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Raymond A. Serway 2013-01-01

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forces and principles of physics. Throughout every chapter, the authors have built in a wide range of examples, exercises, and illustrations that will help you understand the laws of physics AND succeed in your course! Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Time: From Earth Rotation to Atomic Physics - Dennis D. McCarthy 2018-10-18

This accessible reference presents the evolution of concepts of time and methods of time keeping, for historians, scientists, engineers, and educators. The second edition has been updated throughout to describe twentieth- and twenty-first-century advances, progress in devices, time and cosmology, the redefinition of SI units, and the future of UTC.

Elementary Atomic Structure - Gordon Kemble Woodgate 1980

Preface to first edition Preface to second edition 1. Introduction 2. The hydrogen atom-

gross structure 3. Radiative transitions 4. The hydrogen atom- fine structure 5. Two-electron system 6. The central-field approximation 7. Angular problems in many-electron atoms 8. Interaction with static external fields 9. Hyperfine structure and isotope shift Appendix A. Some theorems of quantum mechanics Appendix B. Results of time-independent perturbation theory Appendix C. Notes on angular momentum Appendix D. Ground states of the elements Appendix E. Units Index

Atom Interferometry - Paul R. Berman 1997-01-08

The field of atom interferometry has expanded rapidly in recent years, and today's research laboratories are using atom interferometers both as inertial sensors and for precision measurements. Many researchers also use atom interferometry as a means of researching fundamental questions in quantum mechanics. Atom Interferometry contains contributions from theoretical and experimental physicists at the

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forefront of this rapidly developing field. Editor Paul R. Berman includes an excellent balance of background material and recent experimental results, providing a general overview of atom interferometry and demonstrating the promise that it holds for the future. Includes contributions from many of the research groups that have pioneered this emerging field. Discusses and demonstrates new aspects of the wave nature of atoms. Explains the many important applications of atom interferometry, from a measurement of the gravitational constant to atom lithography. Examines applications of atom interferometry to fundamentally important quantum mechanics problems.

Relativity Made Relatively Easy - Andrew M. Steane 2012-10-04

This book unfolds the subject of Relativity for undergraduate students of physics. It fills a gap between introductory descriptions and texts for researchers. Assuming almost no prior

knowledge, it allows the student to handle all the Relativity needed for a university course, with explanations as simple, thorough, and engaging as possible.

A Modern Introduction to Quantum Field Theory - Michele Maggiore 2005

Quantum field theory has undergone extraordinary developments in the last few decades and permeates many branches of modern research such as particle physics, cosmology, condensed matter, statistical mechanics and critical phenomena. This book introduces the reader to the modern developments in a manner which assumes no previous knowledge of quantum field theory, and makes it readily accessible from the advanced undergraduate level upwards. - ;The importance and the beauty of modern quantum field theory resides in the power and variety of its methods and ideas, which find application in domain.

Quantum Information - Stephen Barnett 2009-05-28

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Quantum information is an area of science, which brings together physics, information theory, computer science & mathematics. This book, which is based on two successful lecture courses, is intended to introduce readers to the ideas behind new developments including quantum cryptography, teleportation & quantum computing.

Atomic Physics - Dmitry Budker 2004

Written as a collection of problems, hints and solutions, this book should provide help in learning about both fundamental and applied aspects of this vast field of knowledge, where rapid and exciting developments are taking place.

Spectrophysics - Anne P. Thorne 2012-12-06

This book describes the methods of experimental spectroscopy and their use in the study of physical phenomena. The applications of optical spectroscopy may be grouped under three broad headings: chemical analysis, elucidation of atomic and molecular structure, and

investigations of the interactions of radiating atoms and molecules with their environment. I have used the word 'Spectro physics' for the third of these by analogy with spectrochemistry for the first and in preference to 'quantitative spectroscopy'. A number of textbooks treat atomic and molecular structure at varying levels of profundity, but elementary spectrophysics is not, so far as I am aware, covered in anyone existing book. There is moreover a lack of up-to-date books on experimental techniques that treat in a fairly elementary fashion interferometric, Fourier transform and radiofrequency methods as well as prism and grating spectroscopy. In view of the importance of spectrophysics in astrophysics and plasma physics as well as in atomic and molecular spectroscopy there seemed a place for a book describing both the experimental methods and their spectrophysical applications.

Laser Cooling and Trapping - Harold J. Metcalf 2012-12-06

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Intended for advanced undergraduates and beginning graduates with some basic knowledge of optics and quantum mechanics, this text begins with a review of the relevant results of quantum mechanics, before turning to the electromagnetic interactions involved in slowing and trapping atoms and ions, in both magnetic and optical traps. The concluding chapters discuss a broad range of applications, from atomic clocks and studies of collision processes, to diffraction and interference of atomic beams at optical lattices and Bose-Einstein condensation.

American Prometheus - Kai Bird 2007-12-18
WINNER OF THE PULITZER PRIZE FOR
NONFICTION • "The definitive biography"
(Newsweek) of J. Robert Oppenheimer, one of
the iconic figures of the twentieth century, a
brilliant physicist who led the effort to build the
atomic bomb for his country in a time of war,
and who later found himself confronting the
moral consequences of scientific progress. In

this magisterial, acclaimed biography twenty-five years in the making, Kai Bird and Martin Sherwin capture Oppenheimer's life and times, from his early career to his central role in the Cold War. This is biography and history at its finest, riveting and deeply informative. "A masterful account of Oppenheimer's rise and fall, set in the context of the turbulent decades of America's own transformation. It is a tour de force." —Los Angeles Times Book Review
College Physics Paul Peter Urone 1997-12

Problems and Solutions on Atomic, Nuclear and Particle Physics Yung-Kuo Lim 2000-03-04

This book, part of the seven-volume series Major American Universities PhD Qualifying Questions and Solutions contains detailed solutions to 483 questions/problems on atomic, molecular, nuclear and particle physics, as well as experimental methodology. The problems are of a standard appropriate to advanced undergraduate and graduate syllabi, and blend

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together two objectives — understanding of physical principles and practical application. The volume is an invaluable supplement to textbooks.

Atomic physics - Dmitry Budker 2008-07-24

This volume is a collection of problems in atomic, molecular, and optical physics intended for a broad audience of physicists: from undergraduate students to researchers who wish to sharpen their knowledge and learn about recent developments. The 2nd edition contains over 10 new problems, and includes important updates, revisions, and corrections.

Superconductivity, Superfluids and

Condensates - James F. Annett 2004-03-25

Superconductivity, provides a basic introduction to one of the most innovative areas in condensed matter physics today. This book includes ample tutorial material, including illustrations, chapter summaries, graded problem sets, and concise examples. This book is part of the Oxford Master Series in Condensed Matter Physics.

Atoms and Molecules Interacting with Light -

Peter van der Straten 2016-02-04

Focusing on atom-light interactions and containing numerous exercises, this in-depth textbook prepares students for research in a fast-growing field.

The Lost Elements Marco Fontani 2015

In the mid-nineteenth century, chemists came to the conclusion that elements should be organized by their atomic weights. However, the atomic weights of various elements were calculated erroneously, and chemists also observed some anomalies in the properties of other elements. Over time, it became clear that the periodic table as currently comprised contained gaps, missing elements that had yet to be discovered. A rush to discover these missing pieces followed, and a seemingly endless amount of elemental discoveries were proclaimed and brought into laboratories. It wasn't until the discovery of the atomic number in 1913 that chemists were able to begin making sense of

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what did and what did not belong on the periodic table, but even then, the discovery of radioactivity convoluted the definition of an element further. Throughout its formation, the periodic table has seen false entries, good-faith errors, retractions, and dead ends; in fact, there have been more elemental "discoveries" that have proven false than there are current elements on the table. *The Lost Elements: The Shadow Side of Discovery* collects the most notable of these instances, stretching from the nineteenth century to the present. The book tells the story of how scientists have come to understand elements, by discussing the failed theories and false discoveries that shaped the path of scientific progress. Chapters range from early chemists' stubborn refusal to disregard alchemy as legitimate practice, to the effects of the atomic number on discovery, to the switch in influence from chemists to physicists, as elements began to be artificially created in the twentieth century. Along the way, Fontani,

Costa, and Orna introduce us to the key figures in the development of the periodic table as we know it. And we learn, in the end, that this development was shaped by errors and gaffs as much as by correct assumptions and scientific conclusions.

Laser Physics - Simon Hooker 2010-08-05
An up-to-date perspective on laser technology for students at advanced undergraduate or introductory graduate level. The principles of operation and applications of modern laser systems are analysed in detail. The text has over 300 diagrams and each chapter is accompanied with questions (solutions available on application).

Principles of Laser Spectroscopy and Quantum Optics - Paul R. Berman 2010-12-13
Principles of Laser Spectroscopy and Quantum Optics is an essential textbook for graduate students studying the interaction of optical fields with atoms. It also serves as an ideal reference text for researchers working in the fields of laser

spectroscopy and quantum optics. The book provides a rigorous introduction to the prototypical problems of radiation fields interacting with two- and three-level atomic systems. It examines the interaction of radiation with both atomic vapors and condensed matter systems, the density matrix and the Bloch vector, and applications involving linear absorption and saturation spectroscopy. Other topics include hole burning, dark states, slow light, and coherent transient spectroscopy, as well as atom optics and atom interferometry. In the second half of the text, the authors consider applications in which the radiation field is quantized. Topics include spontaneous decay, optical pumping, sub-Doppler laser cooling, the Heisenberg equations of motion for atomic and field operators, and light scattering by atoms in both weak and strong external fields. The concluding chapter offers methods for creating entangled and spin-squeezed states of matter. Instructors can create a one-semester course

based on this book by combining the introductory chapters with a selection of the more advanced material. A solutions manual is available to teachers. Rigorous introduction to the interaction of optical fields with atoms Applications include linear and nonlinear spectroscopy, dark states, and slow light Extensive chapter on atom optics and atom interferometry Conclusion explores entangled and spin-squeezed states of matter Solutions manual (available only to teachers)

Schrödinger's Killer Jonathan P. Dowling
2013-05-07

The race is on to construct the first quantum code breaker, as the winner will hold the key to the entire Internet. From international, multibillion-dollar financial transactions to top-secret government communications, all would be vulnerable to the secret-code-breaking ability of the quantum computer. Written by a renowned quantum physicist closely involved in the U.S. government's development of quantum

information science, Schrödinger's Killer App: Race to Build the World's First Quantum Computer presents an inside look at the government's quest to build a quantum computer capable of solving complex mathematical problems and hacking the public-key encryption codes used to secure the Internet. The "killer application" refers to Shor's quantum factoring algorithm, which would unveil the encrypted communications of the entire Internet if a quantum computer could be built to run the algorithm. Schrödinger's notion of quantum entanglement—and his infamous cat—is at the heart of it all. The book develops the concept of entanglement in the historical context of Einstein's 30-year battle with the physics community over the true meaning of quantum theory. It discusses the remedy to the threat posed by the quantum code breaker: quantum cryptography, which is unbreakable even by the quantum computer. The author also covers applications to other important areas,

such as quantum physics simulators, synchronized clocks, quantum search engines, quantum sensors, and imaging devices. In addition, he takes readers on a philosophical journey that considers the future ramifications of quantum technologies. Interspersed with amusing and personal anecdotes, this book presents quantum computing and the closely connected foundations of quantum mechanics in an engaging manner accessible to non-specialists. Requiring no formal training in physics or advanced mathematics, it explains difficult topics, including quantum entanglement, Schrödinger's cat, Bell's inequality, and quantum computational complexity, using simple analogies.

[Atomic Physics](#) - Paul Ewart 2019-02-28
Atomic Physics provides a concise treatment of atomic physics and a basis to prepare for work in other disciplines that are underpinned by atomic physics such as chemistry, biology and several aspects of engineering science. The

focus is mainly on atomic structure since this is what is primarily responsible for the physical properties of atoms. After a brief introduction to some basic concepts, the perturbation theory approach follows the hierarchy of interactions starting with the largest. The other interactions of spin, and angular momentum of the outermost electrons with each other, the nucleus and external magnetic fields are treated in order of descending strength. A spectroscopic perspective is generally taken by relating the observations of atomic radiation emitted or absorbed to the internal energy levels involved. X-ray spectra are then discussed in relation to the energy levels of the innermost electrons. Finally, a brief description is given of some modern, laser based, spectroscopic methods for the high resolution study of the nest details of atomic structure.

Atomic Physics C.J. Foot 2005

This modern text on atomic physics is suitable for students at advanced undergraduate level. It

covers both the fundamentals of the subject, as well as cutting-edge developments of the past decade, and contains plenty of tutorial material, including examples, illustrations, summaries and graded problem sets.

Atomic Physics: Precise Measurements and Ultracold Matter - Massimo Inguscio

2013-09-19

This book traces the evolution of Atomic Physics from precision spectroscopy to the manipulation of atoms at a billionth of a degree above absolute zero. Quantum worlds can be simulated and fundamental theories, such as General Relativity and Quantum Electrodynamics, can be tested with table-top experiments.

The New Physics- Gordon Fraser 2009-08-06

Underpinning all the other branches of science, physics affects the way we live our lives, and ultimately how life itself functions. Recent scientific advances have led to dramatic reassessment of our understanding of the world around us, and made a significant impact on our

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lifestyle. In this book, leading international experts, including Nobel prize winners, explore the frontiers of modern physics, from the particles inside an atom to the stars that make up a galaxy, from nano-engineering and brain research to high-speed data networks. Revealing how physics plays a vital role in what we see around us, this book will fascinate scientists of all disciplines, and anyone wanting to know more about the world of physics today.

Physics Concepts and Connections - Henri M. Van Bommel 2002

Rydberg Atoms - Thomas F. Gallagher
2005-11-03

This book provides a comprehensive description of the physics of Rydberg atoms, highlighting their remarkable properties by reference to their behavior in a wide range of physical situations. Following an overview of the basic properties of Rydberg atoms, their interactions with electric and magnetic fields are analyzed in detail. The

collisions of Rydberg atoms with neutral and charged species are described, and the use of multichannel quantum defect theory in the study of Rydberg atomic systems is discussed.

An Introduction to Nuclear Physics

W. N. Cottingham 2001-02-22

This clear and concise introduction to nuclear physics provides an excellent basis for a core undergraduate course in this area. The book opens by setting nuclear physics in the context of elementary particle physics and then shows how simple models can provide an understanding of the properties of nuclei, both in their ground states and excited states, and also of the nature of nuclear reactions. The book also includes chapters on nuclear fission, its application in nuclear power reactors, the role of nuclear physics in energy production and nucleosynthesis in stars. This second edition contains several additional topics: muon-catalysed fusion, the nuclear and neutrino physics of supernovae, neutrino mass and

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neutrino oscillations, and the biological effects of radiation. A knowledge of basic quantum mechanics and special relativity is assumed. Appendices deal with other more specialized topics. Each chapter ends with a set of problems for which outline solutions are provided.

University Physics - Samuel J. Ling 2016-09-29

"University Physics is a three-volume collection that meets the scope and sequence requirements for two- and three-semester calculus-based physics courses. Volume 1 covers mechanics, sound, oscillations, and waves. This textbook emphasizes connections between theory and application, making physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject.

Frequent, strong examples focus on how to approach a problem, how to work with the equations, and how to check and generalize the result."--Open Textbook Library.

University Physics - Samuel J. Ling 2017-12-19

University Physics is designed for the two- or

three-semester calculus-based physics course.

The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have

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already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project.

VOLUME III Unit 1: Optics Chapter 1: The Nature of Light Chapter 2: Geometric Optics and Image Formation Chapter 3: Interference Chapter 4: Diffraction Unit 2: Modern Physics Chapter 5: Relativity Chapter 6: Photons and Matter Waves Chapter 7: Quantum Mechanics Chapter 8: Atomic Structure Chapter 9: Condensed Matter Physics Chapter 10: Nuclear Physics Chapter 11: Particle Physics and Cosmology

Statistical Mechanics - James Sethna 2006-04-07

In each generation, scientists must redefine their fields: abstracting, simplifying and

distilling the previous standard topics to make room for new advances and methods. Sethna's book takes this step for statistical mechanics - a field rooted in physics and chemistry whose ideas and methods are now central to information theory, complexity, and modern biology. Aimed at advanced undergraduates and early graduate students in all of these fields, Sethna limits his main presentation to the topics that future mathematicians and biologists, as well as physicists and chemists, will find fascinating and central to their work. The amazing breadth of the field is reflected in the author's large supply of carefully crafted exercises, each an introduction to a whole field of study: everything from chaos through information theory to life at the end of the universe.

Quantum Atom Optics - Tim Byrnes

2021-08-05

The rapid development of quantum technologies has driven a revolution in related research areas

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such as quantum computation and communication, and quantum materials. The first prototypes of functional quantum devices are beginning to appear, frequently created using ensembles of atoms, which allow the observation of sensitive, quantum effects, and have important applications in quantum simulation and matter wave interferometry. This modern text offers a self-contained introduction to the fundamentals of quantum atom optics and atomic many-body matter wave systems. Assuming a familiarity with undergraduate quantum mechanics, this book will be accessible for graduate students and early career researchers moving into this important new field. A detailed description of the underlying theory of quantum atom optics is given, before development of the key, quantum, technological applications, such as atom interferometry, quantum simulation, quantum metrology, and quantum computing.

Quantum Optics - Anthony Mark Fox 2006-04-27

Written primarily for advanced undergraduate and Master's level students in physics, this text includes a broad range of topics in applied quantum optics such as laser cooling, Bose-Einstein condensation and quantum information processing.

Theoretical Atomic Physics - Harald Friedrich 2012-12-06

After a brief review of quantum mechanics and a summary of conventional atomic theory, H. Friedrich discusses the structure of atomic spectra on the basis of quantum defect theory, which is treated for the first time at such a basic level in a textbook. Special attention is given to highly excited states and to the influence of external fields, which can cause intricate and interesting effects in seemingly simple systems. After a chapter on reaction theory the final chapter treats special topics such as multiphoton absorption and chaos. The book contains the kind of advanced quantum mechanics needed for practical applications in modern atomic physics.

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The presentation is kept deliberately simple and avoids abstract formalism as far as possible.

Modern Classical Optics Geoffrey Brooker
2003-08-07

The book describes classical (non-quantum) optical phenomena and the instruments and technology based on them. It includes many cutting-edge areas of modern physics and its applications which are not covered in many larger and more expensive books.

Quantum Optics - Marlan O. Scully 1997-09-04

An in-depth and wide-ranging introduction to the field of quantum optics.

The Oxford Solid State Basics - Steven H. Simon 2013-06-20

This is a first undergraduate textbook in Solid State Physics or Condensed Matter Physics. While most textbooks on the subject are extremely dry, this book is written to be much more exciting, inspiring, and entertaining.

Concepts of Elementary Particle Physics
Michael E. Peskin 2019-05-29

The purpose of this textbook is to explain the Standard Model of particle physics to a student with an undergraduate preparation in physics. Today we can claim to have a fundamental picture of the strong and weak subnuclear forces. Through an interplay between theory and experiment, we have learned the basic equations through which these forces operate, and we have tested these equations against observations at particle accelerators. The story is beautiful and full of surprises. Using a simplified presentation that does not assume prior knowledge of quantum field theory, this book begins from basic concepts of special relativity and quantum mechanics, describes the key experiments that have clarified the structure of elementary particle interactions, introduces the crucial theoretical concepts, and builds up to the full description of elementary particle interactions as we know them today.

Bose-Einstein Condensation in Dilute Gases
J. Pethick 2008-09-11

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Since an atomic Bose-Einstein condensate, predicted by Einstein in 1925, was first produced in the laboratory in 1995, the study of ultracold Bose and Fermi gases has become one of the most active areas in contemporary physics. This book explains phenomena in ultracold gases from basic principles, without assuming a detailed knowledge of atomic, condensed matter, and nuclear physics. This new edition has been revised and updated, and includes new chapters on optical lattices, low dimensions, and strongly-interacting Fermi systems. This book provides a unified introduction to the physics of ultracold atomic Bose and Fermi gases for advanced undergraduate and graduate students, as well as experimentalists and theorists. Chapters cover the statistical physics of trapped gases, atomic properties, cooling and trapping atoms, interatomic interactions, structure of trapped condensates, collective modes, rotating condensates, superfluidity, interference

phenomena, and trapped Fermi gases. Problems are included at the end of each chapter.

How I Became a Quant - Richard R. Lindsey
2011-01-11

Praise for How I Became a Quant "Led by two top-notch quants, Richard R. Lindsey and Barry Schachter, How I Became a Quant details the quirky world of quantitative analysis through stories told by some of today's most successful quants. For anyone who might have thought otherwise, there are engaging personalities behind all that number crunching!" --Ira Kawaller, Kawaller & Co. and the Kawaller Fund "A fun and fascinating read. This book tells the story of how academics, physicists, mathematicians, and other scientists became professional investors managing billions." --David A. Krell, President and CEO, International Securities Exchange "How I Became a Quant should be must reading for all students with a quantitative aptitude. It provides fascinating examples of the dynamic career opportunities

potentially open to anyone with the skills and passion for quantitative analysis." --Roy D. Henriksson, Chief Investment Officer, Advanced Portfolio Management "Quants"--those who design and implement mathematical models for the pricing of derivatives, assessment of risk, or prediction of market movements--are the backbone of today's investment industry. As the greater volatility of current financial markets has driven investors to seek shelter from increasing uncertainty, the quant revolution has given people the opportunity to avoid unwanted financial risk by literally trading it away, or more specifically, paying someone else to take on the unwanted risk. How I Became a Quant reveals the faces behind the quant revolution, offering you the chance to learn firsthand what it's like to be a quant today. In this fascinating collection of Wall Street war stories, more than two dozen quants detail their roots, roles, and contributions, explaining what they do and how they do it, as well as outlining the sometimes

unexpected paths they have followed from the halls of academia to the front lines of an investment revolution.

Quantum Information, Computation and Communication - Jonathan A. Jones 2012-07-19

Quantum physics allows entirely new forms of computation and cryptography, which could perform tasks currently impossible on classical devices, leading to an explosion of new algorithms, communications protocols and suggestions for physical implementations of all these ideas. As a result, quantum information has made the transition from an exotic research topic to part of mainstream undergraduate courses in physics. Based on years of teaching experience, this textbook builds from simple fundamental concepts to cover the essentials of the field. Aimed at physics undergraduate students with a basic background in quantum mechanics, it guides readers through theory and experiment, introducing all the central concepts without getting caught up in details. Worked

examples and exercises make this useful as a self-study text for those who want a brief

introduction before starting on more advanced books. Solutions are available online at www.cambridge.org/9781107014466.