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Physics

New and Best of Backlist

Spring / Summer 2024



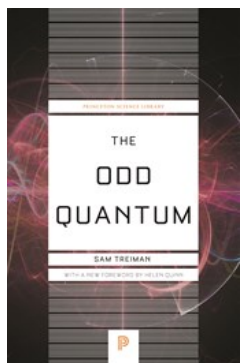
The Einsteinian Revolution – The Historical Roots of His Breakthroughs

Jürgen Renn
9780691168760
£28.00 • \$32.00 • Hardcover
Science / History
January 2024
Princeton University Press

How the Einsteinian revolution can be understood as the result of a long-term evolution of science

The revolution that emerged from Albert Einstein's work in the early twentieth century transformed our understanding of space, time, motion, gravity, matter, and radiation. Beginning with Einstein's miracle year of 1905 and continuing through his development of the theory of general relativity, Einstein spurred a revolution that continues to reverberate in modern-day physics. In *The Einsteinian Revolution*, Hanoch Gutfreund and Jürgen Renn trace the century-long transformation of classical physics and argue that the revolution begun by Einstein was in fact the result of a long-term evolution. Describing the origins and context of Einstein's innovative research, Gutfreund and Renn work to dispel the popular myth of Einstein as a lone genius who brought about a revolution in physics through the power of his own pure thought. We can only understand the birth of modern physics, they say, if we understand the long history of the evolution of knowledge.

Gutfreund and Renn outline the essential structures of the knowledge system of classical physics on which Einstein drew. Examining Einstein's discoveries from 1905 onward, they describe the process by which new concepts arose and the basis of modern physics emerged. These transformations continued, eventually resulting in the establishment of quantum physics and general relativity as the two major conceptual frameworks of modern physics—and its two unreconciled theoretical approaches. Gutfreund and Renn note that Einstein was dissatisfied with this conceptual dichotomy and began a search for a unified understanding of physics—a quest that continued for the rest of his life.



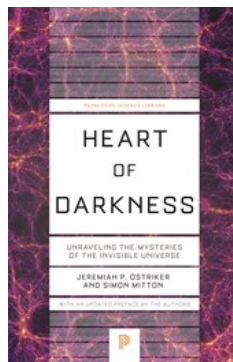
The Odd Quantum

Sam Treiman
9780691254364
£17.99 • \$21.95 • Paperback
Science / Physics
January 2024
Princeton University Press

An acclaimed physicist's accessible yet rigorous introduction to quantum mechanics for nonspecialists

This is a rare and much-needed book: a concise but comprehensive account of quantum mechanics for popular science readers written by a respected physicist. Sam Treiman—who was internationally renowned for his work in particle physics—makes quantum mechanics accessible to nonspecialists. Combining mastery of the material with clear, elegant prose and infectious enthusiasm, he conveys the substance, methods, and profound oddities of the field.

Treiman begins with an overview of quantum mechanics. He sketches the early development of the field by Einstein, Bohr, Heisenberg, Schrödinger, and others, and he makes clear how the quantum outlook flies in the face of common sense. As he explains, the quantum world is intrinsically probabilistic. For example, a particle is not in general in some particular place at a given instant, nor does it have a definite momentum. According to the Heisenberg uncertainty principle, there is a limit to how well both location and momentum can be specified simultaneously. In addition, particles can move through barriers and otherwise move in regions of space that are forbidden by classical mechanics. If a particle has a choice of different paths, it pursues all of them at once. Particles display wave-like characteristics and waves show particle-like characteristics. Treiman pays special attention to the more fundamental wave outlook and its expression in quantum field theory. He deals here with the remarkable fact that all the particles of a given species are strictly identical, and with the unnerving fact that particles can be created and destroyed. As Treiman introduces us to these and other wonders, he also touches—without resolution—on some of the deep philosophical problems of quantum mechanics, notably how probabilities become facts.



Heart of Darkness – Unraveling the Mysteries of the Invisible Universe

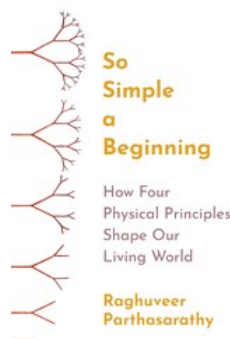
Jeremiah P. Ostriker
9780691258935
£15.99 • \$18.95 • Paperback
Science / Space Science / Astronomy
June 2024
Princeton University Press

Humanity's ongoing quest to unlock the secrets of dark matter and dark energy

Heart of Darkness describes the incredible saga of humankind's quest to unravel the deepest secrets of the universe. Over the past forty years, scientists have learned that two little-understood components—dark matter and dark energy—comprise most of the known cosmos, explain the growth of all cosmic structure, and hold the key to the universe's fate. The story of how evidence for the so-called "Lambda-Cold Dark Matter" model of cosmology has been gathered by generations of scientists throughout the world is told here by one of the pioneers of the field, Jeremiah Ostriker, and his coauthor Simon Mitton.

From humankind's early attempts to comprehend Earth's place in the solar system, to astronomers' exploration of the Milky Way galaxy and the realm of the nebulae beyond, to the detection of the primordial fluctuations of energy from which all subsequent structure developed, this book explains the physics and the history of how the current model of our universe arose and has passed every test hurled at it by the skeptics. Throughout this rich story, an essential theme is emphasized: how three aspects of rational inquiry—the application of direct measurement and observation, the introduction of mathematical modeling, and the requirement that hypotheses should be testable and verifiable—guide scientific progress and underpin our modern cosmological paradigm.

This monumental puzzle is far from complete, however, as scientists confront the mysteries of the ultimate causes of cosmic structure formation and the real nature and origin of dark matter and dark energy.



So Simple a Beginning – How Four Physical Principles Shape Our Living World

Raghuvveer Parthasarathy
9780691258676
£18.99 • \$22.95 • Paperback
Science / Life Sciences / Biophysics
May 2024
Princeton University Press

A biophysicist reveals the hidden unity behind nature's breathtaking complexity

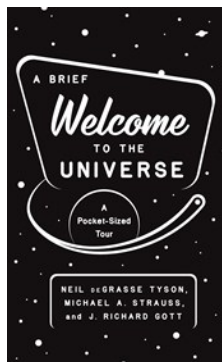
The form and function of a sprinting cheetah are quite unlike those of a rooted tree. A human being is very different from a bacterium or a zebra. The living world is a realm of dazzling variety, yet a shared set of physical principles shapes the forms and behaviors of every creature in it. *So Simple a Beginning* shows how the emerging new science of biophysics is transforming our understanding of life on Earth and enabling potentially lifesaving but controversial technologies such as gene editing, artificial organ growth, and ecosystem engineering.

Raghuvveer Parthasarathy explains how four basic principles—self-assembly, regulatory circuits, predictable randomness, and scaling—shape the machinery of life on scales ranging from microscopic molecules to gigantic elephants. He describes how biophysics is helping to unlock the secrets of a host of natural phenomena, such as how your limbs know to form at the proper places, and why humans need lungs but ants do not. Parthasarathy explores how the cutting-edge biotechnologies of tomorrow could enable us to alter living things in ways both subtle and profound.

Featuring dozens of original watercolors and drawings by the author, this sweeping tour of biophysics offers astonishing new perspectives on how the wonders of life can arise from so simple a beginning.

The University Press Group

Physics 2024



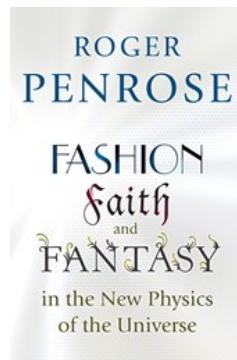
A Brief Welcome to the Universe – A Pocket-Sized Tour

Neil deGrasse Tyson
9780691219943
£9.99 • \$14.95 • Paperback
Science / Physics / Astrophysics
September 2021
Princeton University Press

A pocket-style edition based on the *New York Times* bestseller

A *Brief Welcome to the Universe* offers a breathtaking tour of the cosmos, from planets, stars, and galaxies to black holes and time loops. Bestselling authors and acclaimed astrophysicists Neil deGrasse Tyson, Michael A. Strauss, and J. Richard Gott take readers on an unforgettable journey of exploration to reveal how our universe actually works.

Propelling you from our home solar system to the outermost frontiers of space, this book builds your cosmic insight and perspective through a marvelously entertaining narrative. How do stars live and die? What are the prospects of intelligent life elsewhere in the universe? How did the universe begin? Why is it expanding and accelerating? Is our universe alone or part of an infinite multiverse? Exploring these and many other questions, this pocket-friendly book is your passport into the wonders of our evolving cosmos.



Fashion, Faith, and Fantasy in the New Physics of the Universe

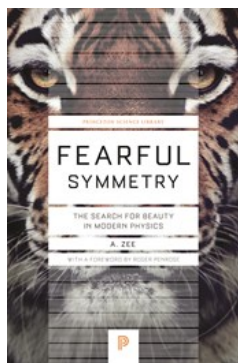
Roger Penrose
9780691178530
£15.99 • \$18.95 • Paperback
Science / Philosophy & Social Aspects
August 2017
Princeton University Press

Nobel Prize–winning physicist Roger Penrose questions some of the most fashionable ideas in physics today, including string theory

What can fashionable ideas, blind faith, or pure fantasy possibly have to do with the scientific quest to understand the universe? Surely, theoretical physicists are immune to mere trends, dogmatic beliefs, or flights of fancy? In fact, acclaimed physicist and bestselling author Roger Penrose argues that researchers working at the extreme frontiers of physics are just as susceptible to these forces as anyone else. In this provocative book, he argues that fashion, faith, and fantasy, while sometimes productive and even essential in physics, may be leading today's researchers astray in three of the field's most important areas—string theory, quantum mechanics, and cosmology.

Arguing that string theory has veered away from physical reality by positing six extra hidden dimensions, Penrose cautions that the fashionable nature of a theory can cloud our judgment of its plausibility. In the case of quantum mechanics, its stunning success in explaining the atomic universe has led to an uncritical faith that it must also apply to reasonably massive objects, and Penrose responds by suggesting possible changes in quantum theory. Turning to cosmology, he argues that most of the current fantastical ideas about the origins of the universe cannot be true, but that an even wilder reality may lie behind them. Finally, Penrose describes how fashion, faith, and fantasy have ironically also shaped his own work, from twistor theory, a possible alternative to string theory that is beginning to acquire a fashionable status, to "conformal cyclic cosmology," an idea so fantastic that it could be called "conformal crazy cosmology."

The result is an important critique of some of the most significant developments in physics today from one of its most eminent figures.

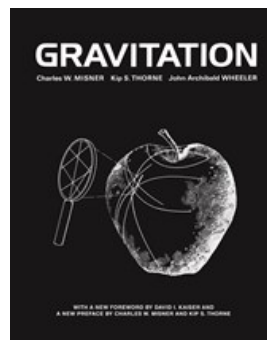


Fearful Symmetry – The Search for Beauty in Modern Physics

Anthony Zee
9780691173269
£18.99 • \$22.95 • Paperback
Science / Physics
September 2016
Princeton University Press

An engaging exploration of beauty in physics, with a foreword by Nobel Prize–winning physicist Roger Penrose

The concept of symmetry has widespread manifestations and many diverse applications—from architecture to mathematics to science. Yet, as twentieth-century physics has revealed, symmetry has a special, central role in nature, one that is occasionally and enigmatically violated. *Fearful Symmetry* brings the incredible discoveries of the juxtaposition of symmetry and asymmetry in contemporary physics within everyone's grasp. A. Zee, a distinguished physicist and skillful expositor, tells the exciting story of how contemporary theoretical physicists are following Einstein in their search for the beauty and simplicity of Nature. Animated by a sense of reverence and whimsy, *Fearful Symmetry* describes the majestic sweep and accomplishments of twentieth-century physics—one of the greatest chapters in the intellectual history of humankind.



Gravitation

Charles W. Misner
9780691177793
£58.00 • \$68.00 • Hardcover
Science / Physics / Gravity
October 2017
Princeton University Press

First published in 1973, *Gravitation* is a landmark graduate-level textbook that presents Einstein's general theory of relativity and offers a rigorous, full-year course on the physics of gravitation. Upon publication, *Science* called it "a pedagogic masterpiece," and it has since become a classic, considered essential reading for every serious student and researcher in the field of relativity. This authoritative text has shaped the research of generations of physicists and astronomers, and the book continues to influence the way experts think about the subject.

With an emphasis on geometric interpretation, this masterful and comprehensive book introduces the theory of relativity; describes physical applications, from stars to black holes and gravitational waves; and portrays the field's frontiers. The book also offers a unique, alternating, two-track pathway through the subject. Material focusing on basic physical ideas is designated as Track 1 and formulates an appropriate one-semester graduate-level course. The remaining Track 2 material provides a wealth of advanced topics instructors can draw on for a two-semester course, with Track 1 sections serving as prerequisites.

This must-have reference for students and scholars of relativity includes a new preface by David Kaiser, reflecting on the history of the book's publication and reception, and a new introduction by Charles Misner and Kip Thorne, discussing exciting developments in the field since the book's original publication.

- The book teaches students to:
- Grasp the laws of physics in flat and curved spacetime
- Predict orders of magnitude
- Calculate using the principal tools of modern geometry

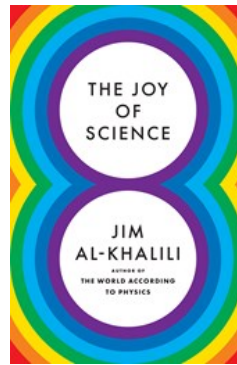


How the Universe Got Its Spots – Diary of a Finite Time in a Finite Space

Janna Levin
9780691232270
£14.99 • \$17.95 • Paperback
Science / Physics
March 2023
Princeton University Press

Mixing memoir and visionary science, a leading astrophysicist's groundbreaking personal account of her life and ideas

Is the universe infinite or just really big? With this question, cosmologist Janna Levin announces the central theme of this book, which established her as one of the most direct, unorthodox, and creative voices in contemporary science. As Levin sets out to determine how big “really big” may be, she offers a rare intimate look at the daily life of an innovative physicist, complete with jet lag and the tensions between personal relationships and the extreme demands of scientific exploration. Nimbly explaining geometry, topology, chaos, and string theory, Levin shows how the pattern of hot and cold spots left over from the big bang may one day reveal the size of the cosmos. The result is a thrilling story of cosmology by one of its leading thinkers.



The Joy of Science

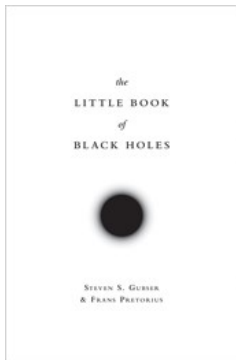
Jim Al-Khalili
9780691211572
£12.99 • \$16.95 • Hardcover
Science / Philosophy & Social Aspects
April 2022
Princeton University Press

Quantum physicist, *New York Times* bestselling author, and BBC host Jim Al-Khalili reveals how 8 lessons from the heart of science can help you get the most out of life

Today's world is unpredictable and full of contradictions, and navigating its complexities while trying to make the best decisions is far from easy. *The Joy of Science* presents 8 short lessons on how to unlock the clarity, empowerment, and joy of thinking and living a little more scientifically.

In this brief guide to leading a more rational life, acclaimed physicist Jim Al-Khalili invites readers to engage with the world as scientists have been trained to do. The scientific method has served humankind well in its quest to see things as they really are, and underpinning the scientific method are core principles that can help us all navigate modern life more confidently. Discussing the nature of truth and uncertainty, the role of doubt, the pros and cons of simplification, the value of guarding against bias, the importance of evidence-based thinking, and more, Al-Khalili shows how the powerful ideas at the heart of the scientific method are deeply relevant to the complicated times we live in and the difficult choices we make.

Read this book and discover the joy of science. It will empower you to think more objectively, see through the fog of your own preexisting beliefs, and lead a more fulfilling life.



The Little Book of Black Holes

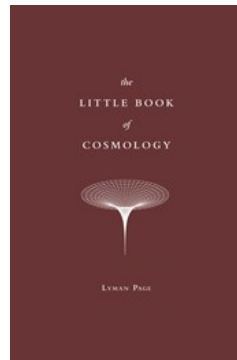
Steven S. Gubser
9780691163727
£16.99 • \$19.95 • Hardcover
Science / Physics / Astrophysics
September 2017
Princeton University Press

Dive into a mind-bending exploration of the physics of black holes

Black holes, predicted by Albert Einstein's general theory of relativity more than a century ago, have long intrigued scientists and the public with their bizarre and fantastical properties. Although Einstein understood that black holes were mathematical solutions to his equations, he never accepted their physical reality—a viewpoint many shared. This all changed in the 1960s and 1970s, when a deeper conceptual understanding of black holes developed just as new observations revealed the existence of quasars and X-ray binary star systems, whose mysterious properties could be explained by the presence of black holes. Black holes have since been the subject of intense research—and the physics governing how they behave and affect their surroundings is stranger and more mind-bending than any fiction.

After introducing the basics of the special and general theories of relativity, this book describes black holes both as astrophysical objects and theoretical “laboratories” in which physicists can test their understanding of gravitational, quantum, and thermal physics. From Schwarzschild black holes to rotating and colliding black holes, and from gravitational radiation to Hawking radiation and information loss, Steven Gubser and Frans Pretorius use creative thought experiments and analogies to explain their subject accessibly. They also describe the decades-long quest to observe the universe in gravitational waves, which recently resulted in the LIGO observatories' detection of the distinctive gravitational wave “chirp” of two colliding black holes—the first direct observation of black holes' existence.

The Little Book of Black Holes takes readers deep into the mysterious heart of the subject, offering



The Little Book of Cosmology

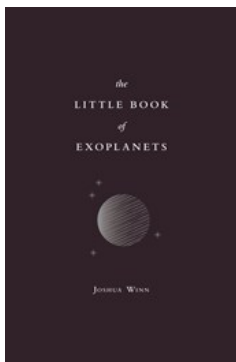
Lyman Page
9780691195780
£16.99 • \$19.95 • Hardcover
Science / Space Science / Cosmology
March 2020
Princeton University Press

The cutting-edge science that is taking the measure of the universe

The Little Book of Cosmology provides a breathtaking look at our universe on the grandest scales imaginable. Written by one of the world's leading experimental cosmologists, this short but deeply insightful book describes what scientists are revealing through precise measurements of the faint thermal afterglow of the Big Bang—known as the cosmic microwave background, or CMB—and how their findings are transforming our view of the cosmos.

Blending the latest findings in cosmology with essential concepts from physics, Lyman Page first helps readers to grasp the sheer enormity of the universe, explaining how to understand the history of its formation and evolution in space and time. Then he sheds light on how spatial variations in the CMB formed, how they reveal the age, size, and geometry of the universe, and how they offer a blueprint for the formation of cosmic structure.

Not only does Page explain current observations and measurements, he describes how they can be woven together into a unified picture to form the Standard Model of Cosmology. Yet much remains unknown, and this incisive book also describes the search for ever deeper knowledge at the field's frontiers—from quests to understand the nature of neutrinos and dark energy to investigations into the physics of the very early universe.



The Little Book of Exoplanets

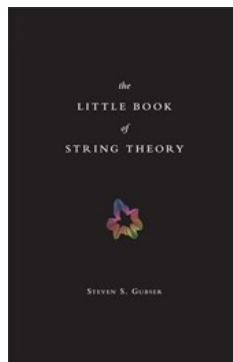
Joshua N. Winn
9780691215471

£18.99 • \$22.95 • Hardcover
Science / Physics / Astrophysics
July 2023
Princeton University Press

A concise and accessible introduction to exoplanets that explains the cutting-edge science behind recent discoveries

For centuries, people have speculated about the possibility of planets orbiting distant stars, but only since the 1990s has technology allowed astronomers to detect them. At this point, more than five thousand such exoplanets have been identified, with the pace of discovery accelerating after the launch of NASA's Transiting Exoplanet Survey Satellite and the Webb Space Telescope. In *The Little Book of Exoplanets*, Princeton astrophysicist Joshua Winn offers a brief and engaging introduction to the search for exoplanets and the cutting-edge science behind recent findings. In doing so, he chronicles the dawn of a new age of discovery—one that has rapidly transformed astronomy and our broader understanding of the universe.

Scientists now know that many Sun-like stars host their own systems of planets, some of which may resemble our solar system and include planets similar to the Earth. But, Winn tells us, the most remarkable discoveries so far have been of planets with unexpected and decidedly un-Earth-like properties, which have upended what we thought we knew about the origins of planetary systems. Winn provides an inside view of the sophisticated detective work astronomers perform as they find and study exoplanets and describes the surprising—sometimes downright bizarre—planets and systems they have found. He explains how these discoveries are revolutionizing astronomy, and he explores the current status and possible future of the search for another Earth. Finally, drawing on his own and other scientists' work, he considers how the discovery of exoplanets and their faraway solar systems changes our perspectives on the universe and our place in it.



The Little Book of String Theory

Steven S. Gubser
9780691142890

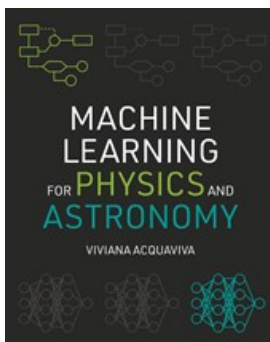
£16.99 • \$19.95 • Hardcover
Science / Physics
March 2010
Princeton University Press

The essential beginner's guide to string theory

The Little Book of String Theory offers a short, accessible, and entertaining introduction to one of the most talked-about areas of physics today. String theory has been called the "theory of everything." It seeks to describe all the fundamental forces of nature. It encompasses gravity and quantum mechanics in one unifying theory. But it is unproven and fraught with controversy. After reading this book, you'll be able to draw your own conclusions about string theory.

Steve Gubser begins by explaining Einstein's famous equation $E = mc^2$, quantum mechanics, and black holes. He then gives readers a crash course in string theory and the core ideas behind it. In plain English and with a minimum of mathematics, Gubser covers strings, branes, string dualities, extra dimensions, curved spacetime, quantum fluctuations, symmetry, and supersymmetry. He describes efforts to link string theory to experimental physics and uses analogies that nonscientists can understand. How does Chopin's *Fantasia-Improvisation* relate to quantum mechanics? What would it be like to fall into a black hole? Why is dancing a waltz similar to contemplating a string duality? Find out in the pages of this book.

The Little Book of String Theory is the essential, most up-to-date beginner's guide to this elegant, multidimensional field of physics.



Machine Learning for Physics and Astronomy

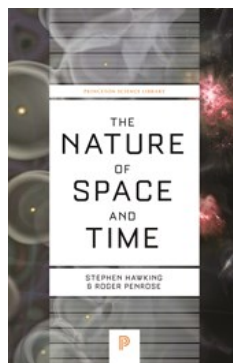
Viviana Acquaviva
9780691206417

£38.00 • \$45.00 • Paperback
Science / Physics / Mathematical & Computational
October 2023
Princeton University Press

A hands-on introduction to machine learning and its applications to the physical sciences

As the size and complexity of data continue to grow exponentially across the physical sciences, machine learning is helping scientists to sift through and analyze this information while driving breathtaking advances in quantum physics, astronomy, cosmology, and beyond. This incisive textbook covers the basics of building, diagnosing, optimizing, and deploying machine learning methods to solve research problems in physics and astronomy, with an emphasis on critical thinking and the scientific method. Using a hands-on approach to learning, *Machine Learning for Physics and Astronomy* draws on real-world, publicly available data as well as examples taken directly from the frontiers of research, from identifying galaxy morphology from images to identifying the signature of standard model particles in simulations at the Large Hadron Collider.

- Introduces readers to best practices in data-driven problem-solving, from preliminary data exploration and cleaning to selecting the best method for a given task
- Each chapter is accompanied by Jupyter Notebook worksheets in Python that enable students to explore key concepts
- Includes a wealth of review questions and quizzes
- Ideal for advanced undergraduate and early graduate students in STEM disciplines such as physics, computer science, engineering, and applied mathematics
- Accessible to self-learners with a basic knowledge of linear algebra and calculus
- Slides and assessment questions (available only to instructors)



The Nature of Space and Time

Stephen Hawking
9780691168449

£12.99 • \$15.95 • Paperback
Science / Physics
October 2015
Princeton University Press

From two of the world's great physicists—Stephen Hawking and Nobel laureate Roger Penrose—a lively debate about the nature of space and time

Einstein said that the most incomprehensible thing about the universe is that it is comprehensible. But was he right? Can the quantum theory of fields and Einstein's general theory of relativity, the two most accurate and successful theories in all of physics, be united into a single quantum theory of gravity? Can quantum and cosmos ever be combined? In *The Nature of Space and Time*, two of the world's most famous physicists—Stephen Hawking (*A Brief History of Time*) and Roger Penrose (*The Road to Reality*)—debate these questions.

The authors outline how their positions have further diverged on a number of key issues, including the spatial geometry of the universe, inflationary versus cyclic theories of the cosmos, and the black-hole information-loss paradox. Though much progress has been made, Hawking and Penrose stress that physicists still have further to go in their quest for a quantum theory of gravity.



On Gravity – A Brief Tour of a Weighty Subject

A. Zee
9780691202662
£12.99 • \$15.95 • Paperback
Science / Physics / Gravity
March 2020
Princeton University Press

A pithy yet deep introduction to Einstein's general theory of relativity

Of the four fundamental forces of nature, gravity might be the least understood and yet the one with which we are most intimate. *On Gravity* combines depth with accessibility to take us on a compelling tour of Einstein's general theory of relativity. A. Zee begins with the discovery of gravity waves, then explains how gravity can be understood in comparison to other classical field theories, presents the idea of curved spacetime, and explores black holes and Hawking radiation. Zee travels as far as the theory reaches, leaving us with tantalizing hints of the unknown, from the intransigence of quantum gravity to the mysteries of dark matter. Infused with Zee's signature warmth and fresh style, *On Gravity* opens a unique pathway to comprehending relativity, gravity, spacetime, and the workings of the universe.



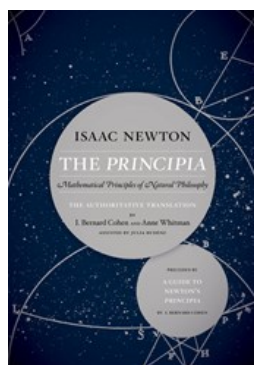
Philosophy of Physics – Space and Time

Tim Maudlin
9780691165714
£20.00 • \$24.95 • Paperback
Science / Philosophy & Social Aspects
June 2015
Princeton University Press

Philosophical foundations of the physics of space-time

This concise book introduces nonphysicists to the core philosophical issues surrounding the nature and structure of space and time, and is also an ideal resource for physicists interested in the conceptual foundations of space-time theory. Tim Maudlin's broad historical overview examines Aristotelian and Newtonian accounts of space and time, and traces how Galileo's conceptions of relativity and space-time led to Einstein's special and general theories of relativity. Maudlin explains special relativity with enough detail to solve concrete physical problems while presenting general relativity in more qualitative terms. Additional topics include the Twins Paradox, the physical aspects of the Lorentz-FitzGerald contraction, the constancy of the speed of light, time travel, the direction of time, and more.

- Introduces nonphysicists to the philosophical foundations of space-time theory
- Provides a broad historical overview, from Aristotle to Einstein
- Explains special relativity geometrically, emphasizing the intrinsic structure of space-time
- Covers the Twins Paradox, Galilean relativity, time travel, and more
- Requires only basic algebra and no formal knowledge of physics



The Principia – Mathematical Principles of Natural Philosophy, The Authoritative Translation

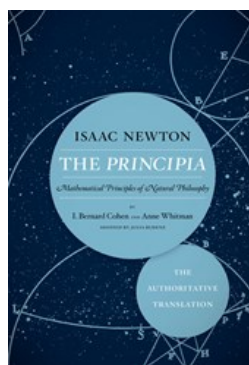
Isaac Newton
9780520290884
£30.00 • \$34.95 • Paperback
Science / Physics / Mathematical & Computational
February 2016
University of California Press

In his monumental 1687 work, *Philosophiæ Naturalis Principia Mathematica*, known familiarly as the *Principia*, Isaac Newton laid out in mathematical terms the principles of time, force, and motion that have guided the development of modern physical science. Even after more than three centuries and the revolutions of Einsteinian relativity and quantum mechanics, Newtonian physics continues to account for many of the phenomena of the observed world, and Newtonian celestial dynamics is used to determine the orbits of our space vehicles.

This authoritative, modern translation by I. Bernard Cohen and Anne Whitman, the first in more than 285 years, is based on the 1726 edition, the final revised version approved by Newton; it includes extracts from the earlier editions, corrects errors found in earlier versions, and replaces archaic English with contemporary prose and up-to-date mathematical forms.

Newton's principles describe acceleration, deceleration, and inertial movement; fluid dynamics; and the motions of the earth, moon, planets, and comets. A great work in itself, the *Principia* also revolutionized the methods of scientific investigation. It set forth the fundamental three laws of motion and the law of universal gravity, the physical principles that account for the Copernican system of the world as emended by Kepler, thus effectively ending controversy concerning the Copernican planetary system.

The illuminating Guide to Newton's *Principia* by I. Bernard Cohen makes this preeminent work truly accessible for today's scientists, scholars, and students.



The Principia: The Authoritative Translation – Mathematical Principles of Natural Philosophy

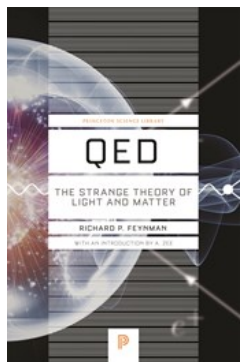
Isaac Newton
9780520290747
£16.99 • \$19.95 • Paperback
Science / Physics / Mathematical & Computational
February 2016
University of California Press

In his monumental 1687 work, *Philosophiæ Naturalis Principia Mathematica*, known familiarly as the *Principia*, Isaac Newton laid out in mathematical terms the principles of time, force, and motion that have guided the development of modern physical science. Even after more than three centuries and the revolutions of Einsteinian relativity and quantum mechanics, Newtonian physics continues to account for many of the phenomena of the observed world, and Newtonian celestial dynamics is used to determine the orbits of our space vehicles.

This authoritative, modern translation by I. Bernard Cohen and Anne Whitman, the first in more than 285 years, is based on the 1726 edition, the final revised version approved by Newton; it includes extracts from the earlier editions, corrects errors found in earlier versions, and replaces archaic English with contemporary prose and up-to-date mathematical forms.

Newton's principles describe acceleration, deceleration, and inertial movement; fluid dynamics; and the motions of the earth, moon, planets, and comets. A great work in itself, the *Principia* also revolutionized the methods of scientific investigation. It set forth the fundamental three laws of motion and the law of universal gravity, the physical principles that account for the Copernican system of the world as emended by Kepler, thus effectively ending controversy concerning the Copernican planetary system.

The translation-only edition of this preeminent work is truly accessible for today's scientists, scholars, and students.



QED – The Strange Theory of Light and Matter

Richard P. Feynman
9780691164090

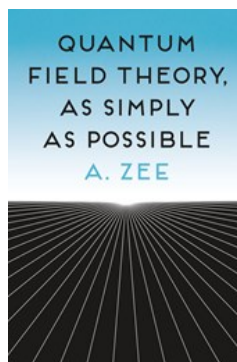
£16.99 • \$19.95 • Paperback

Science / Physics / Quantum Theory

October 2014

Princeton University Press

Celebrated for his brilliantly quirky insights into the physical world, Nobel laureate Richard Feynman also possessed an extraordinary talent for explaining difficult concepts to the general public. Here Feynman provides a classic and definitive introduction to QED (namely, quantum electrodynamics), that part of quantum field theory describing the interactions of light with charged particles. Using everyday language, spatial concepts, visualizations, and his renowned "Feynman diagrams" instead of advanced mathematics, Feynman clearly and humorously communicates both the substance and spirit of QED to the layperson. A. Zee's introduction places Feynman's book and his seminal contribution to QED in historical context and further highlights Feynman's uniquely appealing and illuminating style.



Quantum Field Theory, as Simply as Possible

Anthony Zee
9780691174297

£35.00 • \$39.95 • Hardcover

Science / Physics / Quantum Theory

March 2023

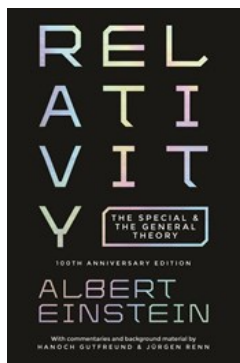
Princeton University Press

An exceptionally accessible introduction to quantum field theory

Quantum field theory is by far the most spectacularly successful theory in physics, but also one of the most mystifying. *Quantum Field Theory, as Simply as Possible* provides an essential primer on the subject, giving readers the conceptual foundations they need to wrap their heads around one of the most important yet baffling subjects in physics.

Quantum field theory grew out of quantum mechanics in the late 1930s and was developed by a generation of brilliant young theorists, including Julian Schwinger and Richard Feynman. Their predictions were experimentally verified to an astounding accuracy unmatched by the rest of physics. Quantum field theory unifies quantum mechanics and special relativity, thus providing the framework for understanding the quantum mysteries of the subatomic world. With his trademark blend of wit and physical insight, A. Zee guides readers from the classical notion of the field to the modern frontiers of quantum field theory, covering a host of topics along the way, including antimatter, Feynman diagrams, virtual particles, the path integral, quantum chromodynamics, electroweak unification, grand unification, and quantum gravity.

A unique and valuable introduction for students and general readers alike, *Quantum Field Theory, as Simply as Possible* explains how quantum field theory informs our understanding of the universe, and how it can shed light on some of the deepest mysteries of physics.



Relativity – The Special and the General Theory – 100th Anniversary Edition

Albert Einstein
9780691191812

£14.99 • \$17.95 • Paperback

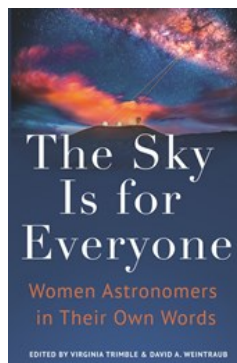
Science / Physics / Relativity

March 2019

Princeton University Press

A handsome annotated edition of Einstein's celebrated book on relativity

After completing the final version of his general theory of relativity in November 1915, Albert Einstein wrote *Relativity*. Intended for a popular audience, the book remains one of the most lucid explanations of the special and general theories ever written. This edition of Einstein's celebrated book features an authoritative English translation of the text along with commentaries by Hanoch Gutfreund and Jürgen Renn that examine the evolution of Einstein's thinking and cast his ideas in a modern context. Providing invaluable insight into one of the greatest scientific minds of all time, the book also includes a unique survey of the introductions from past editions, covers from selected early editions, a letter from Walther Rathenau to Einstein discussing the book, and a revealing sample from Einstein's original handwritten manuscript.



The Sky Is for Everyone – Women Astronomers in Their Own Words

9780691253916

£16.99 • \$19.95 • Paperback

Science / Space Science / Astronomy

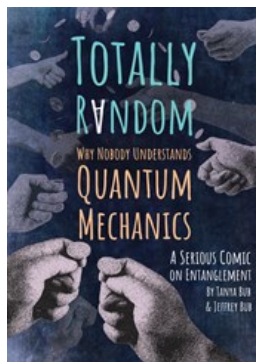
October 2023

Princeton University Press

An inspiring anthology of writings by trailblazing women astronomers from around the globe

The Sky Is for Everyone is an internationally diverse collection of autobiographical essays by women who broke down barriers and changed the face of modern astronomy. Virginia Trimble and David Weintraub vividly describe how, before 1900, a woman who wanted to study the stars had to have a father, brother, or husband to provide entry, and how the considerable intellectual skills of women astronomers were still not enough to enable them to pry open doors of opportunity for much of the twentieth century. After decades of difficult struggles, women are closer to equality in astronomy than ever before. Trimble and Weintraub bring together the stories of the tough and determined women who flung the doors wide open. Taking readers from 1960 to today, this triumphant anthology serves as an inspiration to current and future generations of women scientists while giving voice to the history of a transformative era in astronomy.

With contributions by Neta A. Bahcall, Beatriz Barbay, Ann Merchant Boesgaard, Jocelyn Bell Burnell, Catherine Cesarsky, Poonam Chandra, Xuefei Chen, Cathie Clarke, Judith Gamora Cohen, France Anne Córdova, Anne Pyne Cowley, Božena Czerny, Wendy L. Freedman, Yilen Gómez Maqueo Chew, Gabriela González, Saeko S. Hayashi, Martha P. Haynes, Roberta M. Humphreys, Vicky Kalogera, Gillian Knapp, Shazrene S. Mohamed, Carole Mundell, Priyamvada Natarajan, Dara J. Norman, Hiranya Peiris, Judith Lynn Pipher, Dina Prialnik, Annela I. Sargent, Sara Seager, Gražina Tautvaišienė, Silvia Torres-Peimbert, Virginia Trimble, Meg Urry, Ewine F. van Dishoeck, Patricia Ann Whitelock, Sidney Wolff, and Rosemary F. G. Wyse.



Totally Random – Why Nobody Understands Quantum Mechanics (A Serious Comic on Entanglement)

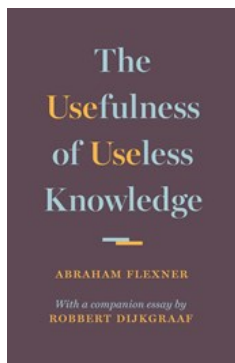
Tanya Bub
9780691176956
£18.99 • \$22.95 • Paperback
Science / Physics / Quantum Theory
June 2018
Princeton University Press

An eccentric comic about the central mystery of quantum mechanics

Totally Random is a comic for the serious reader who wants to really understand the central mystery of quantum mechanics—entanglement: what it is, what it means, and what you can do with it.

Measure two entangled particles separately, and the outcomes are totally random. But compare the outcomes, and the particles seem as if they are instantaneously influencing each other at a distance—even if they are light-years apart. This, in a nutshell, is entanglement, and if it seems weird, then this book is for you. *Totally Random* is a graphic experiential narrative that unpacks the deep and insidious significance of the curious correlation between entangled particles to deliver a gut-feel glimpse of a world that is not what it seems. See for yourself how entanglement has led some of the greatest thinkers of our time to talk about crazy-sounding stuff like faster-than-light signaling, many worlds, and cats that are both dead and alive. Find out why it remains one of science's most paradigm-shaking discoveries. Join Niels Bohr's therapy session with the likes of Einstein, Schrödinger, and other luminaries and let go of your commonsense notion of how the world works. Use your new understanding of entanglement to do the seemingly impossible, like beat the odds in the quantum casino, or quantum encrypt a message to evade the Sphinx's all-seeing eye. But look out, or you might just get teleported back to the beginning of the book!

A fresh and subversive look at our quantum world with some seriously funny stuff, *Totally Random* delivers a real understanding of entanglement that will completely change the way you think about the nature of physical reality.



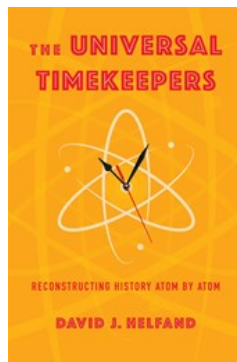
The Usefulness of Useless Knowledge

Abraham Flexner
9780691174761
£8.99 • \$10.95 • Hardcover
Science / Philosophy & Social Aspects
February 2017
Princeton University Press

A short, provocative book about why "useless" science often leads to humanity's greatest technological breakthroughs

A forty-year tightening of funding for scientific research has meant that resources are increasingly directed toward applied or practical outcomes, with the intent of creating products of immediate value. In such a scenario, it makes sense to focus on the most identifiable and urgent problems, right? Actually, it doesn't. In his classic essay "The Usefulness of Useless Knowledge," Abraham Flexner, the founding director of the Institute for Advanced Study in Princeton and the man who helped bring Albert Einstein to the United States, describes a great paradox of scientific research. The search for answers to deep questions, motivated solely by curiosity and without concern for applications, often leads not only to the greatest scientific discoveries but also to the most revolutionary technological breakthroughs. In short, no quantum mechanics, no computer chips.

This brief book includes Flexner's timeless 1939 essay alongside a new companion essay by Robert Dijkgraaf, the Institute's current director, in which he shows that Flexner's defense of the value of "the unobstructed pursuit of useless knowledge" may be even more relevant today than it was in the early twentieth century. Dijkgraaf describes how basic research has led to major transformations in the past century and explains why it is an essential precondition of innovation and the first step in social and cultural change. He makes the case that society can achieve deeper understanding and practical progress today and tomorrow only by truly valuing and substantially funding the curiosity-driven "pursuit of useless knowledge" in both the sciences and the humanities.



The Universal Timekeepers – Reconstructing History Atom by Atom

David Helfand
9780231210980
£20.00 • \$24.95 • Hardcover
Science / Physics / Atomic & Molecular
October 2023
Columbia University Press

Atoms are unfathomably tiny. It takes fifteen million trillion of them to make up a single poppy seed—give or take a few billion. And there's hardly anything to them: atoms are more than 99.9999999999 percent empty space. Yet scientists have learned to count these slivers of near nothingness with precision and to peer into their internal states. In looking so closely, we have learned that atoms, because of their inimitable signatures and imperturbable internal clocks, are little archives holding the secrets of the past.

David J. Helfand reconstructs the history of the universe—back to its first microsecond 13.8 billion years ago—with the help of atoms. He shows how, by using detectors and reactors, microscopes and telescopes, we can decode the tales these infinitesimal particles tell, answering questions such as: Is a medieval illustrated prayer book real or forged? How did maize cultivation spread from the highlands of central Mexico to New England? What was Earth's climate like before humans emerged? Where can we find clues to identify the culprit in the demise of the dinosaurs? When did our planet and solar system form? Can we trace the births of atoms in the cores of massive stars or even glimpse the origins of the universe itself?

A lively and inviting introduction to the building blocks of everything we know, *The Universal Timekeepers* demonstrates the power of science to unveil the mysteries of unreachably remote times and places.



Welcome to the Universe – An Astrophysical Tour

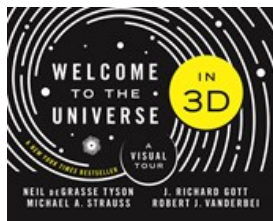
Neil deGrasse Tyson
9780691157245
£35.00 • \$39.95 • Hardcover
Science / Physics / Astrophysics
October 2016
Princeton University Press

The *New York Times* bestselling tour of the cosmos from three of today's leading astrophysicists

Welcome to the Universe is a personal guided tour of the cosmos by three of today's leading astrophysicists. Inspired by the enormously popular introductory astronomy course that Neil deGrasse Tyson, Michael A. Strauss, and J. Richard Gott taught together at Princeton, this book covers it all—from planets, stars, and galaxies to black holes, wormholes, and time travel.

Describing the latest discoveries in astrophysics, the informative and entertaining narrative propels you from our home solar system to the outermost frontiers of space. How do stars live and die? Why did Pluto lose its planetary status? What are the prospects of intelligent life elsewhere in the universe? How did the universe begin? Why is it expanding and why is its expansion accelerating? Is our universe alone or part of an infinite multiverse? Answering these and many other questions, the authors open your eyes to the wonders of the cosmos, sharing their knowledge of how the universe works.

Brehtaking in scope and stunningly illustrated throughout, *Welcome to the Universe* is for those who hunger for insights into our evolving universe that only world-class astrophysicists can provide.



Welcome to the Universe in 3D – A Visual Tour

Neil deGrasse Tyson
9780691194073

£22.00 • \$29.95 • Hardcover

Science / Physics / Astrophysics

April 2022

Princeton University Press

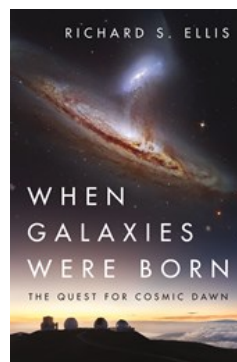
New York Times bestseller

Journey into the universe through the most spectacular sights in astronomy in stereoscopic 3D

Welcome to the Universe in 3D takes you on a grand tour of the observable universe, guiding you through the most spectacular sights in the cosmos—in breathtaking 3D. Presenting a rich array of stereoscopic 3D images, which can be viewed in 3D using a special stereo viewer that folds easily out of the cover of the book, this book reveals your cosmic environment as you have never seen it before.

Astronomy is the story of how humankind's perception of the two-dimensional dome of the sky evolved into a far deeper comprehension of an expanding three-dimensional cosmos. This book invites you to take part in this story by exploring the universe in depth, as revealed by cutting-edge astronomical research and observations. You will journey from the Moon through the solar system, out to exoplanets, distant nebulas, and galaxy clusters, until you finally reach the cosmic microwave background radiation (or CMB), the most distant light we can observe. The distances to these celestial wonders range from 1.3 light-seconds to 13.8 billion light-years. Along the way, the authors explain the fascinating features of what you are seeing, including how the 3D images were made using the same technique that early astronomers devised to measure distances to objects in space.

The dramatic 3D images in this one-of-a-kind book will astonish you, extending your vision out to the farthest reaches of the universe. You will never look up into the night sky the same way again.



When Galaxies Were Born – The Quest for Cosmic Dawn

Richard S. Ellis
9780691211305

£28.00 • \$33.00 • Hardcover

Science / Space Science / Astronomy

November 2022

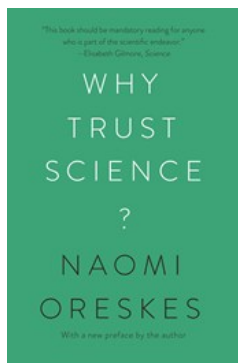
Princeton University Press

One of today's leading astronomers takes readers inside the decades-long search for the first galaxies and the origin of starlight

Astronomers are like time travelers, scanning the night sky for the outermost galaxies that first came into being when our universe was a mere fraction of its present age. *When Galaxies Were Born* is Richard Ellis's firsthand account of how a pioneering generation of scientists harnessed the world's largest telescopes to decipher the history of the universe and witness cosmic dawn, the time when starlight first bathed the cosmos and galaxies emerged from darkness.

In a remarkable career spanning more than forty years, Ellis has made some of the most spectacular discoveries in modern cosmology. He has traveled the world to conduct observations in locales as beautiful and remote as the Australian outback, the Canary Islands, Hawaii, and the Chilean desert. In this book, he brings to life a golden age of astronomy, describing the triumphs and the technical setbacks, the rivalries with competing teams, and the perennial challenge of cloudy nights. Ellis reveals the astonishing progress we have made in building ever larger and more powerful telescopes, and provides a tantalizing glimpse of cosmic dawn.

Stunningly illustrated with a wealth of dramatic photos, *When Galaxies Were Born* is a bold scientific adventure enlivened by personal insights and anecdotes that enable readers to share in the thrill of discovery at the frontiers of astronomy.



Why Trust Science?

Naomi Oreskes
9780691212265

£15.99 • \$18.95 • Paperback

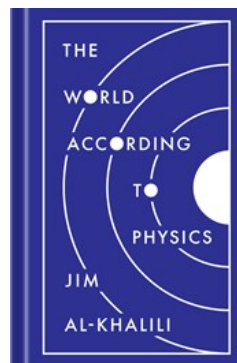
Science / Philosophy & Social Aspects

May 2021

Princeton University Press

Why the social character of scientific knowledge makes it trustworthy

Are doctors right when they tell us vaccines are safe? Should we take climate experts at their word when they warn us about the perils of global warming? Why should we trust science when so many of our political leaders don't? Naomi Oreskes offers a bold and compelling defense of science, revealing why the social character of scientific knowledge is its greatest strength—and the greatest reason we can trust it. Tracing the history and philosophy of science from the late nineteenth century to today, this timely and provocative book features a new preface by Oreskes and critical responses by climate experts Ottmar Edenhofer and Martin Kowarsch, political scientist Jon Krosnick, philosopher of science Marc Lange, and science historian Susan Lindee, as well as a foreword by political theorist Stephen Macedo.



The World According to Physics

Jim Al-khalili
9780691182308

£12.99 • \$17.95 • Hardcover

Science / Physics

February 2020

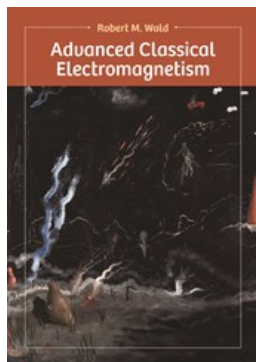
Princeton University Press

Quantum physicist, *New York Times* bestselling author, and BBC host Jim Al-Khalili offers a fascinating and illuminating look at what physics reveals about the world

Shining a light on the most profound insights revealed by modern physics, Jim Al-Khalili invites us all to understand what this crucially important science tells us about the universe and the nature of reality itself.

Al-Khalili begins by introducing the fundamental concepts of space, time, energy, and matter, and then describes the three pillars of modern physics—quantum theory, relativity, and thermodynamics—showing how all three must come together if we are ever to have a full understanding of reality. Using wonderful examples and thought-provoking analogies, Al-Khalili illuminates the physics of the extreme cosmic and quantum scales, the speculative frontiers of the field, and the physics that underpins our everyday experiences and technologies, bringing the reader up to speed with the biggest ideas in physics in just a few sittings. Physics is revealed as an intrepid human quest for ever more foundational principles that accurately explain the natural world we see around us, an undertaking guided by core values such as honesty and doubt. The knowledge discovered by physics both empowers and humbles us, and still, physics continues to delve valiantly into the unknown.

Making even the most enigmatic scientific ideas accessible and captivating, this deeply insightful book illuminates why physics matters to everyone and calls one and all to share in the profound adventure of seeking truth in the world around us.



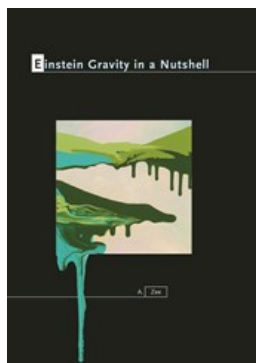
Advanced Classical Electromagnetism

Robert Wald
9780691220390
£45.00 • \$53.00 • Hardcover
Science / Physics / Electromagnetism
May 2022
Princeton University Press

A modern approach to classical electromagnetism

Electromagnetism is one of the pillars of modern physics. Robert Wald provides graduate students with a clear, concise, and mathematically precise introduction to the subject, covering all the core topics while bringing the teaching of electromagnetism up to date with our modern understanding of the subject. Electromagnetism is usually taught in a quasi-historical fashion, starting from concepts formulated in the eighteenth and nineteenth centuries, but this tends to promote outdated ways of thinking about the theory. Wald begins with Maxwell's equations—the foundation of electromagnetism—together with the formulas for the energy density, momentum density, and stress tensor of the electromagnetic field. He then proceeds through all the major topics in classical electromagnetism, such as electrostatics, dielectrics, magnetostatics, electrodynamics and radiation, diffraction, and special relativity. The last two chapters discuss electromagnetism as a gauge theory and the notion of a point charge—topics not normally treated in electromagnetism texts.

- Completely rethinks how to teach electromagnetism to first-year graduate students
- Presents electromagnetism from a modern, mathematically precise perspective, formulating key conceptual ideas and results clearly and concisely
- Written by a world-class physicist and proven in the classroom
- Covers all the subjects found in standard electromagnetism textbooks as well as additional topics such as the derivation of the initial value formulation for Maxwell's equations
- Also ideal as a supplementary text or for self-study



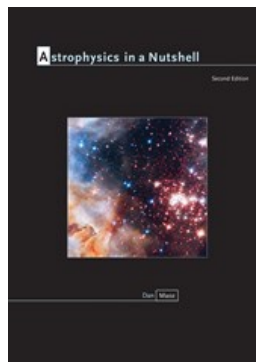
Einstein Gravity in a Nutshell

Anthony Zee
9780691145587
£88.00 • \$105.00 • Hardcover
Science / Physics / Relativity
May 2013
Princeton University Press

An ideal introduction to Einstein's general theory of relativity

This unique textbook provides an accessible introduction to Einstein's general theory of relativity, a subject of breathtaking beauty and supreme importance in physics. With his trademark blend of wit and incisiveness, A. Zee guides readers from the fundamentals of Newtonian mechanics to the most exciting frontiers of research today, including de Sitter and anti-de Sitter spacetimes, Kaluza-Klein theory, and brane worlds. Unlike other books on Einstein gravity, this book emphasizes the action principle and group theory as guides in constructing physical theories. Zee treats various topics in a spiral style that is easy on beginners, and includes anecdotes from the history of physics that will appeal to students and experts alike. He takes a friendly approach to the required mathematics, yet does not shy away from more advanced mathematical topics such as differential forms. The extensive discussion of black holes includes rotating and extremal black holes and Hawking radiation. The ideal textbook for undergraduate and graduate students, *Einstein Gravity in a Nutshell* also provides an essential resource for professional physicists and is accessible to anyone familiar with classical mechanics and electromagnetism. It features numerous exercises as well as detailed appendices covering a multitude of topics not readily found elsewhere.

- Provides an accessible introduction to Einstein's general theory of relativity
- Guides readers from Newtonian mechanics to the frontiers of modern research
- Emphasizes symmetry and the Einstein-Hilbert action
- Covers topics not found in standard textbooks on Einstein gravity
- Includes interesting historical asides
- Features numerous exercises and detailed appendices
- Ideal for students, physicists, and scientifically minded lay readers



Astrophysics in a Nutshell – Second Edition

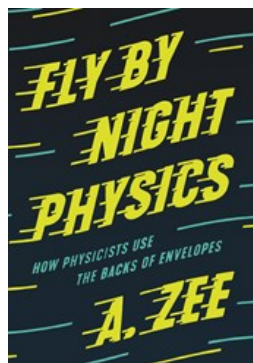
Dan Maoz
9780691164793
£75.00 • \$90.00 • Hardcover
Science / Physics / Astrophysics
March 2016
Princeton University Press

The ideal one-semester astrophysics introduction for science undergraduates—now expanded and fully updated

Winner of the American Astronomical Society's Chambliss Award, *Astrophysics in a Nutshell* has become the text of choice in astrophysics courses for science majors at top universities in North America and beyond. In this expanded and fully updated second edition, the book gets even better, with a new chapter on extrasolar planets; a greatly expanded chapter on the interstellar medium; fully updated facts and figures on all subjects, from the observed properties of white dwarfs to the latest results from precision cosmology; and additional instructive problem sets. Throughout, the text features the same focused, concise style and emphasis on physics intuition that have made the book a favorite of students and teachers.

Written by Dan Maoz, a leading active researcher, and designed for advanced undergraduate science majors, *Astrophysics in a Nutshell* is a brief but thorough introduction to the observational data and theoretical concepts underlying modern astronomy. Generously illustrated, it covers the essentials of modern astrophysics, emphasizing the common physical principles that govern astronomical phenomena, and the interplay between theory and observation, while also introducing subjects at the forefront of modern research, including black holes, dark matter, dark energy, and gravitational lensing.

In addition to serving as a course textbook, *Astrophysics in a Nutshell* is an ideal review for a qualifying exam and a handy reference for teachers and researchers.



Fly by Night Physics – How Physicists Use the Backs of Envelopes

Anthony Zee
9780691182544
£42.00 • \$51.00 • Hardcover
Science / Physics
November 2020
Princeton University Press

The essential primer for physics students who want to build their physical intuition

Presented in A. Zee's incomparably engaging style, this book introduces physics students to the practice of using physical reasoning and judicious guesses to get at the crux of a problem. An essential primer for advanced undergraduates and beyond, *Fly by Night Physics* reveals the simple and effective techniques that researchers use to think through a problem to its solution—or failing that, to smartly guess the answer—before starting any calculations.

In typical physics classrooms, students seek to master an enormous toolbox of mathematical methods, which are necessary to do the precise calculations used in physics. Consequently, students often develop the unfortunate impression that physics consists of well-defined problems that can be solved with tightly reasoned and logical steps. Idealized textbook exercises and homework problems reinforce this erroneous impression. As a result, even the best students can find themselves completely unprepared for the challenges of doing actual research.

In reality, physics is replete with back of the envelope estimates, order of magnitude guesses, and fly by night leaps of logic. Including exciting problems related to cutting-edge topics in physics, from Hawking radiation to gravity waves, this indispensable book will help students more deeply understand the equations they have learned and develop the confidence to start flying by night to arrive at the answers they seek. For instructors, a solutions manual is available upon request.



Group Theory in a Nutshell for Physicists

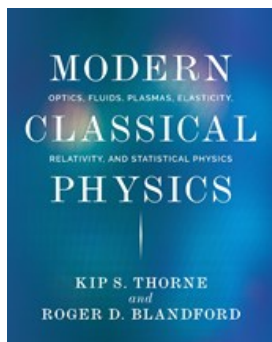
Anthony Zee
9780691162690
£84.00 • \$99.95 • Hardcover
Science / Physics
April 2016
Princeton University Press

A concise, modern textbook on group theory written especially for physicists

Although group theory is a mathematical subject, it is indispensable to many areas of modern theoretical physics, from atomic physics to condensed matter physics, particle physics to string theory. In particular, it is essential for an understanding of the fundamental forces. Yet until now, what has been missing is a modern, accessible, and self-contained textbook on the subject written especially for physicists.

Group Theory in a Nutshell for Physicists fills this gap, providing a user-friendly and classroom-tested text that focuses on those aspects of group theory physicists most need to know. From the basic intuitive notion of a group, A. Zee takes readers all the way up to how theories based on gauge groups could unify three of the four fundamental forces. He also includes a concise review of the linear algebra needed for group theory, making the book ideal for self-study.

- Provides physicists with a modern and accessible introduction to group theory
- Covers applications to various areas of physics, including field theory, particle physics, relativity, and much more
- Topics include finite group and character tables; real, pseudoreal, and complex representations; Weyl, Dirac, and Majorana equations; the expanding universe and group theory; grand unification; and much more
- The essential textbook for students and an invaluable resource for researchers
- Features a brief, self-contained treatment of linear algebra
- An online illustration package is available to professors
- Solutions manual (available only to professors)



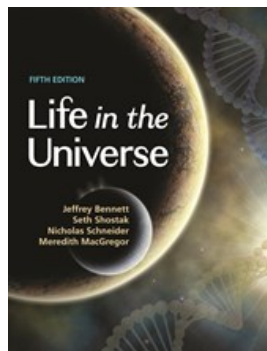
Modern Classical Physics - Optics, Fluids, Plasmas, Elasticity, Relativity, and Statistical Physics

Kip S. Thorne
9780691159027
£117.00 • \$140.00 • Hardcover
Science / Physics
August 2017
Princeton University Press

A groundbreaking text and reference book on twenty-first-century classical physics and its applications

This first-year graduate-level text and reference book covers the fundamental concepts and twenty-first-century applications of six major areas of classical physics that every masters- or PhD-level physicist should be exposed to, but often isn't: statistical physics, optics (waves of all sorts), elastodynamics, fluid mechanics, plasma physics, and special and general relativity and cosmology. Growing out of a full-year course that the eminent researchers Kip Thorne and Roger Blandford taught at Caltech for almost three decades, this book is designed to broaden the training of physicists. Its six main topical sections are also designed so they can be used in separate courses, and the book provides an invaluable reference for researchers.

- Presents all the major fields of classical physics except three prerequisites: classical mechanics, electromagnetism, and elementary thermodynamics
- Elucidates the interconnections between diverse fields and explains their shared concepts and tools
- Focuses on fundamental concepts and modern, real-world applications
- Takes applications from fundamental, experimental, and applied physics; astrophysics and cosmology; geophysics, oceanography, and meteorology; biophysics and chemical physics; engineering and optical science and technology; and information science and technology
- Emphasizes the quantum roots of classical physics and how to use quantum techniques to elucidate classical concepts or simplify classical calculations



Life in the Universe, 5th Edition

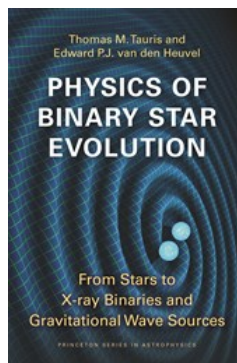
Jeffrey Bennett
9780691241784
£88.00 • \$105.00 • Paperback
Science / Space Science
October 2022
Princeton University Press

The world's leading textbook on astrobiology—ideal for an introductory one-semester course and now fully revised and updated

Are we alone in the cosmos? How are scientists seeking signs of life beyond our home planet? Could we colonize other planets, moons, or even other star systems? This introductory textbook, written by a team of four renowned science communicators, educators, and researchers, tells the amazing story of how modern science is seeking the answers to these and other fascinating questions. They are the questions that are at the heart of the highly interdisciplinary field of astrobiology, the study of life in the universe.

Written in an accessible, conversational style for anyone intrigued by the possibilities of life in the solar system and beyond, *Life in the Universe* is an ideal place to start learning about the latest discoveries and unsolved mysteries in the field. From the most recent missions to Saturn's moons and our neighboring planet Mars to revolutionary discoveries of thousands of exoplanets, from the puzzle of life's beginning on Earth to the latest efforts in the search for intelligent life elsewhere, this book captures the imagination and enriches the reader's understanding of how astronomers, planetary scientists, biologists, and other scientists make progress at the cutting edge of this dynamic field. Enriched with a wealth of engaging features, this textbook brings any citizen of the cosmos up to speed with the scientific quest to discover whether we are alone or part of a universe full of life.

- An acclaimed text designed to inspire students of all backgrounds to explore foundational questions about life in the cosmos



Physics of Binary Star Evolution - From Stars to X-ray Binaries and Gravitational Wave Sources

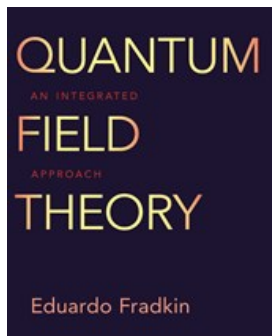
Thomas M. Tauris
9780691179087
£80.00 • \$95.00 • Paperback
Science / Physics / Astrophysics
August 2023
Princeton University Press

A graduate-level textbook on the astrophysics of binary star systems and their evolution

Physics of Binary Star Evolution is an up-to-date textbook on the astrophysics and evolution of binary star systems. Theoretical astrophysicists Thomas Tauris and Edward van den Heuvel cover a wide range of phenomena and processes, including mass transfer and ejection, common envelopes, novae and supernovae, X-ray binaries, millisecond radio pulsars, and gravitational wave (GW) sources, and their links to stellar evolution.

The authors walk through the observed properties and evolution of different types of binaries, with special emphasis on those containing compact objects (neutron stars, black holes, and white dwarfs). Attention is given to the formation mechanisms of GW sources—merging double neutron stars and black holes as well as ultra-compact GW binaries hosting white dwarfs—and to the progenitors of these sources and how they are observed with radio telescopes, X-ray satellites, and GW detectors (LIGO, Virgo, KAGRA, Einstein Telescope, Cosmic Explorer, and LISA). Supported by illustrations, equations, and exercises, *Physics of Binary Star Evolution* combines theory and observations to guide readers through the wonders of a field that will play a central role in modern astrophysics for decades to come.

- 465 equations, 47 tables, and 350+ figures
- More than 80 exercises (analytical, numerical, and computational)
- Over 2,500 extensive, up-to-date references



Quantum Field Theory – An Integrated Approach

Eduardo Fradkin

9780691149080

£75.00 • \$91.00 • Hardcover

Science / Physics / Quantum Theory

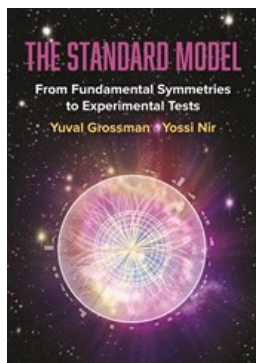
April 2021

Princeton University Press

The only graduate-level textbook on quantum field theory that fully integrates perspectives from high-energy, condensed-matter, and statistical physics

Quantum field theory was originally developed to describe quantum electrodynamics and other fundamental problems in high-energy physics, but today has become an invaluable conceptual and mathematical framework for addressing problems across physics, including in condensed-matter and statistical physics. With this expansion of applications has come a new and deeper understanding of quantum field theory—yet this perspective is still rarely reflected in teaching and textbooks on the subject. Developed from a year-long graduate course Eduardo Fradkin has taught for years to students of high-energy, condensed-matter, and statistical physics, this comprehensive textbook provides a fully "multicultural" approach to quantum field theory, covering the full breadth of its applications in one volume.

- Brings together perspectives from high-energy, condensed-matter, and statistical physics in both the main text and exercises
- Takes students from basic techniques to the frontiers of physics
- Pays special attention to the relation between measurements and propagators and the computation of cross sections and response functions
- Focuses on renormalization and the renormalization group, with an emphasis on fixed points, scale invariance, and their role in quantum field theory and phase transitions
- Other topics include non-perturbative phenomena, anomalies, and conformal invariance
- Features numerous examples and extensive problem sets
- Also serves as an invaluable resource for researchers



The Standard Model – From Fundamental Symmetries to Experimental Tests

Yuval Grossman

9780691239101

£58.00 • \$70.00 • Hardcover

Science / Physics

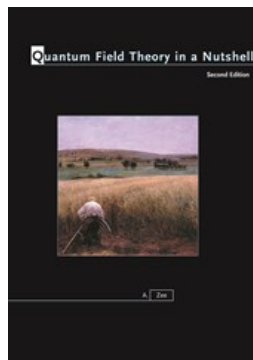
October 2023

Princeton University Press

An authoritative, hands-on introduction to the foundational theory and experimental tests of particle physics

The Standard Model is an elegant and extremely successful theory that formulates the laws of fundamental interactions among elementary particles. This incisive textbook introduces students to the physics of the Standard Model while providing an essential overview of modern particle physics, with a unique emphasis on symmetry principles as the starting point for constructing models. *The Standard Model* equips students with an in-depth understanding of this impressively predictive theory and an appreciation of its beauty, and prepares them to interpret future experimental results.

- Describes symmetry principles of growing complexity, including Abelian symmetries and their application in QED, the theory of electromagnetic interactions, non-Abelian symmetries and their application in QCD, the theory of strong interactions, and spontaneously broken symmetries and their application in the theory of weak interactions
- Derives the Lagrangian that implements these symmetry principles and extracts the phenomenology that follows from it, such as elementary particles and accidental symmetries
- Explains how the Standard Model has been experimentally tested, emphasizing electroweak precision measurements, flavor-changing neutral current processes, neutrino oscillations, and cosmology
- Demonstrates how to extend the model to address experimental and observational puzzles, such as neutrino masses, dark matter, and the baryon asymmetry of the



Quantum Field Theory in a Nutshell – Second Edition

A Zee

9780691140346

£80.00 • \$95.00 • Hardcover

Science / Physics / Quantum Theory

February 2010

Princeton University Press

A fully updated edition of the classic text by acclaimed physicist A. Zee

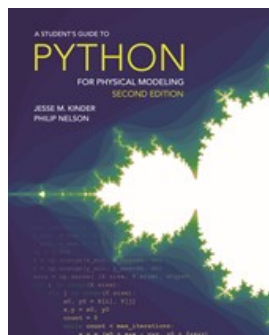
Since it was first published, *Quantum Field Theory in a Nutshell* has quickly established itself as the most accessible and comprehensive introduction to this profound and deeply fascinating area of theoretical physics. Now in this fully revised and expanded edition, A. Zee covers the latest advances while providing a solid conceptual foundation for students to build on, making this the most up-to-date and modern textbook on quantum field theory available.

This expanded edition features several additional chapters, as well as an entirely new section describing recent developments in quantum field theory such as gravitational waves, the helicity spinor formalism, on-shell gluon scattering, recursion relations for amplitudes with complex momenta, and the hidden connection between Yang-Mills theory and Einstein gravity. Zee also provides added exercises, explanations, and examples, as well as detailed appendices, solutions to selected exercises, and suggestions for further reading.

- The most accessible and comprehensive introductory textbook available
- Features a fully revised, updated, and expanded text
- Covers the latest exciting advances in the field
- Includes new exercises
- Offers a one-of-a-kind resource for students and researchers

Leading universities that have adopted this book include:

- Arizona State University
- Boston University



A Student's Guide to Python for Physical Modeling – Second Edition

Jesse M. Kinder

9780691223650

£22.00 • \$26.95 • Paperback

Science / Physics

October 2021

Princeton University Press

A fully updated tutorial on the basics of the Python programming language for science students

Python is a computer programming language that has gained popularity throughout the sciences. This fully updated second edition of *A Student's Guide to Python for Physical Modeling* aims to help you, the student, teach yourself enough of the Python programming language to get started with physical modeling. You will learn how to install an open-source Python programming environment and use it to accomplish many common scientific computing tasks: importing, exporting, and visualizing data; numerical analysis; and simulation. No prior programming experience is assumed.

This guide introduces a wide range of useful tools, including:

- Basic Python programming and scripting
- Numerical arrays
- Two- and three-dimensional graphics
- Animation
- Monte Carlo simulations
- Numerical methods, including solving ordinary differential equations
- Image processing

Numerous code samples and exercises—with solutions—illustrate new ideas as they are introduced. This guide also includes supplemental online resources: code samples, data sets, tutorials, and more. This edition includes new material on symbolic calculations with SymPy, an introduction to

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