

The University Press Group

Physics

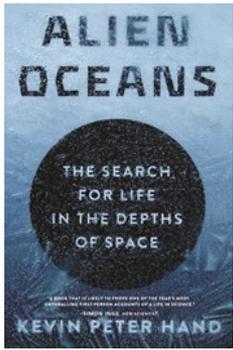
University of California Press

Columbia University Press

Princeton University Press

New and Best of Backlist

Spring 2023



Alien Oceans

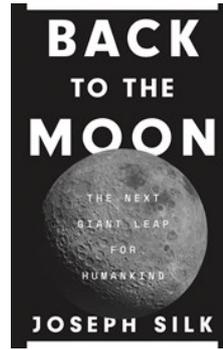
Kevin Hand
9780691227283
£15.99
Trade Paperback
Science / Space Science
September 2021
Princeton University Press

Inside the epic quest to find life on the water-rich moons at the outer reaches of the solar system

Where is the best place to find life beyond Earth? We often look to Mars as the most promising site in our solar system, but recent scientific missions have revealed that some of the most habitable real estate may actually lie farther away. Beneath the frozen crusts of several of the small, ice-covered moons of Jupiter and Saturn lurk vast oceans that may have existed for as long as Earth, and together may contain more than fifty times its total volume of liquid water. Could there be organisms living in their depths? *Alien Oceans* reveals the science behind the thrilling quest to find out.

Kevin Peter Hand is one of today's leading NASA scientists, and his pioneering research has taken him on expeditions around the world. In this captivating account of scientific discovery, he brings together insights from planetary science, biology, and the adventures of scientists like himself to explain how we know that oceans exist within moons of the outer solar system, like Europa, Titan, and Enceladus. He shows how the exploration of Earth's oceans is informing our understanding of the potential habitability of these icy moons, and draws lessons from what we have learned about the origins of life on our own planet to consider how life could arise on these distant worlds.

Alien Oceans describes what lies ahead in our search for life in our solar system and beyond, setting the stage for the transformative discoveries that may await us.



Back to the Moon

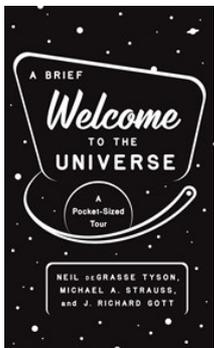
Joseph Silk
9780691215235
£25.00
Hardcover
Science / Space Science
November 2022
Princeton University Press

A scientist's inspiring vision of our return to the Moon as humanity's next thrilling step in space exploration

Just over half a century since Neil Armstrong first stepped foot on the lunar surface, a new space race to the Moon is well underway and rapidly gaining momentum. Laying out a vision for the next fifty years, *Back to the Moon* is astrophysicist Joseph Silk's persuasive and impassioned case for putting scientific discovery at the forefront of lunar exploration.

The Moon offers opportunities beyond our wildest imaginings, and plans to return are rapidly gaining momentum around the world. NASA aims to build a habitable orbiting space station to coordinate lunar development and exploration, while European and Chinese space agencies are planning lunar villages and the mining of precious resources dwindling here on Earth. Powerful international and commercial interests are driving the race to revisit the Moon, but lunar infrastructures could also open breathtaking vistas onto the cosmos. Silk describes how the colonization of the Moon could usher in a thrilling new age of scientific exploration, and lays out what the next fifty years of lunar science might look like. With lunar telescopes of unprecedented size situated in permanently dark polar craters and on the far side of the Moon, we could finally be poised to answer some of the most profound questions confronting humankind, including whether we are alone in the Universe and what our cosmic origins are.

Addressing both the daunting challenges and the immense promise of lunar exploration and exploitation, *Back to the Moon* reveals how prioritizing science, and in particular lunar astronomy, will enable us to address the deepest cosmic mysteries.



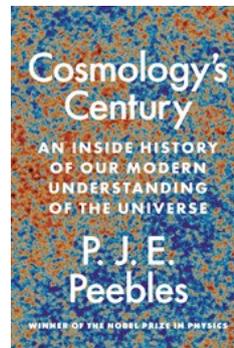
A Brief Welcome to the Universe

Neil deGrasse Tyson
9780691219943
£9.99
Trade 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.



Cosmology's Century

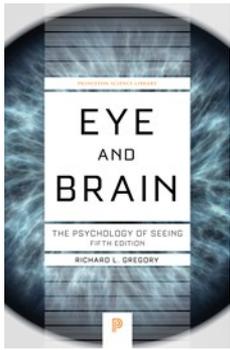
P. J. E. Peebles
9780691196022
£38.00
Hardcover
Science / Space Science / Cosmology
June 2020
Princeton University Press

From Nobel Prize-winning physicist P. J. E. Peebles, the story of cosmology from Einstein to today

Modern cosmology began a century ago with Albert Einstein's general theory of relativity and his notion of a homogenous, philosophically satisfying cosmos. *Cosmology's Century* is the story of how generations of scientists built on these thoughts and many new measurements to arrive at a well-tested physical theory of the structure and evolution of our expanding universe.

In this landmark book, one of the world's most esteemed theoretical cosmologists offers an unparalleled personal perspective on how the field developed. P. J. E. Peebles was at the forefront of many of the greatest discoveries of the past century, making fundamental contributions to our understanding of the presence of helium and microwave radiation from the hot big bang, the measures of the distribution and motion of ordinary matter, and the new kind of dark matter that allows us to make sense of these results. Taking readers from the field's beginnings, Peebles describes how scientists working in independent directions found themselves converging on a theory of cosmic evolution interesting enough to warrant the rigorous testing it passes so well. He explores the major advances—some inspired by remarkable insights or perhaps just lucky guesses—as well as the wrong turns taken and the roads not explored. He shares recollections from major players in this story and provides a rare, inside look at how science is really done.

A monumental work, *Cosmology's Century* also emphasizes where the present theory is incomplete, suggesting exciting directions for continuing research.

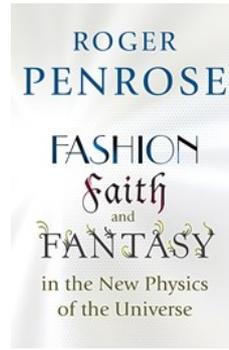


Eye and Brain

Richard L. Gregory
9780691165165
£16.99
Trade Paperback
Science / Physics / Optics & Light
September 2015
[Princeton University Press](#)

Since the publication of the first edition in 1966, *Eye and Brain* has established itself worldwide as an essential introduction to the basic phenomena of visual perception. Richard Gregory offers clear explanations of how we see brightness, movement, color, and objects, and he explores the phenomena of visual illusions to establish principles about how perception normally works and why it sometimes fails.

Illusion continues to be a major theme in the book, which provides a comprehensive classification system. There are also sections on what babies see and how they learn to see, on motion perception, the relationship between vision and consciousness, and on the impact of new brain imaging techniques.



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

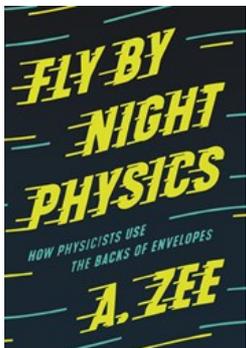
Roger Penrose
9780691178530
£14.99
Trade Paperback
Science / Philosophy & Social Aspects
September 2017
[Princeton University Press](#)

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.



Fly by Night Physics

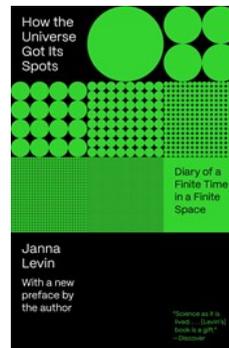
A. Zee
9780691182544
£40.00
Hardcover
Science / Physics
October 2020
[Princeton University Press](#)

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.

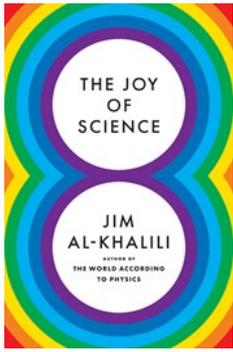


How the Universe Got Its Spots

Janna Levin
9780691232270
£14.99
Trade Paperback
Science / Physics
January 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. Nimble 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

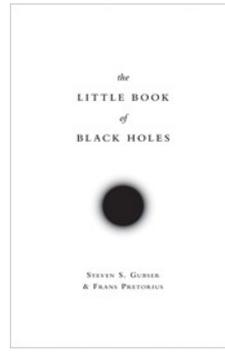
Jim Al-Khalili
9780691211572
£12.99
Hardcover
Science / Philosophy & Social Aspects
April 2022
[Princeton University Press](#)

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

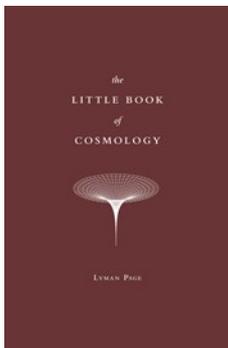
Steven S. Gubser
9780691163727
£16.99
Hardcover
Science / Physics / Astrophysics
October 2017
[Princeton University Press](#)

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 rare clarity of insight into the physics that makes black holes simple yet destructive manifestations of geometric destiny.



The Little Book of Cosmology

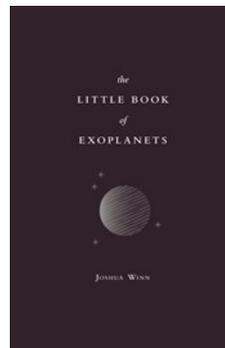
Lyman Page
9780691195780
£16.99
Hardcover
Science / Space Science / Cosmology
April 2020
[Princeton University Press](#)

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.



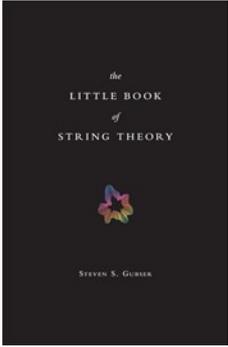
The Little Book of Exoplanets

Joshua N. Winn
9780691215471
£18.99
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 Satellite Survey 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

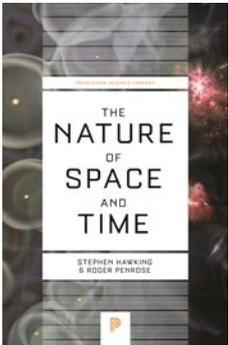
Steven S. Gubser
9780691142890
£16.99
Hardcover
Science / Physics
February 2010
[Princeton University Press](#)

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-Impromptu 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.



The Nature of Space and Time

Stephen Hawking
9780691168449
£12.99
Trade Paperback
Science / Physics
September 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.

Machine Learning for Physics and Astronomy

Viviana Acquaviva
9780691206417
£38.00
Trade Paperback
Science / Physics / Mathematical & Computational
August 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)



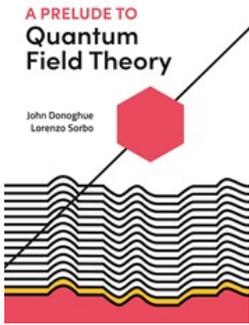
Philosophy of Physics

Tim Maudlin
9780691165714
£18.99
Trade Paperback
Science / Philosophy & Social Aspects
May 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



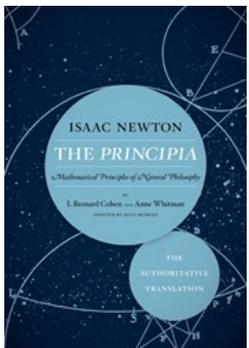
A Prelude to Quantum Field Theory

John Donoghue
9780691223483
£25.00
Trade Paperback
Science / Physics / Quantum Theory
March 2022
[Princeton University Press](#)

A concise, beginner-friendly introduction to quantum field theory

Quantum field theory is a powerful framework that extends quantum mechanics in ways that are essential in many modern applications. While it is the fundamental formalism for the study of many areas of physics, quantum field theory requires a different way of thinking, and many newcomers to the subject struggle with the transition from quantum mechanics. *A Prelude to Quantum Field Theory* introduces the key concepts of quantum field theory in a brief and accessible manner while never sacrificing mathematical rigor. The result is an easy-to-use textbook that distills the most general properties of the theory without overwhelming beginning students with more advanced applications.

- Bridges quantum mechanics and quantum field theory, emphasizing analogies and differences
- Emphasizes a “quantum field theoretical mindset” while maintaining mathematical rigor
- Obtains quantum fields as the continuum limit of a quantized system of many particles
- Highlights the correspondence between wave function—fundamental in quantum mechanics—and the formalism of second quantization used in quantum field theory
- Provides a step-by-step derivation of Feynman rules for the perturbative study of interacting theories
- Introduces students to renormalization, path integrals techniques, and more
- Discusses more modern topics like effective field theories
- Ideal for both undergraduate and graduate students
- Proven in the classroom



The Principia: The Authoritative Translation

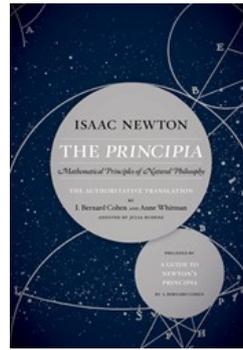
Isaac Newton
9780520290747
£16.99
Trade Paperback
Science / Physics / Mathematical & Computational
February 2016
[University of California Press](#)

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.



The Principia: The Authoritative Translation and Guide

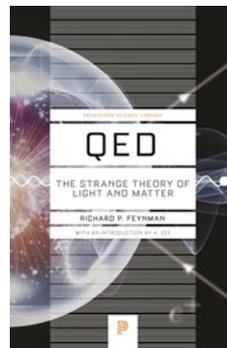
Isaac Newton
9780520290884
£30.00
Trade Paperback
Science / Physics / Mathematical & Computational
February 2016

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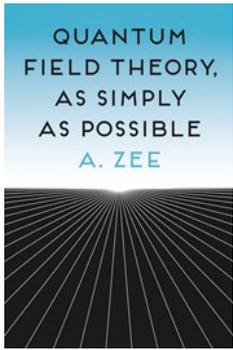
The illuminating Guide to Newton's *Principia* by I. Bernard Cohen makes this preeminent work truly accessible for today's scientists, scholars, and students.



QED

Richard P. Feynman
9780691164090
£14.99
Trade 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

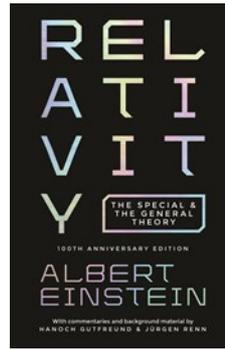
A. Zee
9780691174297
£35.00
Hardcover
Science / Physics / Quantum Theory
January 2023
Princeton University Press

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.

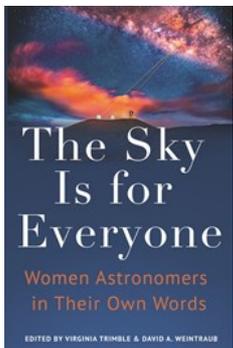


Relativity

Albert Einstein
9780691191812
£13.99
Trade 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.



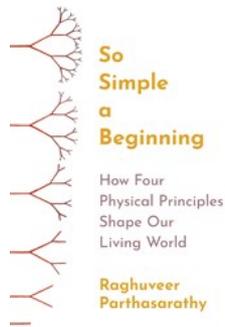
The Sky Is for Everyone

Virginia Trimble
9780691207100
£25.00
Hardcover
Science / Space Science / Astronomy
June 2022
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 Barbuy, Ann Merchant Boesgaard, Jocelyn Bell Burnell, Catherine Cesarsky, Poonam Chandra, Xuefei Chen, Cathie Clarke, Judith Gamora Cohen, France Anne Córdova, Anne Pyne Cowley, Bożena 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, Anneila I. Sargent, Sara Seager, Grażina Tautvaišienė, Silvia Torres-Peimbert, Virginia Trimble, Meg Urry, Ewine F. van Dishoeck, Patricia Ann Whitelock, Sidney Wolff, and Rosemary F. G. Wyse.



So Simple a Beginning

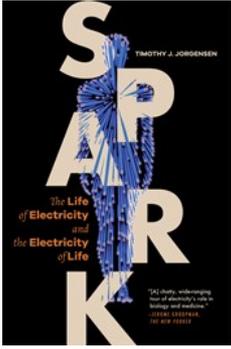
Raghuvver Parthasarathy
9780691200408
£30.00
Hardcover
Science / Life Sciences / Biophysics
February 2022
Princeton University Press

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.

Raghuvver 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.



Spark

Timothy J. Jorgensen
9780691248158
£18.99
Trade Paperback
Science / Physics / Electricity
June 2023
Princeton University Press

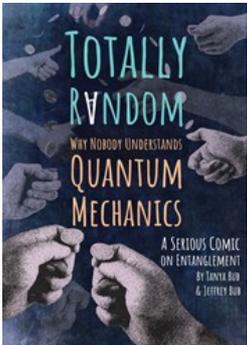
A fresh look at electricity and its powerful role in life on Earth

When we think of electricity, we likely imagine the energy humming inside our home appliances or lighting up our electronic devices—or perhaps we envision the lightning-streaked clouds of a stormy sky. But electricity is more than an external source of power, heat, or illumination. Life at its essence is nothing if not electrical.

The story of how we came to understand electricity's essential role in all life is rooted in our observations of its influences on the body—influences governed by the body's central nervous system. *Spark* explains the science of electricity from this fresh, biological perspective. Through vivid tales of scientists and individuals—from Benjamin Franklin to Elon Musk—Timothy Jorgensen shows how our views of electricity and the nervous system evolved in tandem, and how progress in one area enabled advancements in the other. He explains how these developments have allowed us to understand—and replicate—the ways electricity enables the body's essential functions of sight, hearing, touch, and movement itself.

Throughout, Jorgensen examines our fascination with electricity and how it can help or harm us. He explores a broad range of topics and events, including the Nobel Prize-winning discoveries of the electron and neuron, the history of experimentation involving electricity's effects on the body, and recent breakthroughs in the use of electricity to treat disease.

Filled with gripping adventures in scientific exploration, *Spark* offers an indispensable look at electricity, how it works, and how it animates our lives from within and without.



Totally Random

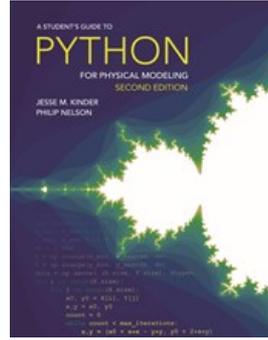
Tanya Bub
9780691176956
£18.99
Trade Paperback
Science / Physics / Quantum Theory
June 2018
Princeton University Press

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.



A Student's Guide to Python for Physical Modeling

Jesse M. Kinder
9780691223650
£20.00
Trade Paperback
Science / Physics
August 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 Python libraries for data science and machine learning (pandas and sklearn), and a primer on Python classes and object-oriented programming. A new appendix also introduces command line tools and version control with Git.



A Traveler's Guide to the Stars

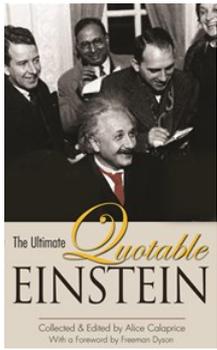
Les Johnson
9780691212371
£22.00
Hardcover
Science / Space Science
October 2022
Princeton University Press

A brief guide to the real science of interstellar travel

With known exoplanets now numbering in the thousands and initiatives like 100 Year Starship and Breakthrough Starshot advancing the idea of interstellar travel, the age-old dream of venturing forth into the cosmos and perhaps even colonizing distant worlds may one day become a reality. *A Traveler's Guide to the Stars* reveals how.

Les Johnson takes you on a thrilling tour of the physics and technologies that may enable us to reach the stars. He discusses the latest exoplanet discoveries, promising interstellar missions on the not-so-distant horizon, and exciting new developments in space propulsion, power, robotics, communications, and more. But interstellar travel will not be easy, and it is not for the faint of heart. Johnson describes the harsh and forbidding expanse of space that awaits us, and he addresses the daunting challenges—both human and technological—that we will need to overcome in order to realize tomorrow's possibilities.

A Traveler's Guide to the Stars is your passport to the next great frontier of human discovery, providing a rare inside look at the remarkable breakthroughs in science and technology that will help tomorrow's space travelers chart a course for the stars.



The Ultimate Quotable Einstein

Albert Einstein
9780691160146
£13.99
Trade Paperback
Science / Physics
September 2013
[Princeton University Press](#)

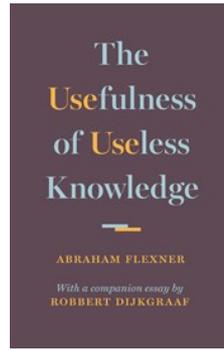
The most comprehensive collection of Einstein quotations ever published

Here is the definitive new edition of the hugely popular collection of Einstein quotations that has sold tens of thousands of copies worldwide and been translated into twenty-five languages.

The Ultimate Quotable Einstein features 400 additional quotes, bringing the total to roughly 1,600 in all. This ultimate edition includes new sections—"On and to Children," "On Race and Prejudice," and "Einstein's Verses: A Small Selection"—as well as a chronology of Einstein's life and accomplishments, Freeman Dyson's authoritative foreword, and new commentary by Alice Calaprice.

In *The Ultimate Quotable Einstein*, readers will also find quotes by others about Einstein along with quotes attributed to him. Every quotation in this informative and entertaining collection is fully documented, and Calaprice has carefully selected new photographs and cartoons to introduce each section.

- Features 400 additional quotations
- Contains roughly 1,600 quotations in all
- Includes new sections on children, race and prejudice, and Einstein's poetry
- Provides new commentary
- Beautifully illustrated
- The most comprehensive collection of Einstein quotes ever published



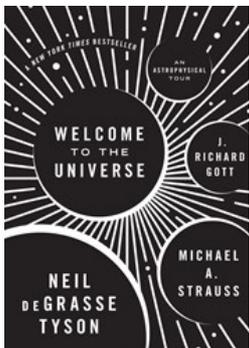
The Usefulness of Useless Knowledge

Abraham Flexner
9780691174761
£7.99
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.



Welcome to the Universe

Neil deGrasse Tyson
9780691157245
£35.00
Hardcover
Science / Physics / Astrophysics
September 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.

Breathtaking 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

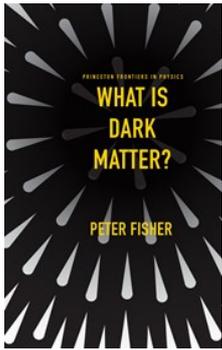
Neil deGrasse Tyson
9780691194073
£22.00
Hardcover
Science / Physics / Astrophysics
April 2022
[Princeton University Press](#)

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 color 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.



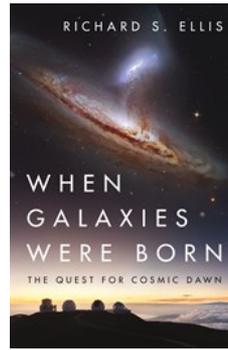
What Is Dark Matter?

Peter Fisher
9780691148342
£30.00
Hardcover
Science / Physics / Condensed Matter
July 2022
[Princeton University Press](#)

What we know about dark matter and what we have yet to discover

Astronomical observations have confirmed dark matter's existence, but what exactly is dark matter? In *What Is Dark Matter?*, particle physicist Peter Fisher introduces readers to one of the most intriguing frontiers of physics. We cannot actually see dark matter, a mysterious, nonluminous form of matter that is believed to account for about 27 percent of the mass-energy balance in the universe. But we know dark matter is present by observing its ghostly gravitational effects on the behavior and evolution of galaxies. Fisher brings readers quickly up to speed regarding the current state of the dark matter problem, offering relevant historical context as well as a close look at the cutting-edge research focused on revealing dark matter's true nature.

Could dark matter be a new type of particle—an axion or a Weakly Interacting Massive Particle (WIMP)—or something else? What have physicists ruled out so far—and why? What experimental searches are now underway and planned for the near future, in hopes of detecting dark matter on Earth or in space? Fisher explores these questions and more, illuminating what is known and unknown, and what a triumph it will be when scientists discover dark matter's identity at last.



When Galaxies Were Born

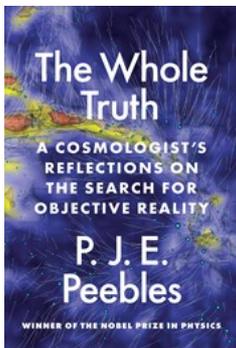
Richard S. Ellis
9780691211305
£28.00
Hardcover
Science / Space Science / Astronomy
November 2022
[Princeton University Press](#)

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.



The Whole Truth

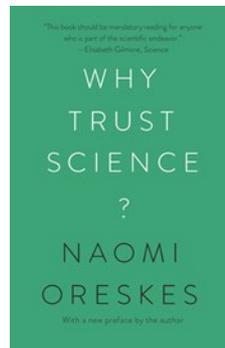
P. J. E. Peebles
9780691231358
£22.00
Hardcover
August 2022
[Princeton University Press](#)

From the Nobel Prize-winning physicist, a personal meditation on the quest for objective reality in natural science

A century ago, thoughtful people questioned how reality could agree with physical theories that keep changing, from a mechanical model of the ether to electric and magnetic fields, and from homogeneous matter to electrons and atoms. Today, concepts like dark matter and dark energy further complicate and enrich the search for objective reality. *The Whole Truth* is a personal reflection on this ongoing quest by one of the world's most esteemed cosmologists.

What lies at the heart of physical science? What are the foundational ideas that inform and guide the enterprise? Is the concept of objective reality meaningful? If so, do our established physical theories usefully approximate it? P. J. E. Peebles takes on these and other big questions about the nature of science, drawing on a lifetime of experience as a leading physicist and using cosmology as an example. He traces the history of thought about the nature of physical science since Einstein, and succinctly lays out the fundamental working assumptions. Through a careful examination of the general theory of relativity, Einstein's cosmological principle, and the theory of an expanding universe, Peebles shows the evidence that we are discovering the nature of reality in successive approximations through increasingly rigorous scrutiny.

A landmark work, *The Whole Truth* is essential reading for anyone interested in the practice of science.

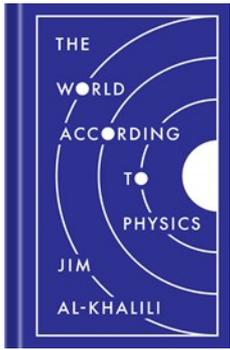


Why Trust Science?

Naomi Oreskes
9780691212265
£15.99
Trade Paperback
Science / Philosophy & Social Aspects
April 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

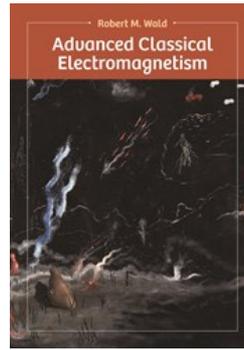
Jim Al-khalili
9780691182308
£12.99
Hardcover
Science / Physics
March 2020
[Princeton University Press](#)

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.



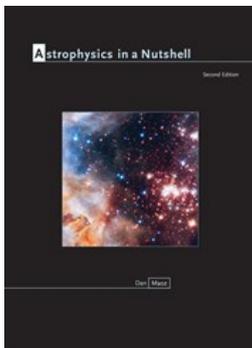
Advanced Classical Electromagnetism

Robert Wald
9780691220390
£42.00
Hardcover
Science / Physics / Electromagnetism
March 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



Astrophysics in a Nutshell

Dan Maoz
9780691164793
£70.00
Hardcover
Science / Physics / Astrophysics
February 2016
[Princeton University Press](#)

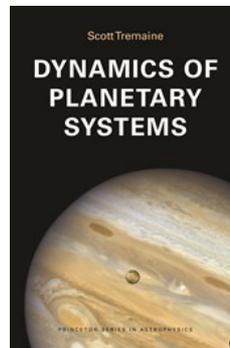
The ideal one-semester astrophysics introduction for science undergraduates—now expanded and fully updated

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.

- The most concise and current astrophysics textbook for science majors—now expanded and fully updated with the latest research results
- Contains a broad and well-balanced selection of traditional and current topics
- Uses simple, short, and clear derivations of physical results



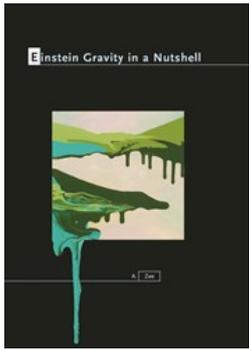
Dynamics of Planetary Systems

Scott Tremaine
9780691207117
£62.00
Trade Paperback
Science / Physics / Astrophysics
February 2023
[Princeton University Press](#)

An introduction to celestial mechanics for advanced undergraduates, graduate students, and researchers new to the field

Celestial mechanics—the study of the movement of planets, satellites, and smaller bodies such as comets—is one of the oldest subjects in the physical sciences. Since the mid-twentieth century, the field has experienced a renaissance due to advances in space flight, digital computing, numerical mathematics, nonlinear dynamics, and chaos theory, and the discovery of exoplanets. This modern, authoritative introduction to planetary system dynamics reflects these recent developments and discoveries and is suitable for advanced undergraduate and graduate students as well as researchers. The book treats both traditional subjects, such as the two-body and three-body problems, lunar theory, and Hamiltonian perturbation theory, as well as a diverse range of other topics, including chaos in the solar system, comet dynamics, extrasolar planets, planetesimal dynamics, resonances, tidal friction and disruption, and more. The book provides readers with all the core concepts, tools, and methods needed to conduct research in the subject.

- Provides an authoritative introduction that reflects recent advances in the field
- Topics treated include Andoyer variables, co-orbital satellites and quasi-satellites, Hill's problem, the Milankovich equations, Colombo's top and Cassini states, the Yarkovsky and YORP effects, orbit determination for extrasolar planets, and more
- More than 100 end-of-book problems elaborate on concepts not fully covered in the main text
- Appendixes summarize the necessary background material
- Suitable for advanced undergraduates and graduate students; some knowledge of Hamiltonian mechanics and methods of mathematical physics (vectors, matrices, special functions, etc.) required
- Solutions manual available on request for instructors who adopt the book for a course



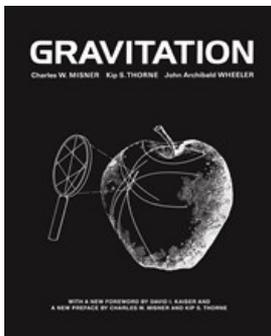
Einstein Gravity in a Nutshell

A Zee
9780691145587
£84.00
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



Gravitation

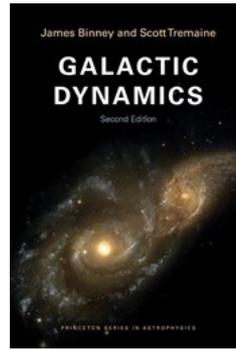
Charles W. Misner
9780691177793
£52.00
Hardcover
Science / Physics / Gravity
October 2017
[Princeton University Press](#)

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
- Understand Einstein's geometric framework for physics
- Explore applications, including neutron stars, Schwarzschild and Kerr black holes, gravitational collapse, gravitational waves, cosmology, and so much more



Galactic Dynamics

James Binney
9780691130279
£92.00
Trade Paperback
Science / Physics / Astrophysics
January 2008
[Princeton University Press](#)

Since it was first published in 1987, *Galactic Dynamics* has become the most widely used advanced textbook on the structure and dynamics of galaxies and one of the most cited references in astrophysics. Now, in this extensively revised and updated edition, James Binney and Scott Tremaine describe the dramatic recent advances in this subject, making *Galactic Dynamics* the most authoritative introduction to galactic astrophysics available to advanced undergraduate students, graduate students, and researchers.

Every part of the book has been thoroughly overhauled, and many sections have been completely rewritten. Many new topics are covered, including N-body simulation methods, black holes in stellar systems, linear stability and response theory, and galaxy formation in the cosmological context. Binney and Tremaine, two of the world's leading astrophysicists, use the tools of theoretical physics to describe how galaxies and other stellar systems work, succinctly and lucidly explaining theoretical principles and their applications to observational phenomena. They provide readers with an understanding of stellar dynamics at the level needed to reach the frontiers of the subject.

This new edition of the classic text is the definitive introduction to the field.

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- A complete revision and update of one of the most cited references in astrophysics
- Provides a comprehensive description of the dynamical structure and evolution of galaxies and other stellar systems



Group Theory in a Nutshell for Physicists

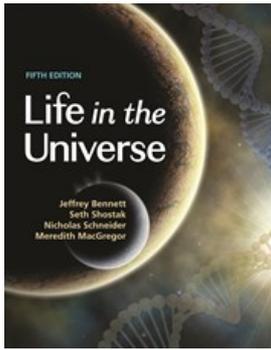
A. Zee
9780691162690
£80.00
Hardcover
Science / Physics
March 2016
[Princeton University Press](#)

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)



Life in the Universe, 5th Edition

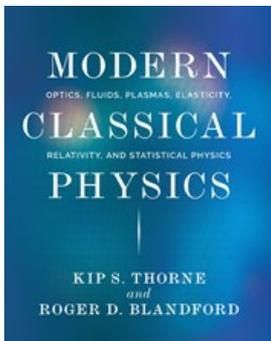
Jeffrey Bennett
9780691241784
£84.00
Trade Paperback
Science / Space Science
August 2022
[Princeton University Press](#)

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
- Completely revised and updated to include the latest developments in the field, including recent exploratory space missions to Mars, frontier exoplanet science, research on the origin of life on Earth, and more
- Enriched with helpful learning aids, including in-chapter Think about It questions, optional Do the Math and Special Topic boxes, Movie Madness boxes, end-of-chapter



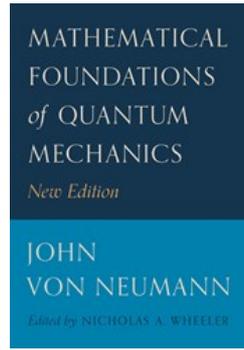
Modern Classical Physics

Kip Thorne
9780691159027
£109.00
Hardcover
Science / Physics
September 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.

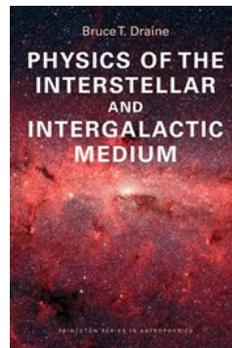
- Presents all the major fields of classical physics except three prerequisites: classical mechanics, electromagnetism, and elementary thermodynamics
- Elucidates the interconnections between diverse fields and explains their shared concepts and tools
- Focuses on fundamental concepts and modern, real-world 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
- Features hundreds of color figures, some five hundred exercises, extensive cross-references, and a detailed index
- An online illustration package is available



Mathematical Foundations of Quantum Mechanics

John Von Neumann
9780691178578
£84.00
Trade Paperback
Science / Physics / Quantum Theory
February 2018
[Princeton University Press](#)

Quantum mechanics was still in its infancy in 1932 when the young John von Neumann, who would go on to become one of the greatest mathematicians of the twentieth century, published *Mathematical Foundations of Quantum Mechanics*—a revolutionary book that for the first time provided a rigorous mathematical framework for the new science. Robert Beyer's 1955 English translation, which von Neumann reviewed and approved, is cited more frequently today than ever before. But its many treasures and insights were too often obscured by the limitations of the way the text and equations were set on the page. In this new edition of this classic work, mathematical physicist Nicholas Wheeler has completely reset the book in TeX, making the text and equations far easier to read. He has also corrected a handful of typographic errors, revised some sentences for clarity and readability, provided an index for the first time, and added prefatory remarks drawn from the writings of Léon Van Hove and Freeman Dyson. The result brings new life to an essential work in theoretical physics and mathematics.



Physics of the Interstellar and Intergalactic Medium

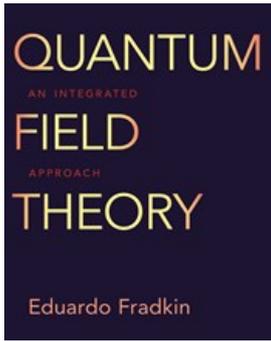
Bruce T. Draine
9780691122144
£75.00
Trade Paperback
Science / Physics / Astrophysics
January 2011
[Princeton University Press](#)

An essential resource for graduate students and astrophysicists

This is a comprehensive and richly illustrated textbook on the astrophysics of the interstellar and intergalactic medium—the gas and dust, as well as the electromagnetic radiation, cosmic rays, and magnetic and gravitational fields, present between the stars in a galaxy and also between galaxies themselves.

Topics include radiative processes across the electromagnetic spectrum; radiative transfer; ionization; heating and cooling; astrochemistry; interstellar dust; fluid dynamics, including ionization fronts and shock waves; cosmic rays; distribution and evolution of the interstellar medium; and star formation. While it is assumed that the reader has a background in undergraduate-level physics, including some prior exposure to atomic and molecular physics, statistical mechanics, and electromagnetism, the first six chapters of the book include a review of the basic physics that is used in later chapters. This graduate-level textbook includes references for further reading, and serves as an invaluable resource for working astrophysicists.

- Essential textbook on the physics of the interstellar and intergalactic medium
- Based on a course taught by the author for more than twenty years at Princeton University
- Covers radiative processes, fluid dynamics, cosmic rays, astrochemistry, interstellar dust, and more
- Discusses the physical state and distribution of the ionized, atomic, and molecular phases of the interstellar medium
- Reviews diagnostics using emission and absorption lines
- Features color illustrations and detailed reference materials in appendices
- Instructor's manual with problems and solutions (available only to teachers)



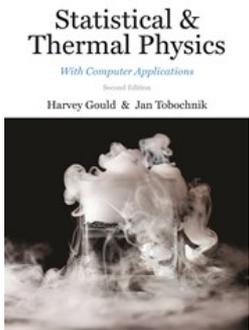
Quantum Field Theory

Eduardo Fradkin
9780691149080
£70.00
Hardcover
Science / Physics / Quantum Theory
March 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



Statistical and Thermal Physics

Harvey Gould
9780691201894
£70.00
Hardcover
Science / Physics
September 2021
Princeton University Press

A completely revised edition that combines a comprehensive coverage of statistical and thermal physics with enhanced computational tools, accessibility, and active learning activities to meet the needs of today’s students and educators

This revised and expanded edition of *Statistical and Thermal Physics* introduces students to the essential ideas and techniques used in many areas of contemporary physics. Ready-to-run programs help make the many abstract concepts concrete. The text requires only a background in introductory mechanics and some basic ideas of quantum theory, discussing material typically found in undergraduate texts as well as topics such as fluids, critical phenomena, and computational techniques, which serve as a natural bridge to graduate study.

- Completely revised to be more accessible to students
- Encourages active reading with guided problems tied to the text
- Updated open source programs available in Java, Python, and JavaScript
- Integrates Monte Carlo and molecular dynamics simulations and other numerical techniques
- Self-contained introductions to thermodynamics and probability, including Bayes’ theorem
- A fuller discussion of magnetism and the Ising model than other undergraduate texts
- Treats ideal classical and quantum gases within a uniform framework
- Features a new chapter on transport coefficients and linear response theory
- Draws on findings from contemporary research
- Solutions manual (available only to instructors)



Quantum Field Theory in a Nutshell

A Zee
9780691140346
£75.00
Hardcover
Science / Physics / Quantum Theory
February 2010
Princeton University Press

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

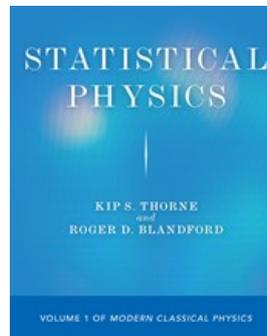
Since it was first published, *Quantum Field Theory in a Nutshell* has quickly established itself as the most accessible and comprehensive introduction to this profound and deeply fascinating area of theoretical physics. Now in this fully revised and expanded edition, A. Zee covers the latest advances 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
- Brandeis University
- Brown University



Statistical Physics

Kip S. Thorne
9780691206127
£42.00
Trade Paperback
Science / Physics
June 2021
Princeton University Press

A groundbreaking textbook on twenty-first-century statistical physics and its applications

Kip Thorne and Roger Blandford’s monumental *Modern Classical Physics* is now available in five stand-alone volumes that make ideal textbooks for individual graduate or advanced undergraduate courses on statistical physics; optics; elasticity and fluid dynamics; plasma physics; and relativity and cosmology. Each volume teaches the fundamental concepts, emphasizes modern, real-world applications, and gives students a physical and intuitive understanding of the subject.

Statistical Physics is an essential introduction that is different from others on the subject because of its unique approach, which is coordinate-independent and geometric; embraces and elucidates the close quantum-classical connection and the relativistic and Newtonian domains; and demonstrates the power of statistical techniques—particularly statistical mechanics—by presenting applications not only to the usual kinds of things, such as gases, liquids, solids, and magnetic materials, but also to a much wider range of phenomena, including black holes, the universe, information and communication, and signal processing amid noise.

- Includes many exercise problems
- Features color figures, suggestions for further reading, extensive cross-references, and a detailed index
- Optional “Track 2” sections make this an ideal book for a one-quarter, half-semester, or full-semester course
- An online illustration package is available to professors

The five volumes, which are available individually as paperbacks and ebooks, are *Statistical Physics; Optics; Elasticity and Fluid Dynamics; Plasma Physics; and Relativity and Cosmology*.