. This pioneering book will provide detailed accounts of quasi-optical phenomena in the particle polarization, and will interest physicists and professionals in experimental particle physics.

600pp	Winter 2011	
978-981-4324-83-0	US\$148	£92
978-981-4324-84-7(ebook)	US\$192	

Forthcoming

## THE NEUTRON

**A Tool and an Object in Nuclear and Particle Physics**  
by **Hans G Börner** (Institut Laue Langevin) & **Friedrich Gönnewein** (University Tübingen)

The reactor-based laboratory at the Institut Laue Langevin is recognized as the world's most intense and reliable source of slow neutrons for investigations in low energy particle and nuclear physics. This book highlights for the first time the impact of about 600 very diverse publications, produced in these fields at this institute during the past 30 years. On one hand neutrons are used as a tool to generate nuclei in excited states for studying nuclear structure and fission phenomena. On the other hand neutrons are directly used as the objects of investigation. Altogether the uniquely sensitive experiments tell us a great deal about the symmetry characteristics of nuclei, particles and interactions. Complementary to studies at high energy particle accelerators, subtle and precise experiments at very low energies contribute to elucidate questions about the building blocks of the Universe.



200pp	Winter 2011	
978-981-4273-08-4	US\$73	£51
978-981-4277-00-6(ebook)	US\$95	

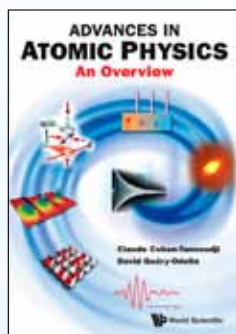
New

## ADVANCES IN ATOMIC PHYSICS

### An Overview

by **Claude Cohen-Tannoudji** (*Collège de France & Laboratoire Kastler Brossel*) & **David Guéry-Odelin** (*Laboratoire Collisions Agrégats Réactivité*)

"Advances in Atomic Physics by Claude Cohen-Tannoudji and David Guéry-Odelin is destined to become a classic. This book describes the spectacular advances of recent decades that have transformed atomic physics into one of the most exciting fields in science. The single volume constitutes a guide, a handbook, a textbook, and an encyclopedia of atomic physics. Throughout, the voice of Claude Cohen-Tannoudji — whose own contributions were seminal to this transformation and whose lectures at the College de France are legendary — rings through with the elegance and transparency that rank him as among the great teachers of our time."



Daniel Kleppner  
Center for Ultracold Atoms, MIT

796pp	Sep 2011	
978-981-277-496-5	US\$98	£61
978-981-277-497-2(pbk)	US\$48	£30
978-981-277-498-9(ebook)	US\$127	

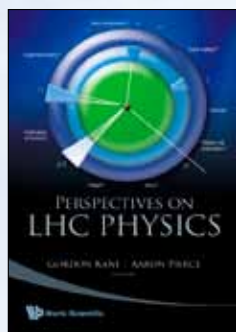
## PERSPECTIVES ON LHC PHYSICS

edited by **Gordon Kane & Aaron Pierce** (*University of Michigan*)

"... is a timely, heterogeneous offering, with some interesting gems and informative parts ... there should be sections of it to interest most readers in the physical sciences."

CERN Courier

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.



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(ebook)	US\$129	

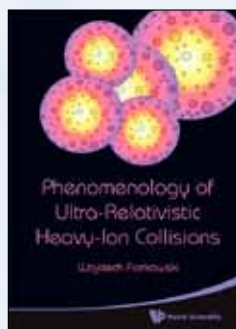
Textbook

## PHENOMENOLOGY OF ULTRA-RELATIVISTIC HEAVY-ION COLLISIONS

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

"It gives an excellent introduction to and an in-depth review of the standard theoretical framework that is used to interpret the heavy-ion data. It provides a clear, logical and unified description of statistical, hydrodynamical and kinetic models ... there are various exercises in each chapter for use as a textbook in a graduate course. All in all, this book is highly recommendable both for heavy-ion and non-heavy-ion physicists."

CERN Courier



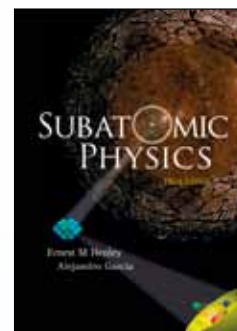
436pp	Mar 2010	
978-981-4280-66-2	US\$108	£72
978-981-4280-68-6(ebook)	US\$140	

Textbook

## SUBATOMIC PHYSICS (Third Edition)

by **Ernest M Henley & Alejandro Garcia** (*University of Washington*)

"Henley and Garcia's presentation and style hold the reader's attention right from the start. The treatment is at just the right level to whet the reader's appetite, slake their thirst for understanding and assess the current 'state of the art' ... this is a highly enlightening and up-to-date text, rather ambitious in its scope but successful in its aim to provide a comprehensive and comprehensible pedagogic overview of an exciting field of physics."



Contemporary Physics

640pp	Jul 2007	
978-981-270-056-8	US\$121	£71
978-981-270-057-5(pbk)	US\$73	£41
Solutions Manual		
978-981-279-745-2(pbk)	US\$21	£10

Textbook

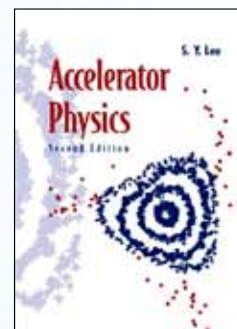
## ACCELERATOR PHYSICS (Second Edition)

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

"The large number of formulas and the excellent table of contents and index make the book a very useful addition to the library of a scientist or engineer already in the field."

Physics Today

**Contents:** Historical Developments; Layout and Components of Accelerators; Accelerator Applications; Transverse Motion; **Synchrotron Motion:** Longitudinal Equation of Motion; Adiabatic Synchrotron Motion; RF Phase and Voltage Modulations; **Physics of Electron Storage Rings:** Fields of a Moving Charged Particle; Radiation Damping and Excitation; Emittance in Electron Storage Rings; **Special Topics in Beam Physics:** Free Electron Laser (FEL); Beam-Beam Interaction; **Basics of Classical Mechanics;** **Numerical Methods and Physical Constants:** Fourier Transform; Model Independent Analysis; Cauchy Theorem and the Dispersion Relation; and many other topics.



596pp	Dec 2004	
978-981-256-182-4	US\$107	£64
978-981-256-200-5(pbk)	US\$55	£33

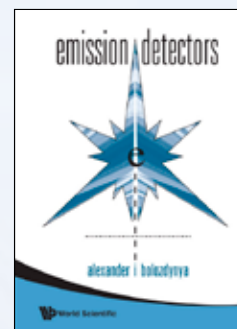
## EMISSION DETECTORS

by **Alexander I Bolozdyna**

(*National Research Nuclear University "MEPhI", Russia*)

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.

**Readership:** Detector physicists and experimentalists, nuclear engineers, materials scientists, and advanced graduate students in physics and medical imaging.



224pp	Jul 2010	
978-981-283-405-8	US\$60	£37
978-981-283-406-5(ebook)	US\$78	

Advanced Series on Directions in High Energy Physics

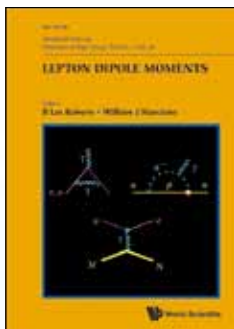
## LEPTON DIPOLE MOMENTS

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



**“Lepton dipole moment experiments are reaching levels of sensitivity that will make or break theories ... Roberts and Marciano have put together an excellent survey of lepton dipole moments and their certain power to change our world view whatever may come.”**

CERN Courier



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.

772pp                      Dec 2009  
978-981-4271-83-7      US\$185                  £122  
978-981-4271-84-4(ebook)      US\$241

Advanced Series on Directions in High Energy Physics

## PERSPECTIVES ON SUPERSYMMETRY II

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



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.



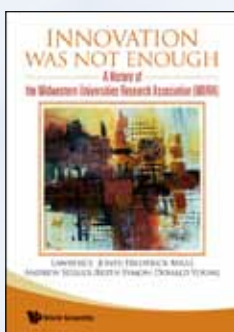
604pp                      Apr 2010  
978-981-4307-48-2      US\$141                  £97  
978-981-4307-49-9(pbk)      US\$65                  £45  
978-981-4307-50-5(ebook)      US\$183

## INNOVATION WAS NOT ENOUGH

**A History of the Midwestern Universities Research Association (MURA)**

by **Lawrence Jones** (*University of Michigan*), **Frederick Mills** (*Fermi National Accelerator Laboratory*), **Andrew Sessler** (*Lawrence Berkeley National Laboratory*), **Keith Symon** (*University of Wisconsin-Madison*) & **Donald Young** (*Fermi National Accelerator Laboratory*)

This book presents 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. A number of students were trained by MURA in accelerator techniques, and went on to important posts where they made further contributions to the field. The authors were all members of the MURA staff and themselves made many contributions to the field. No other such history exists, and there are relatively few publications devoted to the history of particle accelerators.



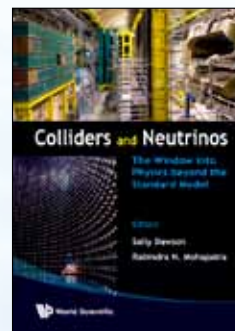
268pp                      Oct 2009  
978-981-283-283-2      US\$49                  £32  
978-981-283-284-9(ebook)      US\$64

## COLLIDERS AND NEUTRINOS

**The Window into Physics beyond the Standard Model (TASI 2006)**

edited by **Sally Dawson** (*Brookhaven National Laboratory*) & **Rabindra N Mohapatra** (*University of Maryland*)

**“The quality of the contributions is highly commendable and a tribute to the editors ... The coverage is educative, informative and stimulating ... these Proceedings offer valuable, clear insights: truly a window upon the features and workings of our thought-provoking, complex, ever-fascinating physical Universe.”**



Contemporary Physics

716pp                      Aug 2008  
978-981-281-925-3      US\$183                  £121  
978-981-281-926-0(ebook)      US\$238

## QUARK-GLUON PLASMA 4

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

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.



452pp                      Feb 2010  
978-981-4293-28-0      US\$150                  £99  
978-981-4293-29-7(ebook)      US\$195

## SEVENTY YEARS OF DOUBLE BETA DECAY

**From Nuclear Physics to Beyond-Standard-Model Particle Physics**

edited by **H V Klapdor-Kleingrothaus** (*Heidelberg, 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.



1556pp                      Mar 2010  
978-981-283-235-1      US\$446                  £295  
978-981-283-236-8(ebook)      US\$580

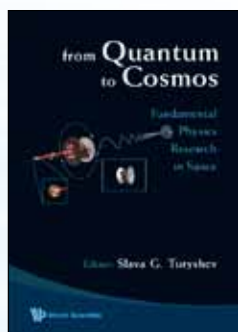
## FROM QUANTUM TO COSMOS

### Fundamental Physics Research in Space

edited by **Slava G Turyshev**

(NASA Jet Propulsion Laboratory, California Institute of Technology)

The articles in this review volume have been contributed by participants of the international workshop "From Quantum to Cosmos: Fundamental Physics Research in Space" held at the Airlie Center in Warrenton, Virginia, USA, on May 21–24, 2006. 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, including dark matter candidates, and studies of dark energy.



**764pp** **May 2009**  
**978-981-4261-20-3** **US\$181** **£119**  
**978-981-4261-21-0(ebook)** **US\$235**

**Forthcoming**

## INDUSTRIAL ACCELERATORS AND THEIR APPLICATIONS

edited by **Robert W Hamm** &

**Marianne E Hamm** (*R & M Technical Enterprises, California*)

This unique new book is a comprehensive review of the many current industrial applications of particle accelerators, written by experts in each of these fields. Readers will gain a broad understanding of the principles of these applications, the extent to which they are employed, and the accelerator technology utilized. The book also serves as a thorough introduction to these fields for non-experts and laymen.

**Readership:** Physicists, engineers and practitioners in accelerator technology and applications.

**320pp** **Winter 2011**  
**978-981-4307-04-8** **US\$144** **£100**  
**978-981-4307-05-5(ebook)** **US\$187**

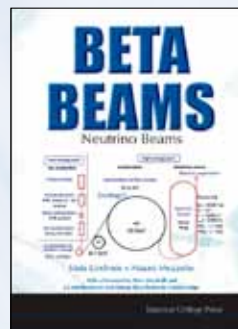
## BETA BEAMS

### Neutrino Beams

**With a Foreword by Piero Zucchelli and a Contribution on Low Energy Beta Beams by Cristina Volpe**

by **Mats Lindroos** (*CERN*) & **Mauro Mezzetto** (*INFN, Sezione di Padova*)

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.



**168pp** **Jul 2009**  
**978-1-84816-377-5** **US\$99** **£66**  
**978-1-84816-378-2(ebook)** **US\$129**

Series on Knots and Everything

## THE ORIGIN OF DISCRETE PARTICLES

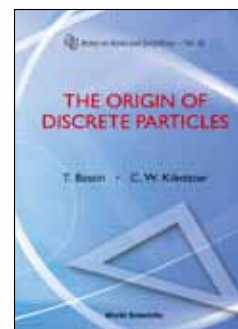
by **T Bastin** & **C W Kilmister**

**Vol. 42**

**"The book itself is a fairly edifying read: it is highly original, thought-provoking, and, given its subject matter, surprisingly clear."**

### Mathematical Reviews

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 ( $10^7$ ).



**196pp** **Aug 2009**  
**978-981-4261-67-8** **US\$87** **£57**  
**978-981-4261-68-5(ebook)** **US\$113**

**Forthcoming**

## AN INTRODUCTION TO THE PHYSICS OF PARTICLE ACCELERATORS

### Solutions Manual (Second Edition)

by **Mario Conte** (*INFN Sezione di Genova*) &

**William W MacKay** (*Brookhaven National Laboratory*)

This manual provides solutions to the problems given in the second edition of the textbook entitled *An Introduction to the Physics of Particle Accelerators*. Simple-to-solve problems play a useful role as a first check of the student's level of knowledge whereas difficult problems will test the student's capacity of finding the bearing of the problems in an interdisciplinary environment. The solutions to several problems will require strong engagement of the student, not only in accelerator physics but also in more general physical subjects, such as the profound approach to classical mechanics (discussed in Chapter 3) and the subtleties of spin dynamics (Chapter 13).

**150pp** **Oct 2011**  
**978-981-4295-99-4(pbk)** **US\$33** **£23**

**Textbook**

## AN INTRODUCTION TO THE PHYSICS OF PARTICLE ACCELERATORS

(Second Edition)

by **Mario Conte** (*INFN, Italy*) &

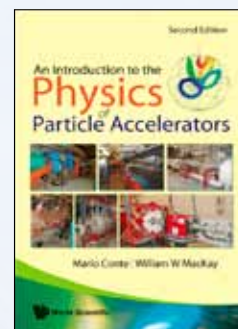
**William W MacKay** (*Brookhaven National Laboratory, USA*)

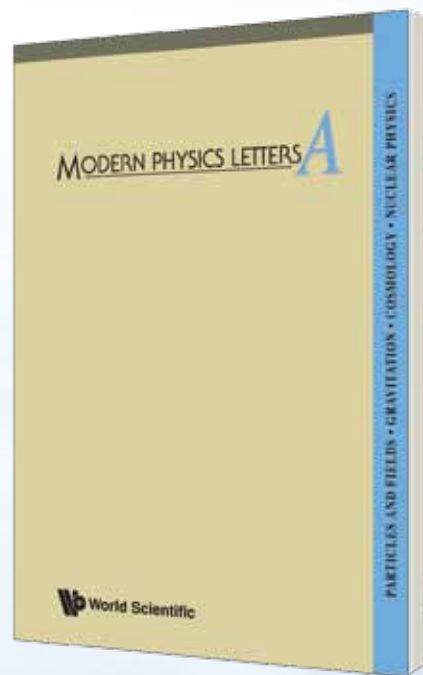
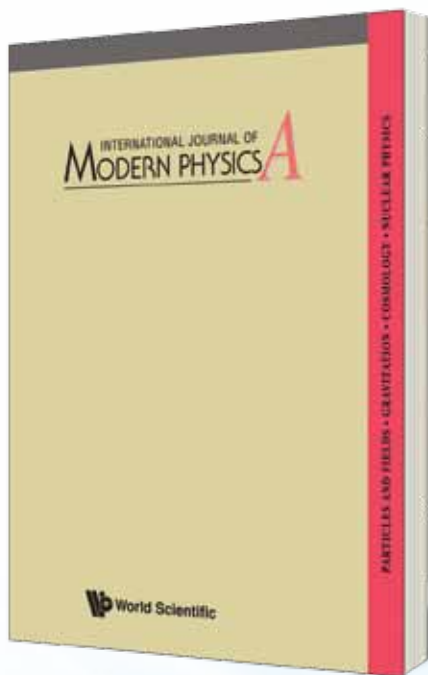
In the second edition, new chapters on spin dynamics of polarized beams as well as instrumentation and measurements are included, with a discussion of frequency spectra and Schottky signals. The additional material also covers quadratic Lie groups and integration highlighting new techniques using Cayley transforms, detailed estimation of collider luminosities, and new problems.

**Contents:** Introduction; Equations of Motion for Weak Focusing; Mechanics of Trajectories; Optical Elements with Static Magnetic Fields; Strong Focusing; Lattice Exercises; Synchrotron Oscillations; Synchrotron Radiation; RF Linear Accelerators; Resonances; Space-Charge Effects; How to Baffle Liouville; Spin Dynamics; Position Measurements and Spectra.

**Readership:** Graduates and advanced undergraduates in physics.

**392pp** **Apr 2008**  
**978-981-277-960-1** **US\$122** **£81**  
**978-981-277-961-8(pbk)** **US\$78** **£51**





## International Journal of Modern Physics A

Particles and Fields; Gravitation; Cosmology

<http://www.worldscinet.com/ijmpa/ijmpa.shtml>

### Notable IJMPA Papers

These articles are freely accessible on the website until 12/31/2011

#### HEAVY BARYONS IN A QUARK MODEL

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