Cosmic Update
Dark Puzzles. Arrow of Time. Future History

The Multiversal book series is equally unique, providing book-length extensions of the lectures with enough additional depth for those who truly want to explore these fields, while also providing the kind of clarity that is appropriate for interested lay people to grasp the general principles involved.

Lawrence M. Krauss


Features
- Covers a new approach on the problem of the selection of the initial conditions for our universe, an approach not covered in other books
- Utilizes a non-technical language to address the latest theories on cosmology, but includes technical appendices which add more depth to each chapter
- Written by a leading expert in the field of cosmology who is actively involved in research

Fields of interest
- Classical and Quantum Gravitation, Relativity Theory; Quantum Physics; Astronomy, Astrophysics and Cosmology

Target groups
- Research

Type of publication
- Monograph

Due November 2011

Advances in the Physics of Particles and Nuclei – Volume 31

The series Advances in the Physics of Particles and Nuclei (APPN) is devoted to the archiving, in printed high-quality book format, of the comprehensive, long shelf-life reviews published in The European Physical Journal A and C. APPN will be of benefit in particular to those librarians and research groups, who have chosen to have only electronic access to these journals. Occasionally, original material in review format and refereed by the series’ editorial board will also be included. This volume contains the following two reviews: Nora Brambilla et al.: Heavy Quarkonium: Progress, Puzzles and Opportunities Daniel Wicke: Properties of the Top Quark

Contents

Fields of interest
- Elementary Particles, Quantum Field Theory; Astrophysics and Astroparticles; Nuclear Physics, Heavy Ions, Hadrons

Target groups
- Research

Type of publication
- Monograph

Due September 2011

Integrated Modeling of Telescopes

Ground- or space-based telescopes are becoming increasingly more complex and construction budgets are typically in the billion dollar range. Facing costs of this magnitude, availability of engineering tools for prediction of performance and design optimization is imperative. Establishment of simulation models combining different technical disciplines such as Structural Dynamics, Control Engineering, Optics and Thermal Engineering is indispensable. Such models are normally called Integrated Models because they involve many different disciplines. The models will play an increasingly larger role for design of future interdisciplinary optical systems in space or on ground. The book concentrates on integrated modeling of optical and radio telescopes but the techniques presented will be applicable to a large variety of systems. Hence, the book will be of interest to optical and radio telescope designers, designers of spacecrafts that include optical systems, and to designers of various complex defense systems. The book may also find use as a textbook for undergraduate and graduate courses within the field.

Features
- Unique approach to cross-disciplinarian modeling techniques, system modeling, etc.
- Describes how to set up interdisciplinary models combining structural dynamics, control engineering, optics and (to some extent) thermal engineering

Contents

Fields of interest
- Astronomy, Astrophysics and Cosmology; Astronomy, Observations and Techniques; Astrophysics and Astroparticles

Target groups
- Professional/practitioner

Type of publication
- Monograph

Due July 2011
Theoretical Methods for Strongly Correlated Systems

The volume presents, for the very first time, an exhaustive collection of modern theoretical methods specifically tailored for the analysis of Strongly Correlated Systems. Many novel materials, with functional properties emerging from macroscopic quantum behaviors at the frontier of modern research in physics, chemistry and materials science, belong to this class of systems. Any technique is presented in great detail by its own inventor or by one of the world-wide recognized main contributors. The exposition has a clear didactical cut and fully reports on the most relevant case study where the specific technique showed to be very successful in describing and enlightening the puzzling physics of a particular strongly correlated system. The book is intended as textbook and/or main reference, but for advanced graduate students and post-docs in the field as well.

Features
- First graduate textbook on strongly correlated systems
- Presents an approach to unifying theory for strongly correlated systems which is still missing
- For the very first time an exhaustive collection of modern theoretical methods specifically tailored for the analysis of strongly correlated systems is presented
- Didactical presentation of the most fundamental and substantial field in condensed matter physics

Fields of interest
Solid State Physics; Spectroscopy and Microscopy; Mathematical Methods in Physics

Target groups
Research

Type of publication
Monograph

Probability in Physics

What is the role and meaning of probability in physical theory, in particular in two of the most successful theories of our age, quantum physics and statistical mechanics? Laws once conceived as universal and deterministic, such as Newton’s laws of motion, or the second law of thermodynamics, are replaced in these theories by inherently probabilistic laws. This collection of essays by some of the world’s foremost experts, presents an in-depth analysis of the meaning of probabilities in contemporary physics. Among the questions addressed are: how are probabilities conceived? - What is their nature and explanatory value? - What can and cannot be achieved by them? - What are the differences between quantum and the classical probabilities? The result is an informative and thought-provoking book for the scientifically inquisitive.

Features
- Presents the views of twenty eminent physicists on fundamental questions of probability
- Demonstrates the central role of probability in our best physical theories
- Presents historical background and new ideas on longstanding questions
- Treats philosophical aspects such as the status of natural laws in general

From the contents

Fields of interest
Statistical Physics, Dynamical Systems and Complexity; Quantum Physics; Probability Theory and Stochastic Processes

Target groups
Research

Type of publication
Monograph

The Performance of the ATLAS Detector

The ATLAS detector at the CERN Large Hadron Collider is an apparatus of unprecedented complexity, designed to probe physics in proton-proton collisions at centre-of-mass energies up to 14 TeV. It was installed in its underground cavern at the LHC during the period 2004 to 2008. Testing of individual subsystems began immediately with calibration systems and cosmic rays, and by 2008 full detector systems could be operated with the planned infrastructure, readout, and monitoring systems. Several commissioning runs of the full detector were organized in 2008 and 2009. During these runs the detector was operated continuously for several months with its readout triggered by cosmic ray muons. At the same time, regular calibrations of individual detector systems were made. In the course of these runs, signals from tens of millions of cosmic ray events were recorded. These commissioning runs continued until the first beam-beam collisions in late 2009.

Features
- Written by experts in the field

From the contents

Fields of interest
Elementary Particles, Quantum Field Theory; Measurement Science and Instrumentation; Nuclear Physics, Heavy Ions, Hadrons

Target groups
Research

Type of publication
Monograph

Due September 2011

- approx. € 99.95 | £90.00
- approx. * (D) 106.95 | (A) 109.95 | sFr 143.50
ISBN 978-3-642-21830-9

Due August 2011

2011. 300 p. 5 illus. (The Frontiers Collection) Hardcover
- approx. € 69.95 | £62.99
- approx. * (D) 74.45 | (A) 76.95 | sFr 100.50
ISBN 978-3-642-21378-6

Only available in print


2011. 300 p. Hardcover
- approx. € 69.95 | £62.99
- approx. * (D) 74.45 | (A) 76.95 | sFr 100.50
ISBN 978-3-642-22113-4
The Casual Sky Observer’s Guide

Stargazing with Binoculars and Small Telescopes

The Casual Sky Observer’s Pocket Guide offers an observing program for occasional amateur observers looking for some quick, fun astronomy adventures under the stars. In the real world, where time for observing is limited, the weather is seldom perfect, and expensive equipment is not an option, amateur astronomy may not be seen as a worthwhile activity. However, portable and quick-to-set-up instruments are available. A pair of binoculars or a small telescope fills the bill. And the way to make the most of these instruments is described in the Casual Sky Observer’s Pocket Guide. Not only does the book feature the best and brightest showpieces of the heavens; it also provides a great deal of physical and environmental data as well as lots of fascinating information and beautiful illustrations that provide a unique perspective on the many treasures within and beyond our home galaxy, the Milky Way—stars, star clusters, other galaxies, and nebulae, all within reach of binoculars or a small telescope.

Features
- Reveals how amateur astronomers can do serious deep-sky observing without having to invest a lot of time and in expensive or complicated instruments
- Includes finder charts matched with face-on and edge-on views of our galaxy to help visualize the location and properties of the observed deep-sky objects
- Contains many attractive wide-field eyepiece sketches that, unlike photographs, show exactly what the dark-adapted human eye sees
- Serves as a perfect travel companion for stargazing vacations, where baggage restrictions limit the amount of reading material one can take

Fields of interest
- Astronomy, Observations and Techniques; Popular Science in Astronomy

Type of publication
- Popular/general

Target groups
- Popular science

Due November 2011

- approx. € 29,95 | £19.99
- approx. * € (D) 32,00 | € (A) 32,95 | sFr 34,50
ISBN 978-1-4614-0594-8

Handbook of Spectral Lines in Diamond

Volume 1: Tables and Interpretations

This handbook is a breakthrough in the understanding of the large number of spectral lines in diamond. Data on more than 2000 lines and bands are presented in 70 tables, including many unpublished results. With a novel organization scheme the search for a specific line is greatly simplified as a benefit for researchers and students. In order to meet the interest of researchers in understanding the spectra, structure assignments for 80 % of the lines are given, of which 15 % only were published before. The majority of the structures of the 300 centers is explained for the first time in most cases. A key instrument in the interpretation is the analysis by donor-acceptor pair transitions. In a special chapter, 95 such centers are listed and discussed, of which only two were published before, the first one by the present author in 1994.

Features
- Presents the most complete compilation of spectral lines in diamond
- Presents spectral analysis of the spectra for over 90 donor-acceptor pair systems published for the first time
- Delivers important data for diamond optoelectronics
- Presents new color centers in diamond

From the contents

Fields of interest
- Spectroscopy and Microscopy; Optics, Optoelectronics, Plasmonics and Optical Devices; Characterization and Evaluation of Materials

Type of publication
- Handbook

Target groups
- Research

Due November 2011

- approx. € 99,95 | £90.00
- approx. * € (D) 106,95 | € (A) 109,95 | sFr 143,50
ISBN 978-3-642-77214-4

Wave Equations in Higher Dimensions

Higher dimensional theories have attracted much attention because they make it possible to reduce much of physics in a concise, elegant fashion that unifies the two great theories of the 20th century: Quantum Theory and Relativity. This book provides an elementary description of quantum wave equations in higher dimensions at an advanced level so as to put all current mathematical and physical concepts and techniques at the reader’s disposal. A comprehensive description of quantum wave equations in higher dimensions and their broad range of applications in quantum mechanics is provided, which complements the traditional coverage found in the existing quantum mechanics textbooks and gives scientists a fresh outlook on quantum systems in all branches of physics. In Parts I and II the basic properties of the SO(n) group are reviewed and basic theories and techniques related to wave equations in higher dimensions are introduced. Parts III and IV cover important quantum systems in the framework of non-relativistic and relativistic quantum mechanics in terms of the theories presented in Part II. In particular, the Levinson theorem and the generalized hypervirial theorem in higher dimensions, the Schrödinger equation with position-dependent mass and the Kaluza-Klein theory in higher dimensions are investigated. In this context, the dependence of the energy levels on the dimension is shown.

Features
- Unifies the main results and developments of research on quantum wave equations in higher dimensions in the framework of non-relativistic and relativistic quantum mechanics
- Presents a fresh outlook on quantum systems in all branches of physics
- Contains an extensive bibliographic list of all widely scattered publications in this field

Fields of interest
- Quantum Physics; Classical and Quantum Gravitation, Relativity Theory; Difference and Functional Equations

Type of publication
- Monograph

Target groups
- Research

Due September 2011

2011. XXVI, 338 p. 51 Illus. Hardcover
- approx. € 119,95 | £108.00
- approx. * € (D) 128,35 | € (A) 131,95 | sFr 172,00
The Mythology of the Night Sky
An Amateur Astronomer’s Guide to the Ancient Greek and Roman Legends

G. Genta, Politecnico di Torino, Mechanics Department, Torino, Italy

Introduction to the Mechanics of Space Robots

Based on lecture notes on a space robotics course, this book offers a pedagogical introduction to the mechanics of space robots. After presenting an overview of the environments and conditions space robots have to work in, the author discusses a variety of manipulatory devices robots may use to perform their tasks. This is followed by a discussion of robot mobility in these environments and the various technical approaches. The last two chapters are dedicated to actuators, sensors and power systems used in space robots. This book fills a gap in the space technology literature and will be useful for students and for those who have an interest in the broad and highly interdisciplinary field of space robotics, and in particular in its mechanical aspects.

Features
► Unlike other books, this book also deals with topics like mobility on planetary surfaces in its different forms.

Contents

Fields of interest
Astronomy, Astrophysics and Cosmology; Aerospace Technology and Astronautics; Robotics, Mechatronics

Target groups
Research

Type of publication
Monograph

Due September 2011

Jointly published with Microcosm Press

2011. XX, 620 p. 214 illus. (Space Technology Library, Volume 26) Hardcover
► £ 119.95 | £108.00
► € 139.95 | €126.00
► - € (D) 149,75 | € (A) 153,94 | SFr 201,00
ISBN 978-3-642-20516-3

Key Devices in Fibre Optics

The book gives an in-depth description of the key devices of current and next generation fibre optic communication networks. In particular, the book covers devices such as semiconductor lasers, optical amplifiers, modulators, wavelength filters, and detectors but the relevant properties of optical fibres as well. The presentations include the physical principles underlying the various devices, the technologies used for the realization of the different devices, typical performance characteristics and limitations, and development trends towards more advanced components are also illustrated. Thus the scope of the book spans relevant principles, state-of-the-art implementations, the status of current research and expected future components.

Features
► Comprehensive survey of fibre optic devices
► Covers the major developments in fibre optic devices and networks
► Integrates physics and technology of fibre optics components and devices
► A reference work for researchers, engineers and graduate students alike

Contents

Fields of interest
Optics, Optoelectronics, Plasmonics and Optical Devices; Engineering, general

Target groups
Research

Type of publication
Monograph

Due September 2011

2011. 500 p. (Springer Series in Optical Sciences, Volume 161) Hardcover
► € 119.95 | £108.00
► - € (D) 128,35 | € (A) 131,95 | SFr 172,00
ISBN 978-3-642-20516-3
**The Physics of Music and Color**

The Physics of Music and Color deals with two subjects, music and color - sound and light in the physically objective sense - in a single volume. The basic underlying physical principles of the two subjects overlap greatly: both music and color are manifestations of wave phenomena, and commonalities exist as to the production, transmission, and detection of sound and light. This book aids readers in studying both subjects, which involve nearly the entire gamut of the fundamental laws of classical as well as modern physics. Where traditional introductory physics and courses are styled so that the basic principles are introduced first and are then applied wherever possible, this book is based on a motivational approach: it introduces a subject by demonstrating a set of related phenomena, challenging readers by calling for a physical basis for what is observed. The Physics of Music and Color is written at level suitable for college students without any scientific background, requiring only simple algebra and a passing familiarity with trigonometry. It contains numerous problems at the end of each chapter that help the reader to fully grasp the subject.

**Features**
- Deals with related subjects of sound and light in one volume
- No scientific background and little mathematical background required
- Motivational approach to physics learning
- Teaches students how to respond to physical phenomena by searching for a deeper appreciation of what is observable

**From the contents**

**Fields of interest**
- Acoustics
- Optics
- Electrodynamics
- Engineering Acoustics

**Target groups**
- Graduate

**Type of publication**
- Monograph

**Due September 2011**

2011. 480 p. 393 illus., 100 in color. Hardcover
- € 79.95 | £72.00
- *€ (D) 85.55 | € (A) 87.95 | sFr 115.00*  
ISBN 978-1-4614-0556-6

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**Measurement Uncertainties**

**Measurements of Physical Parameters and Calibration of Instruments**

This book fulfills the global need to evaluate measurement results along with the associated uncertainty. In the book, together with the details of uncertainty calculations for many physical parameters, probability distributions and their properties are discussed. Definitions of various terms are given and will help the practicing metrologists to grasp the subject. The book helps to establish international standards for the evaluation of the quality of raw data obtained from various laboratories for interpreting the results of various national metrology institutes in an international inter-comparisons. For the routine calibration of instruments, a new idea for the use of pooled variance is introduced. The uncertainty calculations are explained for (i) independent linear inputs, (ii) non-linear inputs and (iii) correlated inputs. The merits and limitations of the Guide to the Expression of Uncertainty in Measurement (GUM) are discussed. Monte Carlo methods for the derivation of the output distribution from the input distributions are introduced. The Bayesian alternative for calculation of expanded uncertainty is included. A large number of numerical examples is included.

**Features**
- Helps to evaluate measurement results with respect to uncertainty
- Presents details of uncertainty calculations for many physical parameters
- Gives guidance to the practicing metrologists
- Helps to establish international standards to evaluate the quality of data from various laboratories to compare national metrology institutes

**Fields of interest**
- Measurement Science and Instrumentation
- Statistics
- Engineering Physics
- Computer Science
- Physics
- Chemistry
- Earth Sciences
- Quality Control
- Reliability
- Safety
- Risk

**Target groups**
- Research

**Type of publication**
- Monograph

**Due November 2011**

2011. 260 p. 60 illus. Hardcover
- € 99.95 | £90.00
- *€ (D) 106.95 | € (A) 109.95 | sFr 143.50*  
ISBN 978-3-642-20988-8

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**The Spiral Galaxy M33**

This book summarizes the gathering of information on and the growing understanding of M33 from the 1920s, when Hubble first determined its true nature, to the 21st century, when the Hubble Telescope probed deeply into its many secrets. With its regular symmetrical spiral structure, and its being not tilted too much and near enough to allow detailed studies of its stars, M33 is well-suited for the study of a typical spiral galaxy. In this work, Paul Hodge places current research on M33 (and similar galaxies) in both historical and global perspectives. The book is written in a language accessible for specialists and non-specialists, for professional and amateur astronomers, for scientists and the curious public and, most importantly, for students.

**Features**
- A concise book carefully written by a leading expert
- Provides a balanced overview of historical and most recent research on a typical spiral galaxy

**Contents**
- Basic Data
- Developing Knowledge
- Hubble's Pioneering Study
- Structure
- The Nucleus
- Clusters and Associations
- Gas and Dust
- Spectra and Abundances
- Stellar Populations
- The Star Formation History
- Variable Stars
- X-Ray Sources
- Dynamics and Mass
- Index

**Fields of interest**
- Astronomy
- Astrophysics
- Cosmology

**Target groups**
- Research

**Type of publication**
- Monograph

**Due October 2011**

- approx. € 99.95 | £90.00
- *approx. € (D) 106.95 | € (A) 109.95 | sFr 143.50*
- ISBN 978-94-007-2024-4
Soviet Robots in the Solar System
Mission Technologies and Discoveries

Soviet Robots in the Solar System provides a history of the Soviet robotic lunar and planetary exploration program from its inception, with the attempted launch of a lunar impactor on September 23, 1958, to the last launch in the Russian national scientific space program in the 20th Century, Mars 96, on November 16, 1996. This title makes a unique contribution to understanding the scientific and engineering accomplishments of the Soviet Union’s robotic space exploration enterprise from its infancy to its demise with the collapse of the Soviet Union. The authors provide a comprehensive account of Soviet robotic exploration of the Solar System for both popular space enthusiasts and professionals in the field. Technical details and science results are provided and put into an historical and political perspective in a single volume for the first time.

Features
► Presents a detailed, technical description of Soviet robotic space flights ► Provides an historical timeline of missions and programs in the context of competition with the US ► Outlines Soviet planning in both a national and international political context ► Covers mission objectives, spacecraft engineering, flight details, scientific payload, and results

Fields of interest
Astronomy, Astrophysics and Cosmology; Popular Science in Astronomy; Aerospace Technology and Astronautics

Target groups
Popular/general

Type of publication
Popular science

Due October 2011

J. Raghavan, General Atomics, San Diego, CA, USA

Particle Accelerators, Colliders, and the Story of High Energy Physics
Charming the Cosmic Snake

The Nordic mythical Cosmic Serpent, Midgård, is said to be coiled in the depths of the sea, surrounding the Earth with its tail in its mouth. In physics, this snake is a metaphor for the Universe, where the head, symbolizing the largest entity – the Cosmos – is one with the tail, symbolizing the smallest – the fundamental particle. Particle accelerators, colliders and detectors are built by physicists and engineers to uncover the nature of the Universe while discovering its building blocks. “Charming the Cosmic Snake” takes the readers through the science behind these experimental machines: the physics principles that each stage of the development of particle accelerators helped to reveal, and the particles they helped to discover. The book culminates with a description of the Large Hadron Collider, one of the world's largest and most complex machines operating in a 27-km circumference tunnel near Geneva. That collider may prove or disprove many of our basic theories about the nature of matter. The book provides the material honestly without misrepresenting the science for the sake of excitement or glossing over difficult notions. The principles behind each type of accelerator is made accessible to the undergraduate student and even to a lay reader with cartoons, illustrations and metaphors.

Features
► This book gives the readers a deeper understanding of the science and technology of particle accelerators at each stage of the development, culminating in the Large Hadron Collider (LHC) in CERN, Geneva that engages both the world scientific community and the public interest ► Will relate how the development of the accelerators enabled significant physics discoveries

Fields of interest
Particle Acceleration and Detection, Beam Physics; Electrical Engineering; Particle and Nuclear Physics

Target groups
Popular/general

Type of publication
Undergraduate textbook

Due November 2011

D. Kim, Harvard Smithsonian Center for Astrophysics, Cambridge, MA, USA; S. Pellegrini, Università di Bologna, Italy (Eds.)

Hot Interstellar Matter in Elliptical Galaxies

Based on a number of new discoveries resulting from 10 years of Chandra and XMM-Newton observations and corresponding theoretical works, this is the first book to address significant progress in the research of the Hot Interstellar Matter in Elliptical Galaxies. A fundamental understanding of the physical properties of the hot ISM in elliptical galaxies is critical, because they are directly related to the formation and evolution of elliptical galaxies via star formation episodes, environmental effects such as stripping, infall, and mergers, and the growth of super-massive black holes. Thanks to the outstanding spatial resolution of Chandra and the large collecting area of XMM-Newton, various fine structures of the hot gas have been imaged in detail and key physical quantities have been accurately measured, allowing theoretical interpretations/predictions to be compared and tested against observational results. This book will bring all readers up-to-date on this essential field of research.

Features
► First book addressing significant progress in the research of the Hot Interstellar Matter in Elliptical Galaxies ► Based on new discoveries made in 10 years with the Chandra and XMM-Newton space X-ray telescopes ► Will bring all readers up-to-date with this field of research

From the contents

Fields of interest
Astronomy, Astrophysics and Cosmology

Target groups
Research

Type of publication
Monograph

Due November 2011

2011. 282 p. 95 illus., 17 in color. (Astrophysics and Space Science Library, Volume 378) Hardcover
► approx. € 99,95 | £90.00
► approx. € 99,95 | £90.00
ISBN 978-1-4614-0572-4

2011. XX. 460 p. 218 illus., 30 in color. (Springer Praxis Books / Space Exploration, Tentative volume 1) Softcover
► approx. € 34,95 | £29.99
► approx. € 34,95 | £29.99
ISBN 978-1-4419-7897-4
D. M. Kipping, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA

The Transits of Extrasolar Planets with Moons

Can we detect the moons of extrasolar planets? For two decades, astronomers have made enormous progress in the detection and characterisation of exoplanetary systems but the identification of an “exomoon” is notably absent. In this thesis, David Kipping shows how transiting planets may be used to infer the presence of exomoons through deviations in the time and duration of the planetary eclipses. A detailed account of the transit model, potential distortions, and timing techniques is covered before the analytic forms for the transit variations are derived. It is shown that habitable-zone exomoons above 0.2 Earth-masses are detectable with the Kepler space telescope using these new timing techniques.

Features
▶ A PhD thesis of exceptionally high standard
▶ Opens a new field of research for exomoons
▶ Topic with significant impact in outreach to a wider public

Contents

Fields of interest
Astronomy, Observations and Techniques; Planetary Science

Target groups
Research

Type of publication
Monograph

Due November 2011

2012. 211 p. 42 illus., 2 in color. (Springer Theses) Hardcover
▶ approx. € 99,95 | £90.00
▶ approx. * € (D) 106,95 | € (A) 109,95 | sFr 143,50
ISBN 978-3-642-22268-9

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C. Kitchin, Essex, UK

Exoplanets
Finding, Exploring, and Understanding Alien Worlds

Exoplanets: Finding, Exploring, and Understanding Alien Worlds probes the basis for possible answers to the fundamentals questions asked about these planets orbiting stars other than our Sun. This book examines what such planets might be like, where they are, and how we find them. Until around ten years ago, the only planets that we knew about were within the Solar System. The first genuine planet beyond the confines of the Solar System was discovered only 1988. Since then another 350 or so exoplanets have been detected by various methods, and most of these have been found in the last ten years. Although many more exoplanets discoveries may be expected to occur even as this book is being read, a large enough data set is now available to form the basis for an informed general account of exoplanets. The topic hence is an extremely “hot” one - all the more so because the recently launched Kepler spacecraft should soon start uncovering many more exoplanets, some perhaps comparable with the Earth (and therefore possibly alternative homes for mankind, if we could ever reach them). Exoplanets: Finding, Exploring, and Understanding Alien Life gives a comprehensive, balanced, and above all accurate account of exoplanets.

Features
▶ Will present the first findings from the Kepler telescope mission, which launched in 2009 with the express purpose of finding new worlds
▶ Explores the possibility of humans one day traveling to and living on exoplanets
▶ Reviews the possibility of finding alien life within the context of what we now know about exoplanets

Fields of interest
Extraterrestrial Physics, Space Sciences; Popular Science in Astronomy; Planetology

Target groups
Popular/general

Type of publication
Popular science

Due October 2011

2011. IX, 145 p. 83 illus., 38 in color. Softcover
▶ € 29,95 | £26.99
▶ * € (D) 32,05 | € (A) 32,95 | sFr 43,00
ISBN 978-3-642-21814-4

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P. Léna, Délégation à l’éducation et la formation, Paris, France; D. Rouan, Observatoire de Paris Meudon, France; F. Lebrun, Commissariat à l’Energie Atomique, GIF-sur-Yvette Cedex, Paris, France; F. Mignard, Observatoire de la Côte d’Azur, Nice Cedex 4, France; D. Pelat, Observatoire de Paris Meudon, France

Observational Astrophysics

In collaboration with: L. Mugnier, Office National d’Etudes et Recherches A, Lille Cedex, France

Translated from the French: S. Lyle, Alzen, France

This is the updated, widely revised, restructured and expanded third edition of Léna et al’s successful work Observational Astrophysics. It presents a synthesis on tools and methods of observational astrophysics of the early 21st century. Written specifically for astrophysicists and graduate students, this textbook focuses on fundamental and sometimes practical limitations on the ultimate performance that an astrophysical system may reach, rather than presenting particular systems in detail. In little more than a decade there has been extraordinary progress in imaging and detection technologies in the fields of adaptive optics, optical interferometry, in the submillimetre waveband, observation of neutrinos, discovery of exoplanets, to name but a few examples. The work deals with ground-based and space-based astronomy and their respective fields. And it also presents the ambitious concepts behind space missions aimed for the next decades.

Features
▶ Enlarged and revised 3rd edition of a successful adopted textbook ▶ With a clear part and chapter structure for easier access for students ▶ Covers observational astrophysics over the entire electromagnetic spectrum ▶ Touches upon new and future windows of astronomy: neutrinos and gravitational waves ▶ Offers basics of signal processing, beneficial use of astronomical databases and virtual observatories

Fields of interest
Astrophysics and Astroparticles; Microwaves, RF and Optical Engineering; Signal, Image and Speech Processing

Target groups
Professional/practitioner

Type of publication
Monograph

Due October 2011

▶ approx. € 99,95 | £90.00
▶ approx. * € (D) 106,95 | € (A) 109,95 | sFr 143,50
ISBN 978-3-642-21814-4
Ion Beam Therapy
Fundamentals, Technology, Clinical Applications

The book provides a detailed, up-to-date account of the basics, the technology, and the clinical use of ion beams for radiation therapy. Theoretical background, technical components, and patient treatment schemes are delineated by the leading experts that helped to develop this field from a research niche to its current highly sophisticated and powerful clinical treatment level used to the benefit of cancer patients worldwide. Rather than being a side-by-side collection of articles, this book consists of related chapters. It is a common achievement by 76 experts from around the world. Their expertise reflects the diversity of the field with radiation therapy, medical and accelerator physics, radiobiology, computer science, engineering, and health economics. The book addresses a similarly broad audience ranging from professionals that need to know more about this novel treatment modality or consider to enter the field of ion beam therapy as a researcher.

Features
- Combines first-hand technical, biophysical, and clinical reviews on all aspects of ion beam therapy
- Comprises contributions from the leading academic institutions and leading industrial players in the field
- Contains a detailed description of a novel single-room ion beam facility Is a must for clinicians, accelerator and medical physicists, radiobiologists, educated patients, health economists, and members of regulatory bodies alike

Contents

Fields of interest
Medical and Radiation Physics; Radiotherapy; Nuclear Medicine

Target groups
Research

Type of publication
Monograph

Due October 2011

2011, 540 p. 240 Illus., 200 in color. (Biological and Medical Physics, Biomedical Engineering) Hardcover
- € 139,95 | £126.00
- approx. £ 52,13 | £46.99
ISBN 978-3-642-21413-4

General Relativity Without Calculus
A Concise Introduction to the Geometry of Relativity

“General Relativity Without Calculus” offers a compact but mathematically correct introduction to the general theory of relativity, assuming only a basic knowledge of high school mathematics and physics. Targeted at first year undergraduates (and advanced high school students) who wish to learn Einstein’s theory beyond popular science accounts, it covers the basics of special relativity, Minkowski space-time, non-Euclidean geometry, Newtonian gravity, the Schwarzschild solution, black holes and cosmology. The quick-paced style is balanced by over 75 exercises (including full solutions), allowing readers to test and consolidate their understanding.

Features
- Provides a quite original approach to Relativity, in that it tries to convey nontrivial, quantitative ideas about geometry and general relativity using elementary mathematics only
- Offers a short, but mathematically correct introduction to the general theory of relativity for first-year students of astronomy, mathematics or physics Paves the way for more advanced texts
- Over 75 exercises with full solutions help the reader understand the matter

Contents
1 Lorentz transformations.- 2 Minkowski geometry.- 3 Non-Euclidean geometry.- 4 Gravity.- 5 General relativity.- 6 The Schwarzschild solution.- 7 Cosmology.- 8 Mathematics and physics.

Fields of interest
Classical and Quantum Gravitation, Relativity Theory; Applications of Mathematics; Cosmology

Target groups
Lower undergraduate

Type of publication
Monograph

Due November 2011

2011, 120 p. (Undergraduate Lecture Notes in Physics) Hardcover
- approx. € 34,95 | £31.99
- approx. £ 37,40 | £38,45
ISBN 978-3-642-21451-4
Problems in Quantum Mechanics with Solutions

242 solved problems of several degrees of difficulty in nonrelativistic Quantum Mechanics, ranging from the themes of the crisis of classical physics, through the achievements in the framework of modern atomic physics, down to the still alive, more intriguing aspects connected e.g. with the EPR paradox, the Aharonov--Bohm effect, quantum teleportation.

Features
- The student is taken step by step from the very birth of Quantum Mechanics to the fine structure levels of heavy atoms
- Numerical outputs and orders of magnitude are given the same importance as the formal aspects of Quantum Mechanics
- Not only problems, also subjects not usually covered by most textbooks in Quantum Mechanics

Contents

Fields of interest
Quantum Physics

Target groups
Upper undergraduate

Type of publication
Graduate/Advanced undergraduate textbook

Due July 2011

2011. X, 358 p. 1 illus. in color. (UNITEXT / Collana di Fisica e Astronomia) Softcover
- € 59,95 | £53.99
- * € (D) 64,15 | * € (A) 65,95 | sFr 86,00

Compendium to Radiation Physics for Medical Physicists

500 Problems and Solutions

This exercise book contains 500 typical problems and exercises in modern physics and radiation physics with complete solutions, detailed equations and graphs. This textbook is linked directly with the textbook “Radiation Physics for Medical Physicists”, Springer (2010) but can also be used in combination with other related textbooks. For ease of use, this textbook has exactly the same organizational layout (14 chapters, 125 sections) as the “Radiation Physics for Medical Physicists” textbook and each section is covered by at least one problem with solution given. Equations, figures and tables are cross-referenced between the two books.

Features
- Can be used in combination with other textbooks
- Exercise book for graduate and undergraduate students of medical physics and engineering
- Well chosen and didactically presented problems
- Perfect set for learning in connection with the textbook by Podgorsak and others
- Detailed derivation of results with many detailed illustrations
- Fully worked-out solutions to exercises/questions
- Combines exercises in radiation physics and medical physics

From the contents

Fields of interest
Nanoscale Science and Technology; Nanotechnology and Microengineering

Target groups
Research

Type of publication
Handbook

Due November 2011

2012. 400 p. 320 illus. (NanoScience and Technology) Hardcover
- € 119,95 | £108.00
- * € (D) 128,35 | * € (A) 131,95 | sFr 172,00
ISBN 978-3-642-20467-8

Graphene Nanoelectronics

Metalogy, Synthesis, Properties and Applications

Graphene is a perfectly two-dimensional single-atom thin membrane with zero bandgap. It has attracted huge attention due to its linear dispersion around the Dirac point, excellent transport properties, novel magnetic characteristics, and low spin-orbit coupling. Graphene and its nanostructures may have potential applications in spintronics, photonics, plasmonics and electronics. This book brings together a team of experts to provide an overview of the most advanced topics in theory, experiments, spectroscopy and applications of graphene and its nanostructures. It covers the state-of-the-art in tutorial-like and review-like manner to make the book useful not only to experts, but also newcomers and graduate students.

Features
- Presents the growth of graphene on various substrates, and characterization of graphene layers
- Gives rich information on properties, characterization and metrology of graphene
- Summarizes the current state of the art of graphene devices
- Provides a much needed and authoritative overview of a fast-developing field
- New nano-electronic concept presented

From the contents
Symmetry and the Standard Model
Mathematics and Particle Physics

While theoretical particle physics is an extraordinarily fascinating field, the incredibly fast pace at which it moves along, combined with the huge amount of background information necessary to perform cutting edge research, poses a formidable challenge for graduate students. This book represents the first in a series designed to assist students in the process of transitioning from coursework to research in particle physics. Rather than reading literally dozens of physics and mathematics texts, trying to assimilate the countless ideas, translate notations and perspectives, and see how it all fits together to get a holistic understanding, this series provides a detailed overview of the major mathematical and physical ideas in theoretical particle physics. Ultimately the ideas will be presented in a unified, consistent, holistic picture, where each topic is built firmly on what has come before, and all topics are related in a clear and intuitive way. This introductory text on quantum field theory and particle physics provides both a self-contained and complete introduction to not only the necessary physical ideas, but also a complete mathematical background in theoretical particle physics. The book then continues with an exposition of the Standard Model of Particle Physics, the theory that currently seems to explain the universe apart from gravity.

Features
► Provides the mathematical and physical groundwork of particle physics ► Introduces the standard model in an insightful and elementary way ► Contains clear, intuitive explanations and plenty of examples

Fields of interest
Elementary Particles, Quantum Field Theory; Group Theory and Generalizations; Particle and Nuclear Physics

Target groups
Upper undergraduate

Type of publication
Monograph

Due September 2011

Elementi di management dei programmi spaziali

Un libro per professionisti/lauraeandi o per un corso moderno, aggiornato ed efficace sui sistemi spaziali un testo che presenta in maniera sintetica e rigorosa elementi storici, tecnici ed economici del management dei grandi programmi spaziali

Features
► Informazioni dettagliate, specifiche ed originalmente raccolte sul settore spaziale ► Riferimenti a progetti/programmi reali

Indicazioni pratiche di metodologie gestionali dello specifico settore aerospaziale.

Fields of interest
Fisica extraterrestre, scienze spaziali; Scienze economiche, generale

Target groups
Professional/practitioner

Type of publication
Trattato

Pubblicazione prevista per il mese di settembre 2011

General and Statistical Thermodynamics

This textbook explains completely the general and statistical thermodynamics. It begins with an introductory statistical mechanics course, deriving all the important formulae meticulously and explicitly, without mathematical short cuts. The main part of the book deals with the careful discussion of the concepts and laws of thermodynamics, van der Waals, Kelvin and Clauudius theories, ideal and real gases, thermodynamic potentials, phonons and all the related aspects. To elucidate the concepts introduced and to provide practical problem solving support, numerous carefully worked examples are of great value for students. The text is clearly written and punctuated with many interesting anecdotes. This book is written as main textbook for upper undergraduate students attending a course on thermodynamics.

Features
► Offers a highly pedagogical and very thorough introduction to statistical thermodynamics ► Provides an in-depth examination of the van der Waals gas ► Contains many problems and a large number of solved examples ► Derives all the important formulae meticulously and explicitly, without mathematical short cuts

Contents

Fields of interest
Thermodynamics; Statistical Physics, Dynamical Systems and Complexity; Engineering Thermodynamics, Heat and Mass Transfer

Target groups
Graduate

Type of publication
Graduate/Advanced undergraduate textbook

Due September 2011

2011. XVI, 297 p. 25 illus. Hardcover
► € 79.95 | £72.00
► * € (D) 85,55 | € (A) 87.95

2011. 190 pagg. 80 figg., 30 a colori. Brossura
► approx. € 25,91 | £23.99
► _approx. _ € (D) 27,73 | € (A) 28,50 | sFr 37,50
ISBN 978-88-470-2308-6

2011. 650 p. (Graduate Texts in Physics) Hardcover
► € 98,95 | £89.50
► * € (D) 105,88 | € (A) 108,85 | sFr 142,00
ISBN 978-3-642-21480-6
Optical Transmission
the FP7 BONE project experience

Optical Transmission represents a wide set of visions of researchers who are active in the actual research scene in Europe. An aggregate of highlights of research in transmission with a state of the art presented by the researchers who are driving it are presented. The trends on research are in this book presented by one of the widest networks of excellence put together in Europe in the field of optical networking (more than 40 Research institutions were involved). The readers will find a specialized readout of the current trends and status of transmission ranging from simulation to ultimate experimental results, from modulations to devices. A highlight of Optical Transmission is the introduction in a technical book a chapter on techno-economics, which drives the vision and field a little further. General reading could be made however is more suited for graduated users.

The most important features of Optical Transmission are: wide vision on transmission related issues, state of the art and related trends and techniques; techno-economics of the field.

Features

- Was generated by a core of authors stemming from a very active Network of excellence
- Authors with very consistent vertical issues related to transmission
- Joins is a single book technical and economics of the field of optical transmission

Fields of interest
Laser Technology, Photonics; Optics, Optoelectronics, Plasmonics and Optical Devices; Communications Engineering, Networks

Target groups
Research

Type of publication
Monograph

Due September 2011
2011. X, 285 p. 186 illus., 126 in color. (Signals and Communication Technology) Hardcover
- € 99,95 | £90.00
- * € (D) 106,95 | (A) 109,95 | sFr 143,50
ISBN 978-94-007-1766-4

Due August 2011
2011. 560 p. (Lecture Notes in Physics, Volume 836) Softcover
- approx. € 89,95 | £81.00
- approx. * € (D) 96,25 | (A) 98,95 | sFr 129,00
ISBN 978-3-642-21977-1