Tabletop Intense Femtosecond Pulse Sources and Their Applications

Contents
Introduction 1. Chirped-Pulse Laser Amplifiers 1.1 Progress in Ti:sapphire repletion-rate chopped-pulse amplifiers 1.2 Diode-pumped solid-state femtosecond amplifiers 1.3 Advanced amplifier concepts (thin disk, slab) 1.4 Cryogenically cooled amplifiers 1.5 Toward the Lambda@regime 1.6 mL-class femtosecond fiber amplifiers 2. Optical Parametric Amplifiers 2.1 Optical parametric chirped pulse amplifiers 2.2 Phase-stable optical pulse synthesis in OPA 2.3 High-energy fs pulse extension into the VUV and Mid-IR 2.4 Third-order parametric processes of optical pulses in gases 2.5 Intense THz pulse generation in gases 3. Applications 3.1 High-power high-energy fs pulse micromachining 3.2 Filamentation in atmosphere and stand-off detection 3.3 Coherent X-ray generation in the water window 3.4 Lens-less X-ray imaging 3.5 Incoherent hard X-ray sources and applications to structural dynamics 3.6 Monoeenergetic particles acceleration 3.7 Tabletop free electron lasers

Fields of interest
Laser Technology, Photonics; Physical Chemistry; Electrical Engineering

Target groups
Research

Product category
Monograph

Features
Rispetto alla prima edizione, aggiunta di un paragrafo dedicato alla relazione fra massa del neutrino e massa oscura dell'Universo. Per non appesantire l'esposizione degli argomenti principali, argomenti complementari e sviluppi di calcoli sono raccolti in Appendice

Contents

Appendice.

Fields of interest
Particle and Nuclear Physics; Astrophysics and Astroparticles; Nuclear Fusion

Target groups
Lower undergraduate

Product category
Libro di testo introduttivo

Due August 2013

2013. 400 p. 10 illus. in color. Hardcover  
● approx. *€ (D) 106,95 | € (A) 109,95 | sFr 143,50  
● approx. *€ 99,95 | £90.00  
ISBN 978-3-7091-0111-7

Due July 2013

2013. 310 p. 60 illus., 10 in color. (Springer Series in Materials Science, Volume 183) Hardcover  
● *€ (D) 139,09 | € (A) 142,99 | sFr 173,50  
● *€ 129,99 | £117.00  
ISBN 978-3-642-38176-8
Measuring the Angular Momentum of Supermassive Black Holes

Measuring the spin distribution of supermassive black holes is of critical importance for understanding how these black holes and their host galaxies form and evolve over time, yet this type of study is only in its infancy. This brief describes how astronomers measure spin in supermassive black holes using X-ray spectroscopy. It also reviews the constraints that have been placed on the spin distribution in local, bright active galaxies over the past six years, and the cosmological implications of these constraints. Finally, it summarizes the open questions that remain in this exciting new field of research and points toward future discoveries soon to be made by the next generation of space-based observatories.

Features
- Presents the most recent findings on measuring supermassive black hole spins and what this means for galaxy evolution and cosmology

Contents
I. Introduction on importance of black hole spin. - II. Description of spectroscopic techniques used to measure spin in AGN. - III. Review of current spin measurements. - IV. Implications for the growth of black holes and their host galaxies. - V. Future Directions.

Fields of interest
Astronomy, Astrophysics and Cosmology; Classical and Quantum Gravitation, Relativity Theory; Astronomy, Observations and Techniques

Target groups
Research

Product category
Brief

Alien Seas

Oceans in Space

Oceans were long thought to exist in all corners of the Solar System, from carbonated seas percolating beneath the clouds of Venus to features on the Moon's surface given names such as "the Bay of Rainbows" and the "Ocean of Storms.

Features
- Offers a unique approach to understanding the nature of the surfaces of the planets and moons in our Solar System - Includes original artwork by Carroll depicting alien seas as well as the latest ground-based and spacecraft images - Discusses the facts and issues concerning the search for active biology on other worlds

Contents

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

Target groups
Popular/general

Product category
Monograph
**Viewing and Imaging the Solar System**

**A Complete Guide for Amateur Astronomers**

J. Clark, Cambridge, UK

‘Viewing and Imaging the Solar System: A Complete Guide for Amateur Astronomers’ is for amateur astronomers who are beginners or who want to move beyond the beginner level and develop better observing skills. Newcomers to astronomy are almost always wowed by sights such as the rings of Saturn and the moons of Jupiter, but have little idea how to find Solar System objects for themselves, or what equipment they will need to see or even photograph such objects. This book makes it easy for less advanced astronomers to achieve success quickly by observing and photographing the Solar System rather than trying to find deep sky objects. It is written by an expert on the Solar System, who gained experience by teaching others how to make the most of relatively simple and low-cost equipment. This book presents the material in a way that is both easy to digest and entertaining.

**Features**

- Helps inexperienced amateur astronomers to move beyond the beginner level to develop better observing skills
- Surveys equipment needed to observe and image
- Solar System objects
- Includes specifics on how to identify hard to observe objects
- Explains why our Solar System is the ideal place for an amateur astronomer to get serious with their observations!

**Contents**


**Fields of interest**

Astronomy, Observations and Techniques; Popular Science in Astronomy

**Target groups**

Popular/general

**Product category**

Popular science

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**Factors Governing Tin Whisker Growth**

E. Crandall, Auburn University, AL, USA

**Complexity in Financial Markets**

M. Cristelli, University of Rome, Italy

**Tools and methods from complex systems science can have a considerable impact on the way in which the quantitative assessment of economic and financial issues is approached, as discussed in this thesis. First it is shown that the self-organization of financial markets is a crucial factor in the understanding of their dynamics. In fact, using an agent-based approach, it is argued that financial markets’ stylized facts appear only in the self-organized state.**

**Features**

- Nominated as an outstanding Ph.D. thesis by the University of Rome La Sapienza
- Explains the self-organization of financial markets
- Provides new metrics for economic complexity: measuring countries’ competitiveness and product complexity
- Applies big data and new generation tools for forecasting economic growth

**Contents**


**Fields of interest**

Socio- and Econophysics, Population and Evolutionary Models; Economic Theory; Data Mining and Knowledge Discovery

**Target groups**

Research

**Product category**

Monograph

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**Modeling Psychological Behavior in Agent-Based Models and Order Book Models**

**Due June 2013**

2013. XV, 201 p. 95 illus., 33 in color. (Springer Theses) Hardcover

- *€ (D) 106,99 | € (A) 109,99 | sFr 133,50
- *£ 99,99 | £90.00

ISBN 978-3-319-00722-9
Dai buchi neri all’adroterapia
Un viaggio nella Fisica Moderna

Tutto quello che avreste voluto sapere sulla fisica moderna ma non aveteve nessuno a cui chiedervelo! Questo libro vi conduce in un viaggio affascinante attraverso i misteri della fisica moderna e delle sue tantissime ricadute nella società, presentando anche le ricerche attualissime, le strade che si aprono davanti a noi: a volte ampi viali illuminati a giorno, altre volte sentieri appena accennati.

Dove ci porteranno? La grande forza della scienza, nonché il suo motore, è la curiosità che ci ha spinto a guardare in alto, in profondità ma anche dentro noi stessi. Indagando abbiamo trovato veri tesori. La fisica ci spiega cosa succede nell’atomo ma anche nell’Universo, un mondo che va dal milliardesimo di milliardesimo di metro a una decina di milliardi di anni luce! Abbiamo una spiegazione razionale non soltanto a domande del tipo “di cosa è fatto il mondo?”

Features
- Una presentazione accessibile dei concetti della Fisica Moderna: meccanica quantistica, relatività, modello standard, neutrini, antimateria, buchi neri
- Una sezione dedicata alle ricadute della Fisica Moderna nella società, es. terapia dei tumori con gli acceleratori di particelle (adroterapia)
- Presentazione di esperimenti attuali: ricerche della “particella di Dio”, buchi neri o extra-dimensioni, con un linguaggio accessibile

Contents

Fields of interest
Applied and Technical Physics; Popular Science, general; Science, general

Target groups
Popular/general

Product category
Monografia

Pubblicazione prevista per il mese di June 2013
2013. X, 340 pegg. (I blu) Brossura
► approx. * € (D) 21,72 | € (A) 22,44 | sFr 32,00
► approx. * £ 24,04 | £19.99

Beyond Standard Model Phenomenology at the LHC

This thesis provides an introduction to the physics of the Standard Model and beyond, and to the methods used to analyse Large Hadron Collider (LHC) data. The ‘hierarchy problem’, astrophysical data and experiments on neutrinos indicate that new physics can be expected at the now accessible TeV scale. This work investigates extensions of the Standard Model with gravitons and gravitinos (in the context of supergravity). The production of these particles in association with jets is studied as one of the most promising avenues for researching new physics at the LHC.

Features
- Nominated as an outstanding Ph.D. thesis by the Catholic University of Leuven, Belgium
- Describes theoretical aspects of spin-2 particles, including their propagator and refers to the famous “van Dam-Veltman discontinuity”
- Presents a full phenomenological search for graviton emission, in the context of different BSM theories, in a multi-jet final state
- Includes a phenomenological study of gravitino emission in a multi-jet final state in the context of supersymmetric theories

Contents
- Introduction.
- The Standard Model.
- Gravitation in Beyond Standard Model theories.
- The LHC and collision simulations.
- Phenomenology of graviton production.
- Gravitino production at the LHC.
- Epilogue.
- Massless graviton implementation.
- New routines for ADD theories in MadGraph.

Fields of interest
Elementary Particles, Quantum Field Theory; Quantum Field Theories, String Theory; Cosmology

Target groups
Research

Product category
Monograph

P. de Aquino, Catholic University of Leuven, Belgium

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Research

Product category
Monograph

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Fields of interest
Elementary Particles, Quantum Field Theory; Quantum Field Theories, String Theory; Cosmology

Target groups
Research

Product category
Monograph

P. de Aquino, Catholic University of Leuven, Belgium
K. Fischer, Tokuyama College of Technology, Shunan-Shi, Japan

**Relativity for Everyone**

How Space-Time Bends

This book explains the theory of special and general relativity in detail, without digressions such as information on Einstein's life or the historical background. However, lengthy calculations are replaced with figures and thought experiments, the text being formulated in such a way that the reader will be able to understand the gist even if he or she cannot follow all the calculations. The first part of the book focuses on the essentials of special relativity. Explanations are provided of the famous equivalence between mass and energy and of why Einstein was able to use the theory of electrodynamics as a template for his "electrodynamics of moving bodies", simply because electric charge itself is absolute, leading to the relativity of the motion of moving bodies. General relativity is described in a way that a reader can understand the gist of it even if he or she cannot follow all the calculations. The second part explains the theory of general relativity in detail, without digressions such as information on Einstein's life or the historical background. However, lengthy calculations are kept as low as possible, and deeper sections on quantum reflection, tunable Feshbach resonances and Efimov states are skipped.

**Contents**

- Light, matter, and energy: Light, time, mass, and length
- Light, electricity, and magnetism: Acceleration and inertia: Inertia and gravity
- Equivalence principle in action: How mass creates gravity: Solving the Einstein equation of gravity
- General Relativity in action: Epilogue: Appendices

**Fields of interest**

Classical and Quantum Gravitation, Relativity Theory; Popular Science in Astronomy; Cosmology

**Target groups**

Popular/general

**Product category**

Monograph

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F. Frémont, Caen University, France

**Young-Type Interferences with Electrons**

**Basics and Theoretical Challenges in Molecular Collision Systems**

Since the discovery that atomic-size particles can be described as waves, many interference experiments have been realized with electrons to demonstrate their wave behavior. In this book, after describing the different steps that led to the present knowledge, we focus on the strong link existing between photon and electron interferences, highlighting the similarities and the differences. For example, the atomic centers of a hydrogen molecule are used to mimic the slits in the Young's famous interference experiment with light.

**Features**

- First modern treatment of this topic after Debye's classic book of 1931
- Starts at an elementary level suitable for undergraduates but also addresses interesting research problems
- Profits from the authors' deep knowledge and expertise in atom interferometry

**Contents**

- Photon Interferences: History and Fundamental Aspects
- Interferences with Massive Particles
- Electron Interferences Using Macroscopic and Nanoscopic Interferometers
- Young-Type Electron Interferences Using Single Electron Sources
- A Theoretical Description of Young-Type Interferences Following Auger Electron Emission: Conclusions and Perspectives

**Fields of interest**

Quantum Physics; Atomic, Molecular, Optical and Plasma Physics; Optics, Optoelectronics, Plasmonics and Optical Devices

**Target groups**

Research

**Product category**

Monograph

---

H. Friedrich, TU München, Germany

**Scattering Theory**

This book presents a concise and modern coverage of scattering theory. It is motivated by the fact that experimental advances have shifted and broadened the scope of applications where concepts from scattering theory are used, e.g. to the field of ultracold atoms and molecules, which has been experiencing enormous growth in recent years, largely triggered by the successful realization of Bose-Einstein condensates of dilute atomic gases in 1995. In the present treatment, special attention is given to the role played by the long-range behaviour of the projectile-target interaction, and a theory is developed, which is well suited to describe near-threshold bound and continuum states in realistic binary systems such as diatomic molecules or molecular ions. The level of abstraction is kept as low as at all possible, and deeper questions related to mathematical foundations of scattering theory are passed by. The book should be understandable for anyone with a basic knowledge of nonrelativistic quantum mechanics. It is intended for advanced students and researchers, and it is hoped that it will be useful for theorists and experimentalists alike.

**Features**

- Written by the author of the widely acclaimed textbook
- Theoretical Atomic Physics Includes sections on quantum reflection, tunable Feshbach resonances and Efimov states
- Useful for advanced students and researchers

**Contents**

- Classical Scattering Theory
- Elastic Scattering by a Conservative Potential
- Internal Excitation
- Inelastic Scattering
- Special Topics
- Scaling
- Special Functions

**Fields of interest**

Theoretical, Mathematical and Computational Physics; Low Temperature Physics

**Target groups**

Research

**Product category**

Monograph

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Due July 2013

2013. XIV, 144 p. 114 illus., 2 in color. (Springer Series on Atomic, Optical, and Plasma Physics, Volume 77)

Hardcover

- € (D) 32.09 | € (A) 32.99 | sFr 40.00
- € 29.99 | £16.95

ISBN 978-3-319-00586-7

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Due June 2013

2013. XII, 284 p. 68 illus., 47 in color. (Lecture Notes in Physics, Volume 872)

Softcover

- € (D) 48.14 | € (A) 49.49 | sFr 60.00
- € 44.99 | £40.99

ISBN 978-3-642-38281-9
R. Gendler, Rob Gendler Astropics, Avon, CT, USA (Ed)

Lessons from the Masters
Current Concepts in Astronomical Image Processing

There are currently thousands of amateur astronomers around the world engaged in astrophotography at a sophisticated level.

Features
► Written by a brilliant body of recognized leaders ► Contains the most current, sophisticated and useful information on astrophotography ► Covers all types of astronomical image processing, including processing of events such as eclipses, using DSLRs, and deep sky, planetary, widefield, and high resolution astronomical image processing ► About 150 illustrations (75 in color) exemplify the challenges and accomplishments of the processing of astronomical images by enthusiasts

Contents

Fields of Interest
Astronomy, Observations and Techniques; Popular/General; Image Processing and Computer Vision

Target groups
Popular/general

Product category
Popular science

G. Ghisellini, The Astronomical Observatory of Brera, Merate, Italy

Radiative Processes in High Energy Astrophysics

This book grew out of the author's notes from his course on Radiative Processes in High Energy Astrophysics. The course provides fundamental definitions of radiative processes and serves as a brief introduction to Bremsstrahlung and black body emission, relativistic beaming, synchrotron emission and absorption, Compton scattering, synchrotron self-compton emission, pair creation and emission. The final chapter discusses the observed features of Active Galactic Nuclei and their interpretation based on the radiative processes presented in the book. Written in an informal style, this book will guide students through their first encounter with high-energy astrophysics.

Features
► Offers a compact introduction to the radiative processes relevant in high-energy astrophysics ► Course-tested lecture notes ► Includes an overview of the observed components of Active Galactic Nuclei

Contents

Fields of interest
Astrophysics and Astrophotography; Plasma Physics; Particle Acceleration and Detection, Beam Physics

Target groups
Research

Product category
Monograph

F. Große, Dresden University of Technology, Germany

Theoretical Femtosecond Physics
Atoms and Molecules in Strong Laser Fields

Theoretical investigations of atoms and molecules interacting with pulsed or continuous wave lasers up to atomic field strengths on the order of \(10^{16} \text{ W/cm}^2\) are leading to an understanding of many challenging experimental discoveries. This book deals with the basics of femtosecond physics and goes up to the latest applications of new phenomena. The book presents an introduction to laser physics with mode-locking and pulsed laser operation. The solution of the time-dependent Schrödinger equation is discussed both analytically and numerically. The basis for the non-perturbative treatment of laser-matter interaction in the book is the numerical solution of the time-dependent Schrödinger equation. The light field is treated classically, and different possible gauges are discussed.

Features
► Gives a tutorial-like complete presentation of theoretical femtosecond physics ► Represents the state of the art of theoretical femtosecond physics ► Includes more than 30 exercises with worked-out solutions ► Contains a tutorial chapter on numerical solution methods of the time-dependent Schrödinger equation

Contents

Fields of interest
Atoms and Molecules in Strong Fields, Laser Matter Interaction; Quantum Physics; Optics and Electrodynamics

Target groups
Upper undergraduate

Product category
Graduate/Advanced undergraduate textbook

Due July 2013
2013. VI, 378 p. 26 illus., 233 in color. (The Patrick Moore Practical Astronomy Series, Volume 179)
Softcover
► * € (D) 48,14 | € (A) 49,49 | sFr 60,00
► € 44,99 | £40.99
ISBN 978-1-4614-7833-1

Due July 2013
2013. X, 162 p. 65 illus., 43 in color. (Lecture Notes in Physics, Volume 873)
Softcover
► * € (D) 37,44 | € (A) 38,49 | sFr 47,00
► € 34,99 | £31.99
ISBN 978-3-319-00611-6

Due August 2013
2nd ed. 2013. 281 p. 100 illus. (Graduate Texts in Physics)
Hardcover
► * € (D) 53,49 | € (A) 54,99 | sFr 67,00
► € 49,99 | £44.99
ISBN 978-3-319-00605-5
Handbook of Spintronics
Editors-in-chief: Y. Xu, York University, UK; D. D. Awschalom, University of California at Santa Barbara, CA, USA; J. Nitta, Tohoku University, Japan

Contents
Vol. 1 - Physical Principles (Lead Editor: D. Awschalom) 1.1 Spin Fundamentals, 1.2 Spin transport at nanoscale, 1.3 Spin injection and detection, 1.4 Spin generation and coherence, 1.5 Spin reversal and spin dynamics. Vol. 2 - Materials (Lead Editor: Y. Xu) 2.1 Metallic thin films and recording media, 2.2 Magnetic tunneling structures, 2.3 Hybrid materials, 2.4 Magnetic semiconductors. 2.5 Patterned and self-assembled materials. Vol. 3 - Devices and Applications (Lead Editor: J. Nitta) 3.1 Spin valves and GMR heads, 3.2 Magnetic and recording media, 3.3 Spin transistors and spin logic devices, [...] 

Fields of interest
Condensed Matter Physics; Electrical Engineering; Optical and Electronic Materials

Target groups
Research

Product category
Handbook

Due July 2014

Print
* approx. € (D) 854.93 | € (A) 878.90 | sFr 662.50
* approx. € 799.00 | €632.00
ISBN 978-94-007-6891-8

2014.
* approx. ** € (D) 950,81 | € (A) 958,80 |
| sFr 1393,50
* approx. € 799,00 | € 632.00

Print + eReference
* approx. € (D) 1068.93 | € (A) 1098.90 | sFr 1432.50
* approx. € 999.00 | € 790.50

M. Hoskin, University of Cambridge, UK
William and Caroline Herschel
Pioneers in late 18th-Century Astronomy
This beautifully structured book presents the essentials of William and Caroline Herschel's pioneering achievements in late 18th-century astronomy. Michael Hoskin shows that William Herschel was the first observational cosmologist and one of the first observers to attack the sidereal universe beyond the solar system: Herschel built instruments far better than any being used at the royal observatory. Aided by his sister Caroline, he commenced a great systematic survey that led to his discovery of Uranus in 1781. Unlike observers before him, whose telescopes did not reveal them as astronomical objects, Herschel did not ignore misty patches of light.

Features
* Answers the question: why are the Herschels important in history of science?
* Shows a complete set of portraits of William and Caroline Herschel which have never before been published as a complete reference collection in a single book
* Includes a charming appendix on how visitors to the Herschels recorded their encounters with "The Herschels at Work"
* Authored by the founder and first director of the Department of the History and Philosophy of Science at Cambridge
* Published under the auspices of the Royal Astronomical Society

Contents
1. Vocations in Conflict.
3. "One of the Greatest Mechanics of His Day".
4. The Peerless Assistant.
5. William's Declining Years.
6. John's "Sacred Duty"

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

Target groups
Popular/general

Product category
Brief

Due October 2013

Jointly published with the Royal Astronomical Society
2013. VII, 114 p. 29 illus., 1 in color. (SpringerBriefs in Astronomy) Softcover
* approx. € (D) 53,49 | € (A) 54,99 | sFr 67,00
* € 49,99 | £ 44.99
ISBN 978-94-007-6874-1

M. Huber, A. Pauluhn, Paul Scherrer Institut, Villigen PSI, Switzerland; J. Culhane, International Space Science Institute, Bern, Switzerland; J. G. Timothy, Nightsof Inc., Tiverton, RI, USA; K. Wilhelm, Max-Planck Institut für Sonnensystemforschung, Katenburg-Lindau, Germany; A. Zehnder, Paul Scherrer Institut, Villigen PSI, Switzerland (Eds)
Observing Photons in Space
A Guide to Experimental Space Astronomy
An ideal resource for lecturers, this title is a comprehensive book on experimental space astronomy. The number of astronomers whose knowledge and interest is concentrated on interpreting observations has grown substantially in the past decades; yet, the number of scientists who are familiar with and capable of dealing with instrumentation has dwindled.

Features
* Covers all spectral domains used for observing astrophysical objects and phenomena in space
* Presents extensive details on general techniques used in space astronomy, such as calibration, cryogenics in space and laser aligned structures
* Discusses practical precautions to be used for astronomical space instrumentation as it relates to the launch and other implications of the space environment

Contents
From the Contents: Part I: Observing Photons in Space.
- Part II: Energy and Wavelength Regions.
- Part III: Techniques and Systems.
- Part IV: Detectors.
- Chapter 20: Detector Types Used in Space.
- Part V: Polariometry.
- Part VI: General Techniques.
- Part VII: Space Environment.

Fields of interest
Spectroscopy and Microscopy; Atomic, Molecular, Optical and Plasma Physics; Astronomy, Astrophysics and Cosmology

Target groups
Research

Product category
Monograph

Due July 2014

Print
* approx. * (D) 854.93 | € (A) 878.90 | sFr 662.50
* approx. € 799.00 | € 632.00
ISBN 978-94-007-6891-8

Due July 2014

Print
2014.
* approx. ** (D) 950,81 | € (A) 958,80 |
| sFr 1393,50
* approx. € 799,00 | € 632.00

Due July 2014

Print
* approx. * (D) 1068.93 | € (A) 1098.90 |
| sFr 1432.50
* approx. € 999.00 | € 790.50

143
Elements of Solid State Physics and of Crystalline Nanostructures

The book regards the properties of crystals and nanostructures treating their structure, cohesion energy, electronic states, optical and transport properties and calculation procedures with particular emphasis on the density functional method.

Features
- Each chapter is organized to start from simple physical situations and then consider more complicated models and experimental situations.
- The book contains exercises integrating the text, that make more simple the reading.
- It is required that the reader know the basis of the quantum mechanics.

Fields of interest
Physics, general; Materials Science, general; Chemistry/Food Science, general

Target groups
Upper undergraduate

Product category
Undergraduate textbook

Observer’s Guide to Star Clusters

Amateur astronomers of all expertise from beginner to experienced will find this a thorough star cluster atlas perfect for easy use at the telescope or through binoculars. It enables practical observers to locate the approximate positions of objects in the sky, organized by constellation. This book was specifically designed as an atlas and written for easy use in field conditions. The maps are in black-and-white so that they can be read by the light of a red LED observer’s reading light. The clusters and their names/numbers are printed in bold black, against a “grayed-out” background of stars and constellation figures. To be used as a self-contained reference, the book provides the reader with detailed and up-to-date coverage of objects visible with small-, medium-, and large-aperture telescopes, and is equally useful for simple and computer-controlled telescopes.

Features
- Provides a comprehensive coverage for identifying and locating star clusters in all relevant constellations in the northern and southern hemispheres.
- Affords a simple yet detailed means of locating star clusters quickly for any time or locations, without having to read through an index.
- Easy to use at the telescope.

Contents
Introduction to Star Clusters.- How to observe and image star clusters.- How to use the star maps.- Constellations A-Z.

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

Target groups
Popular/general

Product category
Popular science

Portrait of Gunnar Källén

A Physics Shooting Star and Poet of Early Quantum Field Theory

Wolfgang Pauli referred to him as ‘my discovery,’ Robert Oppenheimer described him as ‘one of the most gifted theorists’ and Niels Bohr found him enormously stimulating. Who was the man in question, Gunnar Källén (1926-1968)? His appearance in the physics sky was like a shooting star. His contributions to the scientific debate caused excitement among young and old. Similar to his friend and mentor, Wolfgang Pauli, he demanded honesty and rigor in physics – a distinct dividing line between fact and speculation. In his obituary, Arthur S. Wightman would write: ‘Gunnar Källén was a proud continuer of the tradition in quantum field theory established by Wolfgang Pauli.’

Features
- First personal and scientific biography of Gunnar Kallen.
- With short invited contributions by people personally acquainted with Kallen.
- Includes commented reprints of some of his scientific papers.

Contents
Part I Youth, Career, Personality, Legacy, Family and Fatal Accident.- Part II Correspondence With Pauli, Heisenberg and Dirac; Källén in Action.- Part III Promotion of Science in His Honor.- Part IV On Källén’s Scientific Work.- Part V Publications, Selected Papers and Commentaries.- Selected Papers.- Additional Commentaries.

Fields of interest
Elementary Particles, Quantum Field Theory; History and Philosophical Foundations of Physics; Mathematical Physics

Target groups
Research

Product category
Biography
**Modern trends in Superconductivity and Superfluidity**

**Contents**

Solar System Maps
From Antiquity to the Space Age

This book focuses on the conceptualization of the solar system from ancient times, when diagrams largely represented the universe as perceived by the naked eye, to the modern age, with powerful telescopes and space probes giving us new insights into organization of the solar system and into the topographical features of the planets and other celestial bodies. This book traces the development of people’s view of their place in the cosmos from ancient to modern times, with particular emphasis on the solar system.

Features
- Recounts the evolving conceptualization of the solar system from ancient to modern times
- Provides examples of the artistry of antiquarian celestial maps from books and atlases
- Includes a large section on solar system mapping in the Space Age, highlighting large telescope and space probe images
- Presents each illustration with a legend explaining the relevant astronomical and cartographical features

Contents
Introduction.- Ancient Models of the Universe/Solar System from several non-European cultures.- Earth-centered universe/Solar System model of the Classical Greeks through the Roman and Middle Ages.- Sun-centered universe/Solar System models in the pre-telescope era.- Sun-centered universe/Solar System in the early telescope era.- More powerful telescopes and associated advances leading to a separation of our solar system from the wider universe, as nebulae and galaxies were discovered.- How the Solar System has been more accurately perceived in the Space Age.

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

Target groups
Popular/general

Product category
Popular science

Atomic spectroscopy and radiative processes
The book builds upon the lecture notes of an under-graduate course in Astronomical Spectroscopy, but contains significant material for post-graduate courses. It describes the basic physical principles of atomic spectroscopy and the absorption and emission of radiation in astronomical and laboratory plasmas. It summarizes the basics of Electromagnetism and Thermodynamics, then describes in detail the theory of atomic spectra for complex atoms, with emphasis on astrophysical applications. Equilibrium and non-equilibrium phenomena in plasmas are considered. The interaction between radiation and matter is described, together with various types of radiation (e.g. cyclotron, synchrotron, bremsstrahlung, Compton). The basic theory of polarization is provided, as well as the theory of radiative transfer for astrophysical applications.

Features
- Is unique in its description of astrophysical spectroscopy obtained from basic physical principles
- Is unique in bridging the gap between basic books on atomic spectroscopy and the few very specialised ones for the advanced researcher
- Provides an in-depth description of theoretical aspects, but always provides practical examples of the various applications

Fields of interest
Astrophysics and Astroparticles; Atomic/Molecular Structure and Spectra; Particle Acceleration and Detection, Beam Physics

Target groups
Graduate

Product category
Graduate/Advanced undergraduate textbook

Landolt-Börnstein: Numerical Data and Functional Relationships in Science and Technology - New Series

Advanced Materials and Technologies
Subvolume 11
C. Djèga-Mariadassou, Université de Paris XI-Orsay, France
E. Burzo, Cluj-Napoca, Romania (Ed)

Nanocrystalline Materials
Advanced Materials and Technologies, Subvol. 11A

Features
- Standard reference book with selected and easily retrievable data from the fields of physics and chemistry collected by acknowledged international scientists
- Also available online on www.springermaterials.com
- http://www.landolt-boernstein.com

Contents
Hard magnetic R-Co nanomaterials.- (RR’)2(Fe,M)14X materials.- Crystal structure.- Nanostructure.- Lattice parameters.- Magnetic properties.- Electric properties.- Electronic properties.- Corrosion behavior.- Electrochemical properties.- Mechanical properties.- Nuclear magnetic resonance data.- Nuclear gamma resonance data.- Positron annihilation data.- Tables.- Figures.- References.

Field of interest
Physics, general

Target groups
Research

Product category
Reference work

Due August 2013
2013. 250 p. 70 illus., 40 in color. (Springer Praxis Books / Popular Astronomy) Softcover
► approx. *€ (D) 28,84 | € (A) 29,65 | sFr 37,50
► approx. € 26,95 | £23.99
ISBN 978-1-4614-0895-6

Due September 2013
2nd ed. 2014. Approx. 500 p. 80 illus. (UNITEXT / Collana di Fisica e Astronomia) Softcover
► approx. *€ (D) 74,85 | € (A) 76,95 | sFr 93,50
► approx. € 69,95 | £62.99
ISBN 978-88-470-2807-4

Due October 2013
2013. 550 p. / Advanced Materials and Technologies, Subvolume 11) Hardcover
► *€ (D) 4911,30 | € (A) 5049,00 | sFr 6110,50
► € 4590,00 | £4131.00
ISBN 978-3-642-32398-0
Landolt-Börnstein: Numerical Data and Functional Relationships in Science and Technology - New Series

Editor-in-chief: W. Martienssen

Condensed Matter
Subvolume 34A

C. F. Klingshirn, Karlsruher Institut für Technologie, Karlsruhe, Germany (Ed)

Semiconductor Quantum Structures - Growth and Structuring

With contrib. by: A. Forchel, Würzburg; C. Schneider, Universität Würzburg, Germany; C. F. Klingshirn, Karlsruher Institut für Technologie, Karlsruhe, Germany; P. Gilliot, Strasbourg; S. Hüfing, Würzburg; F. Henneberger, Humboldt-Universität Berlin, Germany; E. Kasper, Stuttgart; B. Hönerlage, IPCMS-GONLO, Strasbourg, France; G. Bauer, Universität Linz, Austria; G. Springholz, Johannes Kepler Universität, Linz, Austria

Volume III/34 of Landolt-Börnstein summarizes our current knowledge of semiconductor quantum structures, a topic in applied condensed matter physics with steadily growing technological importance.

Features
► Standard reference book with selected and easily retrievable data from the fields of physics and chemistry collected by acknowledged international scientists ► Also available on SpringerMaterials.com

Fields of interest
Physics, general; Optical and Electronic Materials

Target groups
Research

Product category
Reference work

Due July 2013

2013. 650 p. / Condensed Matter, Subvolume 34A
Hardcover
► € (D) 7576,30 | € (A) 5929,00 | sFr 7175,50
► € 5390,00 | £4851.00
ISBN 978-3-540-63347-1

Landolt-Börnstein: Numerical Data and Functional Relationships in Science and Technology - New Series

Editor-in-chief: W. Martienssen

Physical Chemistry
Subvolume 12C

F. Predel, MPI f. Metallforschung, Stuttgart, Germany
B. Predel (Ed)

Systems from Dy-Er...Ir-Y

Volume 12: Phase Equilibria, Crystallographic and Thermodynamic Data of Binary Alloys, Subvol. C

Volume 12 of group IV presents phase diagrams, crystallographic and thermodynamic data of binary alloy systems. The subvolume C contains systems from Dy-Er...Ir-Y. Volume 12 forms a supplement to volume 5.

Fields of interest
Physics, general; Physical Chemistry; Thermodynamics

Target groups
Research

Product category
Reference work

Due August 2013

2013. 210 p. 1 illus. in color. / Physical Chemistry, Subvolume 12C | Hardcover
► € (D) 1915,30 | € (A) 1969,00 | sFr 2383,00
► € 1790,00 | £1611.00
ISBN 978-3-642-24777-4

I. Licata, D. Fiscaletti, Institute for Scientific Methodology, Palermo, Italy

Quantum potential: Physics, Geometry and Algebra

Recently the interest in Bohm realist interpretation of quantum mechanics has grown. The important advantage of this approach lies in the possibility to introduce non-locality ab initio, and not as an “unexpected host”. In this book, the authors give a detailed analysis of quantum potential, the non-locality term and its role in quantum cosmology and information. The different approaches to the quantum potential are analysed, starting from the original attempt to introduce a realism of particles trajectories (influenced by de Broglie’s pilot wave) to the recent dynamic interpretation provided by Goldstein, Durr, Tumulka and Zanghì, and the geometrodynamic picture, with suggestion about quantum gravity. Finally we focus on the algebraic reading of Hiley and Birbeck school, that analyse the meaning of the non-local structure of the world, bringing important consequences for the space, time and information concepts.

Contents

Fields of interest
History and Philosophical Foundations of Physics; Quantum Physics; Quantum Information Technology; Spintronics

Target groups
Research

Product category
Brief

Due August 2013

2013. 125 p. 10 illus. (SpringerBriefs in Physics) | Softcover
► approx. € (D) 53,49 | € (A) 54,99 | sFr 67,00
► approx. € 49,99 | £44.99
ISBN 978-3-319-00332-0
S. Littlejohn, University of Bath, UK

**Electrical Properties of Graphite Nanoparticles in Silicone**

**Flexible Oscillators and Electromechanical Sensing**

This thesis examines a novel class of flexible electronic material with great potential for use in the construction of stretchable amplifiers and memory elements. Most remarkably the composite material produces spontaneous oscillations that increase in frequency when pressure is applied to it. In this way, the material mimics the excitatory response of pressure-sensing neurons in the human skin. The composites, formed of silicone and graphitic nanoparticles, were prepared in several allotropic forms and functionalized with naphthalene diimide molecules.

**Features**
- Nominated as an outstanding Ph.D. thesis by the University of Bath, UK
- Reports on the discovery of a broad negative differential resistance region in a flexible composite
- Demonstrates strain-tuned flexible oscillators
- Describes a pressure-sensitive material suitable for state-of-the-art bio-electronic applications

**Contents**
- Background Theory
- Fabrication and Measurement
- Tunneling Negative Differential Resistance in a GSC
- Electromechanical Properties and Sensing
- Electronic Amplification in the NDR Region
- Conclusions and Future Work

**Fields of Interest**
- Nanoscale Science and Technology
- Optical and Electronic Materials
- Surfaces and Interfaces
- Thin Films

**Target groups**
- Research

**Product category**
- Monograph

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T. Mahoney, IAC, La Laguna - Tenerife, Spain

**Mercury**

The purpose of this Gazetteer and Atlas of Astronomy (GAA) is to list, define and illustrate, for the first time, every named (as opposed to merely catalogued) object in the sky within a single reference work for use by the general reader, writers and editors dealing with astronomical themes, and those astronomers concerned with any aspect of astronomical nomenclature.

**Features**
- Lists, defines and illustrates every named object and term as related to Mercury
- Contains an atlas comprising maps and images with coordinate grids and labels identifying features listed in the gazetteer
- Provides British and American pronunciations for the entries based on the broad phonetic principles of both systems
- Traces names to their languages and scripts of origin

**Contents**
- List of Maps
- Foreword
- Preface to the Series
- Preface to Volume 1, Part I
- Acknowledgements
- How to Use this Gazetteer
- Pronunciation Guide
- Abbreviations Used in the Gazetteer
- Mercury: An Overview
- Glossary of Terms Used in the Gazetteer
- Gazetteer of Mercury: Classified Index of Surface Features on Mercury
- Atlas of Mercury
- Appendix 1: IAU Mercury Nomenclature
- Appendix 2: Key to Transcriptions of Non-roman Alphabets
- Appendix 3: Mercury Data
- Appendix 4: Mercury Transits
- Appendix 5: Mercury Timeline
- Bibliography

**Fields of Interest**
- Astronomy, Observations and Techniques
- Astrophysics and Astroparticles
- Astronomy, Astrophysics and Cosmology

**Target groups**
- Research

**Product category**
- Dictionary

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H. G. Merkus, Pijnacker, The Netherlands; G. Meesters, DSM, Delft, The Netherlands (Eds)

**Particle Characteristics and Product Development**

Particulate products have a major share in the market of chemical products. These products show up in a wide variety. Examples given in this book include the constructive materials fine ceramics and concrete, the delicacies chocolate and ice cream, pharmaceutical powders and medical inhalers, sun screen and liquid and powder paints. Size distribution and shape of the particles have different functionalities in these products. Some functions are general, others specific. General functions are powder flow and – at the typical particulate concentrations of these products – that the particles cause adequate rheological behavior during processing and/or for product performance.

**Features**
- Covers particle materials of topical import in many industries
- Links specific particle characteristics to the critical performance factors relevant to industrial applications
- Edited by experts acknowledged in both academia and industry

**Contents**
- Basic Information for Design of Particulate Products
- Measurement of Particle Size, Shape, Porosity and Zeta-potential
- Assessment and Control of Fire and Explosion Hazards and Risks of Particulates
- Potential Toxicological Effects of Particles
- Ceramics
- Concrete
- Construction material to modern particle-based composite concepts
- Chocolate
- Propellants
- Dry powder inhalers
- Powder coatings
- Paint dispersions
- Pharma powders
- Sunscreen

**Fields of Interest**
- Soft and Granular Matter
- Complex Fluids and Microfluidics
- Characterization and Evaluation of Materials
- Nanoscale Science and Technology

**Target groups**
- Research

**Product category**
- Monograph

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**Due October 2013**

2014. 197 p. 32 illus., 22 in color. (Springer Theses
Hardcover
- *€ (D) 106,99 | € (A) 109,99 | sFr 133,50
- *€ 99,99 | £90.00
ISBN 978-3-319-00740-3

**Due July 2013**

2013. XXXVI, 318 p. 15 illus., 5 in color. Hardcover
- *€ (D) 139,09 | € (A) 142,99 | sFr 173,50
- *€ 129,99 | £117.00
ISBN 978-1-4614-7207-0

**Due August 2013**

2013. XII, 300 p. (Particle Technology Series, Volume 19)
Hardcover
- approx. *€ (D) 106,95 | € (A) 109,95 | sFr 133,50
- approx. *€ 99,95 | £90.00
ISBN 978-3-319-00713-7
A. Modinos, National Technical University of Athens, Greece

From Aristotle to Schrödinger: The Curiosity of Physics

From Aristotle to Schrödinger: The Curiosity of Physics offers a novel introduction to the topics commonly encountered in the first two years of an undergraduate physics course, including classical mechanics, thermodynamics and statistical mechanics, electromagnetism, relativity, quantum mechanics, atomic and molecular physics, and astrophysics. The book presents physics as it evolved historically; it covers in considerable depth the development of the subject from ancient Greece to the present day.

Features
► Offers a novel historical approach to the core subjects encountered in physics at the undergraduate level ► Provides physics students with a grounding in the history and conceptual development of the subject ► Provides a useful supplement to standard texts on general physics ► Introduces the required mathematical concepts in an accessible way

Contents


Fields of interest
History and Philosophical Foundations of Physics; History of Science; Quantum Physics

Target groups
Lower undergraduate

Product category
Undergraduate textbook

M. Mohan, University of Delhi, India (Ed)

New Trends in Atomic and Molecular Physics

Advanced Technological Applications

The field of Atomic and Molecular Physics (AMP) has reached significant advances in high-precision experimental measurement techniques. The area covers a wide spectrum ranging from conventional to new emerging multi-disciplinary areas like physics of highly charged ions (HCI), molecular physics, optical science, ultrastiff laser technology etc. This book includes the important topics of atomic structure, physics of atomic collision, photoexcitation, photoionization processes, laser cooling and trapping, Bose Einstein condensation and advanced technology applications of AMP in the fields of astronomy, astrophysics, fusion, biology and nanotechnology. This book is useful for researchers, professors, graduate, postgraduate and PhD students dealing with atomic and molecular physics.

Features
► Represents an up-to-date scientific status report on new trends in atomic and molecular physics ► Multi-disciplinary approach ► Also of interest to researchers in astrophysics and fusion plasma physics ► Contains material important for nano- and laser technology

Contents

From the Contents: Recent Investigations of Radiative Lifetimes and Transition Probabilities in Heavy Elements.—Atomic Structure Calculations useful for Astrophysics and Fusion Plasma.—Highly Charged Ions in Rare Earth Permanent Magnet Penning Traps.—Dominance of Higher-Order Contributions to Electronic Recombination.

Fields of interest
Atomic, Molecular, Optical and Plasma Physics; Characterization and Evaluation of Materials; Spectroscopy and Microscopy

Target groups
Research

Product category
Monograph
This thesis deals with two main procedures performed with the ATLAS detector at the Large Hadron Collider (LHC). The noise description in the hadronic calorimeter TileCal represents a very valuable technical job. The second part presents a fruitful physics analysis - the cross section measurement of the process $p+p \rightarrow Z \rightarrow \tau^+ \tau^-$. The Monte Carlo simulations of the TileCal are described in the first part of the thesis, including a detailed treatment of the electronic noise and multiple interactions (so-called pile-up). An accurate description of both is crucial for the reconstruction of e.g. jets or hadronic tau-jets.

Features
- Nominated as an outstanding Ph.D. thesis by the Charles University in Prague, Czech Republic
- Reports on the dominant background in the search for Higgs bosons decaying into tau lepton pairs
- A valuable contribution to understanding noise in the hadronic calorimeter TileCal

Contents
- Overview of the ATLAS experiment at the LHC.
- Monte Carlo simulations of the Tile calorimeter.
- Electron efficiency measurement.
- $Z \rightarrow \tau^+ \tau^-$ cross section measurement.

Fields of interest
- Elementary Particles, Quantum Field Theory; Measurement Science and Instrumentation; Quantum Field Theories, String Theory

Target groups
- Research

Product category
- Monograph

Due October 2013

2013. 88 p. 35 illus., 26 in color. (Springer Theses) Hardcover
- approx. * € (D) 85,59 | € (A) 87,99 | sFr 106,50
- approx. € 79,99 | £72.00
ISBN 978-3-319-00809-7
W. Paolini, Vienna, VA, USA

**Choosing and Using Astronomical Eyepieces**

A valuable reference that fills a number of niches including that of a buyer’s guide, technical desk reference and observer’s field guide. It documents the past market and its evolution, right up to the present day. In addition to appealing to practical astronomers - and potentially saving them money - it is useful both as a historical reference and as a detailed review of the current market place for this bustling astronomical consumer product.

**Contents**


**Fields of interest**

Astronomy; Observations and Techniques; Popular Science in Astronomy; Microwaves, RF and Optical Engineering

**Target groups**

Popular/general

**Product category**

Popular science

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A. Pechenkin, Lomonosov Moscow State University, Russia

**Leonid Isaakovich Mandelstam**

**Research, Teaching and the Other Life**

This biography of the famous Soviet physicist Leonid Isaakovich Mandelstam (1889-1944), who became a Professor at Moscow State University in 1925, describes his contributions to both physics and technology, as well as discussing the scientific community which formed around him, usually called the Mandelstam school. Mandelstam’s life story is thereby placed in its proper cultural context.

**Contents**


**Fields of interest**

History and Philosophical Foundations of Physics; Optics and Electrodynamics; Quantum Physics

**Target groups**

Research

**Product category**

Monograph

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M. Pérez-Suárez, Security and Quantum Information Group, Instituto de Telecomunicaciones, Lisbon, Portugal

**Quantum Uncertainty Structures**

**A Bayesian Approach to Quantum Randomness**

**Features**

- The reader will find the first comprehensive introduction to the Bayesian probability theory’s implications on quantum information
- The book provides a detailed description of algebraic procedures and analytical results
- The book emphasizes the significance of the applications of quantum signal processing such as entangled quantum states and SIC-POVMs

**Contents**


**Fields of interest**

Quantum Physics; Quantum Information Technology, Spintronics; Probability Theory and Stochastic Processes

**Target groups**

Research

**Product category**

Monograph
The Constellation Observing Atlas

Illustrations by: K. Jones, Calne, UK

Designed for anyone who wishes to learn the constellations or observe the best and brightest deep sky objects and double stars, this book contains an alphabetical list of constellations complete with star maps, historical background, and highlights of deep sky objects. Each entry contains position and physical information on enough stars to support astronomers in star-hopping, swinging the telescope from star to star to star to arrive at a faint target. It provides a carefully selected list of accessible and rewarding deep sky objects. Full-color maps show the constellations, with star types (spectral and physical) indicated by the colors used on the map. Extended objects such as galaxies and nebulae are shown with the approximate apparent size in the sky. With unmatched thoroughness and accessibility, this is a constellation atlas that makes the ideal companion to a night’s telescope viewing, for novices and expert amateur astronomers alike.

Features
► Visualizes relevant physical information of stars and extended objects in an attractive and comprehensive way with different colors, symbol types, and sizes ► Covers the entire sky, both the Northern and Southern Hemisphere ► Contains position (and physical) information on enough stars to support star-hopping

Contents
Introduction: Background and How to Use This Book.- Constellation Maps.- Additional information.- Appendix 1.- Index.

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

Target groups
Popular/general

Product category
Popular science

Mathematical Modelling of the Cell Cycle Stress Response

The cell cycle is a sequence of biochemical events that are controlled by complex but robust molecular machinery. This enables cells to achieve accurate self-reproduction under a broad range of conditions. Environmental changes are transmitted by molecular signaling networks, which coordinate their actions with the cell cycle. This work presents the first description of two complementary computational models describing the influence of osmotic stress on the entire cell cycle of S. cerevisiae. Our models condense a vast amount of experimental evidence on the interaction of the cell cycle network components with the osmotic stress pathway.

Features
► Nominated as an outstanding Ph.D. thesis by the University of Aberdeen, UK ► Includes the first computational model of the entire cell cycle and its interaction with the osmotic stress response network ► Presents a comprehensive model that yields a set of novel predictions to guide further experiments ► Also applies the model’s predictions to higher eukaryotes

Contents
A biological overview of the cell cycle and its response to osmotic stress and the a-factor.- ODE model of the cell cycle response to osmotic stress.- Boolean model of the cell cycle response to stress.- Conclusion.- List of equations, parameters and initial conditions.- Effect of methods of update on existence of fixed points.

Fields of interest
Physics of the Cell; Cell Cycle Analysis; Physiological, Cellular and Medical Topics

Target groups
Research

Product category
Monograph

Cosmic Dawn

The Search for the First Stars and Galaxies

This book takes the reader on an exploration of the structure and evolution of our universe. The basis for our knowledge is the Big Bang theory of the expanding universe. This book then tells the story of our search for the first stars and galaxies using current and planned telescopes. These telescopes are marvels of technology far removed from Galileo’s first telescope but continuing astronomy in his ground breaking spirit. We show the reader how these first stars and galaxies shaped the universe we see today. This story is one of the great scientific adventures of all time.

Features
► Teaches the reader what the first stars and galaxies actually look like and how they could form ► Provides the latest observational findings on the search for the first stars and galaxies ► Explains the aims and goals of next-generation telescopes for astronomy

Contents
An evening in May.- A brief history of cosmology.- The Big Bang.- The Visible Universe.- Dark matter.- Cosmic backgrounds.- Clues from Nearby Galaxies (astronomical fossils).- Structure formation.- A map of the universe.- The First Stars and Galaxies.- The great time machines; A New Generation of Telescopes.- Exploring the Universe from Space with the next Hubble telescope.

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

Target groups
Popular/general

Product category
Monograph

Due August 2013

2013. CLX, 10 p. 121 illus., 108 in color. (The Patrick Moore Practical Astronomy Series) Softcover
► * € (D) 32,09 | € (A) 32,99 | sFr 40,00
► € 29,99 | £26.99
ISBN 978-1-4614-7647-4

Due October 2013

2013. 133 p. 36 illus., 26 in color. (Springer Theses) Hardcover
► approx. * € (D) 106,99 | € (A) 109,99 | sFr 133,50
► approx. € 99,99 | £90.00
ISBN 978-3-319-00743-4

Due July 2013

2013. XV, 287 p. 96 illus., 79 in color. (Astronomers’ Universe) Softcover
► * € (D) 42,79 | € (A) 43,99 | sFr 53,50
► € 39,99 | £35.99
ISBN 978-1-4614-7812-6
E. Robens, Friedrichsdorf, Germany; S. A. Jayaweera, Middlesbrough, UK; S. Kiefer, Messstetten, Germany

Balances

Instruments, Manufacturers, History

The book deals mainly with direct mass determination by means of a conventional balances. It covers the history of the balance from the beginnings in Egypt earlier than 3000 BC to recent developments. All balance types are described with emphasis on scientific balances. Methods of indirect mass determination, which are applied to very light objects like molecules and the basic particles of matter and celestial bodies, are included. As additional guidance, today’s manufacturers are listed and the profile of important companies is reviewed. Several hundred photographs, reproductions and drawings show instruments and their uses.

Features
► Displays measuring weight in all ways possible ► Reviews the reliability of the various methods to measure weight ► Gives a historical survey of the development of scales ► Richly illustrated with several hundred rare photographs, reproductions and drawings of the instruments and their uses ► Presents indirect mass determination ► Gives advice to researchers and engineers about choosing the weight system

Contents
Mass and gravity.- Weights.- Weighing.- Balances.- Balances for special applications.- Balance as symbol and art object.- Documentation and archiving.- Weighing scales manufacturers.

Fields of interest
Measurement Science and Instrumentation; Characterization and Evaluation of Materials; History and Philosophical Foundations of Physics

Target groups
Research

Product category
Reference work

M. Rührken, Karlsruhe Institute of Technology, Germany

Time-Dependent CP Violation Measurements

Analyses of Neutral B Meson to Double-Charm Decays at the Japanese Belle Experiment

This thesis describes a high-quality, high-precision method for the data analysis of an interesting elementary particle reaction. The data was collected at the Japanese B-meson factory KEKB with the Belle detector, one of the most successful large-scale experiments worldwide. CP violation is a subtle quantum effect that makes the world look different when simultaneously left and right and matter and antimatter are exchanged. This being a prerequisite for our own world to have developed from the big bang, there are only a few experimental indications of such effects, and their detection requires very intricate techniques.

Features
► Nominated as an outstanding Ph.D. thesis by the Karlsruhe Institute of Technology, Germany ► Offers a comprehensive introduction to the field of flavor physics and CP violating phenomena ► Provides a detailed reference work on and explanatory examples of time-dependent measurements in particle physics

Contents

Fields of interest
Elementary Particles, Quantum Field Theory; Theoretical, Mathematical and Computational Physics; Measurement Science and Instrumentation

Target groups
Research

Product category
Monograph

I. L. Shapiro, G. de Berredo-Peixoto, Universidade Federal de Juiz de Fora, Brazil

Lecture Notes on Newtonian Mechanics

Lessons from Modern Concepts

Features
► Provides a concise and compact introductory text to Newtonian Mechanics at an advanced level ► Uses modern concepts such as the equivalence principle to simplify solving basic mechanics problems which makes the solutions more understandable ► Fits the need for a one-semester course in Classical Mechanics, before introducing advanced concepts such as action, Lagrange and Hamilton equations

Contents

Fields of interest
Mechanics; Theoretical and Applied Mechanics; Applications of Mathematics

Target groups
Upper undergraduate

Product category
Undergraduate textbook
Galactic Encounters
Our Majestic and Evolving Star-System, From the Big Bang to Time’s End

The book is intended as a rich introduction to the wonders of the Galaxy. It is intended for anyone interested in the geography, beauty, and significance of our home star-system which is perhaps (along with the human brain itself) the grandest single structure the human mind can comprehend. Though scientifically informed and up-to-date (Dr. Conselice is a leading researcher) the text can be appreciated by the general reader (Dr. Sheehan is an accomplished writer and historian of astronomy and Julian Baum an award-winning illustrator).

Features
- An original text; no competing literature on the subject
- This book will fill a niche that has not been occupied by any books since Timothy Ferris’s Galaxies (1980) and Henbest and Couper’s Guide to the Galaxy (1994), both of which were very successful
- The best space-telescope images of galaxies will be complemented by Julian Baum’s maps especially created for this book

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

Target groups
Popular/general

Product category
Popular science

Metrology for Fire Experiments in Outdoor Conditions

Natural fires can be considered as scale-dependant, non-linear processes of mass, momentum and heat transport, resulting from a turbulent reactive and radiative fluid medium flowing over a complex medium, the vegetal fuel. In natural outdoor conditions, the experimental study of natural fires at real scale needs the development of an original metrology, one able to capture the large range of time and length scales involved in its dynamic nature and also able to resist the thermal, mechanical and chemical aggression of flames on devices. Robust, accurate and poorly intrusive tools must be carefully set-up and used for gaining very fluctuating data over long periods. These signals also need the development of original post-processing tools that take into account the non-steady nature of their stochastic components.

Metrology for Fire Experiments in Outdoor Conditions closely analyzes these features, and also describes measurements techniques, the thermal insulation of fragile electronic systems, data acquisition, measurement errors and optimal post-processing algorithms. This book is intended for practitioners as a reference guide for optimizing measurements techniques in an outdoor environment. Advanced-level students and researchers will also find the book invaluable.

Contents
Nomenclature.- Introduction.- Measurement systems.- Beyond measurement devices.- Conclusion.

Fields of interest
Measurement Science and Instrumentation; Engineering Thermodynamics, Heat and Mass Transfer; Engineering Fluid Dynamics

Target groups
Professional/practitioner

Product category
Monograph
Ultra-Short Pulsed Laser Engineered Metal-Glass Nanocomposites

Glasses containing metallic nanoparticles exhibit very promising linear and nonlinear optical properties, mainly due to the surface plasmon resonances (SPRs) of the nanoparticles. The spectral position in the visible and near-infrared range and polarization dependence of the SPR are characteristic determined by the nanoparticles’ shapes. The focus of Ultra-Short Pulsed Laser Engineered Metal-Glass Nanocomposites is the interaction of intense ultra-short laser pulses with glass containing silver nanoparticles embedded in soda-lime glass, and nanostructural modifications in metal-glass nanocomposites induced by such laser pulses.

Contents

Fields of interest
Optics, Optoelectronics, Plasmonics and Optical Devices; Optical and Electronic Materials; Laser Technology, Photonics

Target groups
Research

Product category
Brief

T. Stankovski, Lancaster University, UK
Tackling the Inverse Problem for Non-Autonomous Systems Application to the Life Sciences

This thesis presents a new method for following evolving interactions between coupled oscillatory systems of the kind that abound in nature. Examples range from the subcellular level, to ecosystems, through climate dynamics, to the movements of planets and stars. Such systems mutually interact, adjusting their internal clocks, and may correspondingly move between synchronized and non-synchronized states. The thesis describes a way of using Bayesian inference to exploit the presence of random fluctuations, thus analyzing these processes in unprecedented detail. It first develops the basic theory of interacting oscillators whose frequencies are non-constant, and then applies it to the human heart and lungs as an example.

Features
- Nominated as an outstanding Ph.D. thesis by the University of Lancaster, UK
- Describes a new inference technique for time-evolving coupled systems in the presence of noise
- Includes the first reconstruction of a time-evolving coupling function between open (biological) systems

Contents
Theoretical background: non-autonomous systems and synchronization.- Inference of time-evolving coupled dynamical systems in the presence of noise.- Application to life sciences.- Analogue simulation and synchronization analysis of non-autonomous oscillators.

Fields of interest
Statistical Physics, Dynamical Systems and Complexity; Probability Theory and Stochastic Processes; Theoretical, Mathematical and Computational Physics

Target groups
Research

Product category
Monograph

S. Thutupalli, Princeton University, NJ, USA
Towards Autonomous Soft Matter Systems
Experiments on Membranes and Active Emulsions

This book focuses on the assembly, organization and resultant collective dynamics of soft matter systems maintained away from equilibrium by an energy flux. Living matter is the ultimate example of such systems, which are comprised of different constituents on very different scales (ions, nucleic acids, proteins, cells). The result of their diverse interactions, maintained using the energy from physiological processes, is a fantastically well-organized and dynamic whole.

Features
- Nominated as an outstanding Ph.D. thesis by the Max Planck Institute for Dynamics and Self-Organisation, Germany
- Develops novel experimental systems and techniques aimed at building futuristic soft functional matter
- A cross-disciplinary work that is broadly applicable to research and development in physics, chemistry, biology and engineering

Contents

Fields of interest
Soft and Granular Matter, Complex Fluids and Microfluidics; Physical Chemistry; Membranes

Target groups
Research

Product category
Monograph
Quantifying the Martian Geochemical Reservoirs

J. M. Torres-Rincón, Autonomous University of Barcelona-CSIC, Spain

Hadronic Transport Coefficients from Effective Field Theories

This dissertation focuses on the calculation of transport coefficients in the matter created in a relativistic heavy-ion collision after chemical freeze-out. This matter can be well approximated using a pion gas out of equilibrium. We describe the theoretical framework needed to obtain the shear and bulk viscosities, the thermal and electrical conductivities and the flavor diffusion coefficients of a meson gas at low temperatures. To describe the interactions of the degrees of freedom, we use effective field theories with chiral and heavy quark symmetries.

Features

- Nominated as an outstanding Ph.D. thesis by the Universidad Complutense de Madrid
- Presents a unified description of non-equilibrium phenomena in a hadronic gas
- Applies unitarized effective theories to the calculation of transport coefficients in mesons

Contents


Fields of interest

Nuclear Physics, Heavy Ions, Hadrons; Thermodynamics; Theoretical, Mathematical and Computational Physics

Target groups

Research

Product category

Monograph
Q. Wang, University of Kansas, Lawrence, KS, USA

**Charge Multiplicity Asymmetry Correlation Study Searching for Local Parity Violation at RHIC for STAR Collaboration**

It has been suggested that local parity violation (LPV) in Quantum Chromodynamics (QCD) would lead to charge separation of quarks by the Chiral Magnetic Effect (CME) in heavy ion collisions. Charge Multiplicity Asymmetry Correlation Study Searching for Local Parity Violation at RHIC for STAR Collaboration presents the detailed study of charge separation with respect to the event plane. Results on charge multiplicity asymmetry in Au+Au and d+Au collisions at 200 GeV by the STAR experiment are reported. It was found that the correlation results could not be explained by CME alone. Additionally, the charge separation signal as a function of the measured azimuthal angle range as well as the event-by-event anisotropy parameter are studied. These results indicate that the charge separation effect appears to be in-plane rather than out-of-plane.

**Features**
- Nominated by Purdue University, USA, as an outstanding Ph.D. thesis
- Devises a new method of studying charge separation versus the event structure in heavy-ion collisions
- Discovers that charge separation is proportional to the event structure, indicating the observed signal is dominated by an event-structure-related background

**Contents**
- Introduction
- Experiment
- Data Analysis
- Results and Discussions
- Summary
- Appendix

**Fields of interest**
- Nuclear Physics, Heavy Ions, Hadrons; Particle Acceleration and Detection, Beam Physics; Elementary Particles, Quantum Field Theory

**Target groups**
- Research

**Product category**
- Monograph

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K. Yamanouchi, The University of Tokyo, Japan; G. G. Paulus, Friedrich Schiller University Jena, Germany; D. Mathur, Tata Institute of Fundamental Research, Mumbai, India (Eds)

**Progress in Ultrafast Intense Laser Science X**

The PULS series delivers up-to-date reviews of progress in Ultrafast Intense Laser Science, a newly emerging interdisciplinary research field spanning atomic and molecular physics, molecular science, and optical science, which has been stimulated by the recent developments in ultrafast laser technologies.

**Features**
- Gives a state-of-the-art report of ultrafast intense laser science
- Presents the applications of ultrafast laser technologies in atomic and molecular physics
- Contains contributions by the leading researchers
- Provides interdisciplinary information

**Contents**
- Electron Localization in Hydrogen.
- Observation of Vibrational Wave-Packet Dynamics in D2+ using High-order Harmonic Pulses.
- Frequency Tunable Attosecond Apparatus.
- Strong-Field Atomic Physics in the X-Ray Regime.
- Third Harmonic Generation from Perturbed Femtosecond Filaments in Air.
- Strong and Coherent Forward Emissions from Molecules Driven by Femtosecond Infrared Laser Pulses.
- Tests of Classical and Quantum Electrodynamics with Intense Laser Fields.
- Quantum Vacuum Polarization Searches with High Power Lasers Below the Pair Production Regime.

**Fields of interest**
- Atoms and Molecules in Strong Fields, Laser Matter Interaction; Laser Technology, Photonics; Physical Chemistry

**Target groups**
- Research

**Product category**
- Monograph

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N. Yoshimura, Tokyo, Japan

**Historical Evolution toward Achieving Ultrahigh Vacuum in JEOL Electron Microscopes**

This book describes the course of history of the vacuum system of the transmission electron microscope of JEOL (JEM series), from its birth to today’s microscopes. Present author and co-workers engaged in developing vacuum technology for electron microscopes in JEOL (Japan Electron Optics Laboratory Co. Ltd.) for many years. This book presents you the vacuum technology in electron microscopes of JEOL (JEM), approaching clean ultrahigh vacuum. The users of TEM are high-level researchers, frontiers for new materials or new biological specimens. They often use the TEM at the extremely severe conditions, occurring problem on the vacuum system of the user’s TEM.

**Features**
- Provides a diffusion pump (DP) evacuation system for clean vacuum
- Presents in detail the development of vibration-free DP, sputter ion pump for extreme high-vacuum evacuation and sputter ion pump for inert gases such as Ar and Xe
- Describes how to prevent contamination build-up due to electron beam irradiation

**Contents**
- Introduction of the electron microscope
- History of JEOL electron microscopes
- Accidents and information, instructing us to improve the vacuum systems of JEMs
- Development of the evacuation systems for JEMs
- Development of JEOL SIPS
- Ultrahigh vacuum electron microscopes

**Fields of interest**
- Spectroscopy and Microscopy; Nanotechnology and Microengineering; Machinery and Machine Elements

**Target groups**
- Research

**Product category**
- Brief
P. Zhang, CERN, Geneva 23, Switzerland

**Beam Diagnostics in Superconducting Accelerating Cavities**

**The Extraction of Transverse Beam Position from Beam-Excited Higher Order Modes**

An energetic charged particle beam introduced to an rf cavity excites a wakefield therein. This wakefield can be decomposed into a series of higher order modes and multipoles, which for sufficiently small beam offsets are dominated by the dipole component. This work focuses on using these dipole modes to detect the beam position in third harmonic superconducting S-band cavities for light source applications. A rigorous examination of several means of analysing the beam position based on signals radiated to higher order modes ports is presented.

**Features**
- Nominated as an outstanding Ph.D. thesis by the Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany
- The author is the winner of the 2011 European Accelerator Prize for promising young researchers
- A valuable didactic introduction for students and scientists new to the field of rf diagnostics
- Provides a detailed survey of various dimension reduction methods applicable for rf diagnostics

**Contents**

**Fields of interest**
Particle Acceleration and Detection, Beam Physics; Optics and Electrodynamics; Numerical and Computational Physics

**Target groups**
Research

**Product category**
Monograph

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