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An Introduction to Modern Astrophysics
Astrophysics in a Nutshell
Essential Astrophysics
Knowledge in a Nutshell: Astrophysics
Lectures on Astrophysics
Principles of Physical Cosmology
Knowledge in a Nutshell:
Astrophysics
Plasma Physics for Astrophysics
The Large-Scale Structure of the Universe
Astrophysics in a Nutshell from the Telescope to the Sputnik
A Universe from Nothing
Solutions Manual to Astrophysics in a Nutshell
The Standard Model in a Nutshell
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Nuclear Physics in a Nutshell
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Electromagnetic Processes
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Elementary Particle Physics in a Nutshell
Einstein Gravity in a Nutshell
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Group Theory in a Nutshell for Physicists
Knowledge in a Nutshell:
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AN INTRODUCTION TO ASTROPHYSICS
The Zoomable Universe
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The Little Book of Cosmology
Astrophysics in a Nutshell
A Student's Guide to the Mathematics of Astronomy
Principles of Astrophysics
The Physical Universe
The Universe in a Nutshell
Introduction to Cosmology
An Introduction to Stellar Astrophysics
String

Theory in a Nutshell

An Introduction to Modern Astrophysics

Astrophysics in a Nutshell

A concise but thorough introduction to the observational data and theoretical concepts underlying modern astronomy, *Astrophysics in a Nutshell* is designed for advanced undergraduate science majors taking a one-semester course. This well-balanced and up-to-date textbook covers the essentials of modern astrophysics--from stars to cosmology--emphasizing the common, familiar physical principles that govern astronomical phenomena, and the interplay between theory and observation. In addition to traditional topics such as stellar remnants, galaxies, and the interstellar medium, *Astrophysics in a Nutshell* introduces subjects at the forefront of modern research, including black holes, dark matter, gravitational lensing, and dark energy, all updated with some of the latest observational results. To aid physical understanding, mathematical derivations are kept as simple, short, and clear as possible, and order-of-magnitude estimates, dimensional analysis, and scaling arguments are frequently used. These no-nonsense, "back-of-the-envelope" calculations train students to think like physicists. The book is amply illustrated

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with simple, clear figures and each chapter ends with a set of problems. 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 up-to-date astrophysics textbook for science majors Contains a broad and well-balanced choice of traditional subjects and current research topics Uses simple, short, and clear derivations of physical results Trains students in the essential skills of order-of-magnitude analysis Includes teaching problems with each chapter

Essential Astrophysics

Knowledge in a Nutshell: Astrophysics

The new experiments underway at the Large Hadron Collider at CERN in Switzerland may significantly change our understanding of elementary particle physics and, indeed, the universe. Suitable for first-year graduate students and advanced undergraduates, this textbook provides an introduction to the field

Lectures on Astrophysics

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Quantum theory is at the heart of modern physics, but how does it actually work? NASA scientist and communicator Sten Odenwald demystifies the subject and makes this crucial topic accessible to everyone. Featuring topics such as Schrodinger's cat, the wave-particle duality and the newly emerging theories of quantum gravity, as well as the personalities behind the science, such as Max Planck, Neils Bohr, Werner Heisenberg, Richard Feynman and many more, *Knowledge in a Nutshell: Quantum Physics* provides an essential introduction to cutting edge science. Presented in an easy-to-understand format, with diagrams, illustrations and simple summary sections at the end of each chapter, this new addition to the 'Knowledge in a Nutshell' series brings clarity to some of the great mysteries of physics. ABOUT THE SERIES: The 'Knowledge in a Nutshell' series by Arcturus Publishing provides engaging introductions to many fields of knowledge, including philosophy, psychology and physics, and the ways in which human kind has sought to make sense of our world.

Principles of Physical Cosmology

A science writer explains the significance of Stephen Hawking's work—in terms all of us can understand. Stephen Hawking was one of the most important astrophysicists of the last fifty years. After the publication of *A Brief History of Time*, he became an international celebrity. Though the book sold in the millions, few readers really grasped the significance of his groundbreaking work. Now

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popular Austrian science blogger Florian Freistetter, himself an astronomer, makes Hawking's contributions accessible to everyday readers in this concise, very readable book. By focusing on the essentials, Freistetter deftly and entertainingly makes Hawking's complex theoretical accomplishments understandable. Avoiding technicalities and jargon, he elucidates the great scientist's fascinating work on black holes, gravitational waves, the big bang, and singularities. Concluding with an appreciation of Hawking as a science communicator and popularizer, Freistetter conveys the importance of Hawking's scientific research in terms that nonspecialists can follow.

Knowledge in a Nutshell: Astrophysics

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

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alike. He takes a friendly approach to the required mathematics, yet does not shy away from more advanced mathematical topics such as differential forms. The extensive discussion of black holes includes rotating and extremal black holes and Hawking radiation. The ideal textbook for undergraduate and graduate students, Einstein Gravity in a Nutshell also provides an essential resource for professional physicists and is accessible to anyone familiar with classical mechanics and electromagnetism. It features numerous exercises as well as detailed appendices covering a multitude of topics not readily found elsewhere. Provides an accessible introduction to Einstein's general theory of relativity Guides readers from Newtonian mechanics to the frontiers of modern research Emphasizes symmetry and the Einstein-Hilbert action Covers topics not found in standard textbooks on Einstein gravity Includes interesting historical asides Features numerous exercises and detailed appendices Ideal for students, physicists, and scientifically minded lay readers Solutions manual (available only to teachers)

Plasma Physics for Astrophysics

An illustrated, large-format edition of the best-seller has been expanded to encompass the remarkable advances that have occurred in science and technology over the past eight years, with a new chapter on Wormholes and Time Travel and more than 240 full-color, captioned illustrations. 100,000 first printing.

The Large-Scale Structure of the Universe

Astrophysics in a Nutshell from the Telescope to the Sputnik

A Universe from Nothing

An epic, full-color visual journey through all scales of the universe In The Zoomable Universe, the award-winning astrobiologist Caleb Scharf and the acclaimed artist Ron Miller take us on an epic tour through all known scales of reality, from the largest possible magnitude to the smallest. Drawing on cutting-edge science, they begin at the limits of the observable universe, a scale spanning 10^{27} meters—about 93 billion light-years. And they end in the subatomic realm, at 10^{-35} meters, where the fabric of space-time itself confounds all known rules of physics. In between are galaxies, stars and planets, oceans and continents, plants and animals, microorganisms, atoms, and much, much more. Stops along the way—all enlivened by Scharf's sparkling prose and his original insights into the nature of our universe—include the brilliant core of the Milky Way, the surface of a rogue planet, the back of an elephant, and a sea of jostling quarks. The Zoomable Universe is packed with more than 100 original illustrations and infographics that

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will captivate readers of every age. It is a whimsical celebration of discovery, a testament to our astounding ability to see beyond our own vantage point and chart a course from the farthest reaches of the cosmos to its subatomic depths—in short, a must-have for the shelves of all explorers.

Solutions Manual to Astrophysics in a Nutshell

Nuclear Physics in a Nutshell provides a clear, concise, and up-to-date overview of the atomic nucleus and the theories that seek to explain it. Bringing together a systematic explanation of hadrons, nuclei, and stars for the first time in one volume, Carlos A. Bertulani provides the core material needed by graduate and advanced undergraduate students of physics to acquire a solid understanding of nuclear and particle science. Nuclear Physics in a Nutshell is the definitive new resource for anyone considering a career in this dynamic field. The book opens by setting nuclear physics in the context of elementary particle physics and then shows how simple models can provide an understanding of the properties of nuclei, both in their ground states and excited states, and also of the nature of nuclear reactions. It then describes: nuclear constituents and their characteristics; nuclear interactions; nuclear structure, including the liquid-drop model approach, and the nuclear shell model; and recent developments such as the nuclear mean-field and the nuclear physics of very light nuclei, nuclear reactions with unstable nuclear beams, and the role of nuclear physics in energy production and nucleosynthesis in

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stars. Throughout, discussions of theory are reinforced with examples that provide applications, thus aiding students in their reading and analysis of current literature. Each chapter closes with problems, and appendixes address supporting technical topics.

The Standard Model in a Nutshell

A concise and authoritative introduction to one of the central theories of modern physics. For a theory as genuinely elegant as the Standard Model—the current framework describing elementary particles and their forces—it can sometimes appear to students to be little more than a complicated collection of particles and ranked list of interactions. *The Standard Model in a Nutshell* provides a comprehensive and uncommonly accessible introduction to one of the most important subjects in modern physics, revealing why, despite initial appearances, the entire framework really is as elegant as physicists say. Dave Goldberg uses a "just-in-time" approach to instruction that enables students to gradually develop a deep understanding of the Standard Model even if this is their first exposure to it. He covers everything from relativity, group theory, and relativistic quantum mechanics to the Higgs boson, unification schemes, and physics beyond the Standard Model. The book also looks at new avenues of research that could answer still-unresolved questions and features numerous worked examples, helpful illustrations, and more than 120 exercises. Provides an essential introduction to

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the Standard Model for graduate students and advanced undergraduates across the physical sciences Requires no more than an undergraduate-level exposure to quantum mechanics, classical mechanics, and electromagnetism Uses a "just-in-time" approach to topics such as group theory, relativity, classical fields, Feynman diagrams, and quantum field theory Couched in a conversational tone to make reading and learning easier Ideal for a one-semester course or independent study Includes a wealth of examples, illustrations, and exercises Solutions manual (available only to professors)

The Fabric of the Cosmos

Bestselling author and acclaimed physicist Lawrence Krauss offers a paradigm-shifting view of how everything that exists came to be in the first place. "Where did the universe come from? What was there before it? What will the future bring? And finally, why is there something rather than nothing?" One of the few prominent scientists today to have crossed the chasm between science and popular culture, Krauss describes the staggeringly beautiful experimental observations and mind-bending new theories that demonstrate not only can something arise from nothing, something will always arise from nothing. With a new preface about the significance of the discovery of the Higgs particle, *A Universe from Nothing* uses Krauss's characteristic wry humor and wonderfully clear explanations to take us back to the beginning of the beginning, presenting the most recent evidence for

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how our universe evolved—and the implications for how it's going to end. Provocative, challenging, and delightfully readable, this is a game-changing look at the most basic underpinning of existence and a powerful antidote to outmoded philosophical, religious, and scientific thinking.

Nuclear Physics in a Nutshell

From black holes to dark matter, stellar dynamics to time travel, this concise introduction to astrophysics makes a big bang. NASA scientist and astronomer Sten Odenwald explains the key concepts of astrophysics, bringing clarity to some of the great mysteries of space. These include: - The theory of relativity - Cosmic background radiation - The evolution of stars - The formation of the solar system - The nature of galactic structures Perfect for the non-expert, this new addition to the 'Knowledge in a Nutshell' series takes the complexities of space science and makes them tangible.

Astrophysics in a Nutshell

Essential Astrophysics is a book to learn or teach from, as well as a fundamental reference volume for anyone interested in astronomy and astrophysics. It presents astrophysics from basic principles without requiring any previous study of

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astronomy or astrophysics. It serves as a comprehensive introductory text, which takes the student through the field of astrophysics in lecture-sized chapters of basic physical principles applied to the cosmos. This one-semester overview will be enjoyed by undergraduate students with an interest in the physical sciences, such as astronomy, chemistry, engineering or physics, as well as by any curious student interested in learning about our celestial science. The mathematics required for understanding the text is on the level of simple algebra, for that is all that is needed to describe the fundamental principles. The text is of sufficient breadth and depth to prepare the interested student for more advanced specialised courses in the future. Astronomical examples are provided throughout the text, to reinforce the basic concepts and physics, and to demonstrate the use of the relevant formulae. In this way, the student learns to apply the fundamental equations and principles to cosmic objects and situations. Astronomical and physical constants and units as well as the most fundamental equations can be found in the appendix. Essential Astrophysics goes beyond the typical textbook by including references to the seminal papers in the field, with further reference to recent applications, results, or specialised literature.

Astrophysics for Young People in a Hurry

This book provides an understanding of the theoretical foundations for the calculation of electromagnetic processes. Photon production processes are

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particularly important in astrophysics, since almost all of our knowledge of distant astronomical objects comes from the detection of radiation from these sources. Further, the conditions therein are extremely varied and a wide variety of naturally occurring electromagnetic phenomena can be described by limiting forms of the basic theory. The first chapter reviews some basic principles that are the underpinnings for a general description of electromagnetic phenomena, such as special relativity and, especially, relativistic covariance. Classical and quantum electrodynamics (QED) are then formulated in the next two chapters, followed by applications to three basic processes (Coulomb scattering, Compton scattering, and bremsstrahlung). These processes are related to other phenomena, such as pair production, and the comparisons are discussed. A unique feature of the book is its thorough discussion of the nonrelativistic limit of QED, which is simpler than the relativistic theory in its formulation and applications. The methods of the relativistic theory are introduced and applied through the use of notions of covariance, to provide a shorter path to the more general theory. The book will be useful for graduate students working in astrophysics and in certain areas of particle physics.

Electromagnetic Processes

"This is a truly astonishing book, invaluable for anyone with an interest in astronomy." Physics Bulletin "Just the thing for a first year university science

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course." Nature "This is a beautiful book in both concept and execution." Sky & Telescope

Astrophysics in a Nutshell

From Brian Greene, one of the world's leading physicists and author of the Pulitzer Prize finalist *The Elegant Universe*, comes a grand tour of the universe that makes us look at reality in a completely different way. Space and time form the very fabric of the cosmos. Yet they remain among the most mysterious of concepts. Is space an entity? Why does time have a direction? Could the universe exist without space and time? Can we travel to the past? Greene has set himself a daunting task: to explain non-intuitive, mathematical concepts like String Theory, the Heisenberg Uncertainty Principle, and Inflationary Cosmology with analogies drawn from common experience. From Newton's unchanging realm in which space and time are absolute, to Einstein's fluid conception of spacetime, to quantum mechanics' entangled arena where vastly distant objects can instantaneously coordinate their behavior, Greene takes us all, regardless of our scientific backgrounds, on an irresistible and revelatory journey to the new layers of reality that modern physics has discovered lying just beneath the surface of our everyday world.

Elementary Particle Physics in a Nutshell

Lectures on Astrophysics provides an account of classic and contemporary aspects of astrophysics, with an emphasis on analytic calculations and physical understanding. It introduces fundamental topics in astrophysics, including the properties of single and binary stars, the phenomena associated with interstellar matter, and the structure of galaxies. Nobel Laureate Steven Weinberg combines exceptional physical insight with his gift for clear exposition to cover exciting recent developments and new results. Emphasizing theoretical results, and explaining their derivation and application, this book provides an invaluable resource for physics and astronomy students and researchers.

Einstein Gravity in a Nutshell

This invaluable book, now in its second edition, covers a wide range of topics appropriate for both undergraduate and postgraduate courses in astrophysics. The book conveys a deep and coherent understanding of the stellar phenomena, and basic astrophysics of stars, galaxies, clusters of galaxies and other heavenly bodies of interest. Since the first appearance of the book in 1997, significant progress has been made in different branches of Astronomy and Astrophysics. The second edition takes into account the developments of the subject which have taken place

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in the last decade. It discusses the latest introduction of L and T dwarfs in the Hertzsprung-Russel diagram (or H-R diagram). Other developments discussed pertain to standard solar model, solar neutrino puzzle, cosmic microwave background radiation, Drake equation, dwarf galaxies, ultra compact dwarf galaxies, compact groups and cluster of galaxies. Problems at the end of each chapter motivate the students to go deeper into the topics. Suggested readings at the end of each chapter have been complemented.

Astrophysics in a Nutshell

#1 NEW YORK TIMES BESTSELLER When and how did the universe begin? Why are we here? What is the nature of reality? Is the apparent “grand design” of our universe evidence of a benevolent creator who set things in motion—or does science offer another explanation? In this startling and lavishly illustrated book, Stephen Hawking and Leonard Mlodinow present the most recent scientific thinking about these and other abiding mysteries of the universe, in nontechnical language marked by brilliance and simplicity. According to quantum theory, the cosmos does not have just a single existence or history. The authors explain that we ourselves are the product of quantum fluctuations in the early universe, and show how quantum theory predicts the “multiverse”—the idea that ours is just one of many universes that appeared spontaneously out of nothing, each with different laws of nature. They conclude with a riveting assessment of M-theory, an explanation of

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the laws governing our universe that is currently the only viable candidate for a “theory of everything”: the unified theory that Einstein was looking for, which, if confirmed, would represent the ultimate triumph of human reason.

Stephen Hawking

Designed for teaching astrophysics to physics students at advanced undergraduate or beginning graduate level, this textbook also provides an overview of astrophysics for astrophysics graduate students, before they delve into more specialized volumes. Assuming background knowledge at the level of a physics major, the textbook develops astrophysics from the basics without requiring any previous study in astronomy or astrophysics. Physical concepts, mathematical derivations and observational data are combined in a balanced way to provide a unified treatment. Topics such as general relativity and plasma physics, which are not usually covered in physics courses but used extensively in astrophysics, are developed from first principles. While the emphasis is on developing the fundamentals thoroughly, recent important discoveries are highlighted at every stage.

Group Theory in a Nutshell for Physicists

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In this book, a distinguished expert introduces plasma physics from the ground up, presenting it as a comprehensible field that can be grasped largely on the basis of physical intuition and qualitative reasoning, similar to other fields of physics. Plasmas are ionized gases that can be found in a hydrogen bomb explosion, the confinement chamber of an experimental fusion reactor, the solar corona, the aurora borealis, the interstellar medium, and the immediate vicinity of a gravitational black hole. Not surprisingly, plasma physics appears to consist of numerous topics arising independently from astrophysics, fusion physics, and other practical applications, and hence it remains a field poorly understood even by many astrophysicists. But, in fact, most of these topics can be approached from the same perspective, with a simple, physical intuition. Selecting simple examples and presenting them in a simultaneously intuitive and rigorous manner, Russell Kulsrud guides readers through a careful derivation of the results and allows them to think through the physics for themselves. Thus, they are better prepared for complex cases and more general results. The first eleven chapters present topics by their importance to plasma physics while the last three chapters emphasize the field's astrophysical applications, applying the results accrued earlier. Throughout, many problems illustrate the field's applications. Based on a course the author taught for many years, *Plasma Physics for Astrophysics* is intended for graduate students as well as for working astrophysicists.

Knowledge in a Nutshell: Quantum Physics

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Whether searching for extra-terrestrial life, managing the effects of space weather or learning about dark matter, the study of astrophysics has profound implications for us all. NASA scientist and astronomer Sten Odenwald explains the key concepts of this vast topic, bringing clarity to some of the great mysteries of space. These include:

- The theory of relativity
- Cosmic background radiation
- The evolution of stars
- The formation of the solar system
- The nature of exoplanets
- Space weather systems

Filled with helpful diagrams and simple summaries, *Knowledge in a Nutshell: Astrophysics* is perfect for the non-expert, taking the complexities of space science and making them tangible. ABOUT THE SERIES The 'Knowledge in a Nutshell' series by Arcturus Publishing provides engaging introductions to many fields of knowledge, including philosophy, psychology and physics, and the ways in which human kind has sought to make sense of our world.

The Illustrated a Brief History of Time

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

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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)

The Grand Design

This book gives a survey of astrophysics at the advanced undergraduate level, providing a physics-centred analysis of a broad range of astronomical systems. It originates from a two-semester course sequence at Rutgers University that is meant to appeal not only to astrophysics students but also more broadly to physics

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and engineering students. The organisation is driven more by physics than by astronomy; in other words, topics are first developed in physics and then applied to astronomical systems that can be investigated, rather than the other way around. The first half of the book focuses on gravity. The theme in this part of the book, as well as throughout astrophysics, is using motion to investigate mass. The goal of Chapters 2-11 is to develop a progressively richer understanding of gravity as it applies to objects ranging from planets and moons to galaxies and the universe as a whole. The second half uses other aspects of physics to address one of the big questions. While “Why are we here?” lies beyond the realm of physics, a closely related question is within our reach: “How did we get here?” The goal of Chapters 12-20 is to understand the physics behind the remarkable story of how the Universe, Earth and life were formed. This book assumes familiarity with vector calculus and introductory physics (mechanics, electromagnetism, gas physics and atomic physics); however, all of the physics topics are reviewed as they come up (and vital aspects of vector calculus are reviewed in the Appendix).

Astrophysics in a Nutshell Solutions Manual 2e

Neil deGrasse Tyson’s #1 New York Times best-selling guide to the cosmos, adapted for young readers. From the basics of physics to big questions about the nature of space and time, celebrated astrophysicist and science communicator Neil deGrasse Tyson breaks down the mysteries of the cosmos into bite-sized pieces.

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Astrophysics for Young People in a Hurry describes the fundamental rules and unknowns of our universe clearly—and with Tyson’s characteristic wit, there’s a lot of fun thrown in, too. This adaptation by Gregory Mone includes full-color photos, infographics, and extra explanations to make even the trickiest concepts accessible. Building on the wonder inspired by outer space, Astrophysics for Young People in a Hurry introduces an exciting field and the principles of scientific inquiry to young readers.

AN INTRODUCTION TO ASTROPHYSICS

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,

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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
Trains students in the essential skills of order-of-magnitude analysis
Features a new chapter on extrasolar planets, including discovery techniques
Includes new and expanded sections and problems on the physics of shocks, supernova remnants, cosmic-ray acceleration, white dwarf properties, baryon acoustic oscillations, and more
Contains instructive problem sets at the end of each chapter
Solutions manual (available only to professors)

The Zoomable Universe

The classic account of the structure and evolution of the early universe from Nobel

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Prize-winning physicist P. J. E. Peebles An instant landmark on its publication, *The Large-Scale Structure of the Universe* remains the essential introduction to this vital area of research. Written by one of the world's most esteemed theoretical cosmologists, it provides an invaluable historical introduction to the subject, and an enduring overview of key methods, statistical measures, and techniques for dealing with cosmic evolution. With characteristic clarity and insight, P. J. E. Peebles focuses on the largest known structures—galaxy clusters—weighing the empirical evidence of the nature of clustering and the theories of how it evolves in an expanding universe. A must-have reference for students and researchers alike, this edition of *The Large-Scale Structure of the Universe* introduces a new generation of readers to a classic text in modern cosmology.

Astrophysics for Physicists

An *Introduction to Stellar Astrophysics* aspires to provide the reader with an intermediate knowledge on stars whilst focusing mostly on the explanation of the functioning of stars by using basic physical concepts and observational results. The book is divided into seven chapters, featuring both core and optional content: Basic concepts Stellar Formation Radiative Transfer in Stars Stellar Atmospheres Stellar Interiors Nucleosynthesis and Stellar Evolution and Chemically Peculiar Stars and Diffusion. Student-friendly features include: Detailed examples to help the reader better grasp the most important concepts A list of exercises is given at

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the end of each chapter and answers to a selection of these are presented. Brief recalls of the most important physical concepts needed to properly understand stars. A summary for each chapter Optional and advanced sections are included which may be skipped without interfering with the flow of the core content. This book is designed to cover the most important aspects of stellar astrophysics inside a one semester (or half-year) course and as such is relevant for advanced undergraduate students following a first course on stellar astrophysics, in physics or astronomy programs. It will also serve as a basic reference for a full-year course as well as for researchers working in related fields.

The Little Book of Cosmology

The classic introduction to physical cosmology from Nobel Prize-winning physicist P. J. E. Peebles Principles of Physical Cosmology is the essential introduction to this critical area of modern physics, written by a leading pioneer who has shaped the course of the field for decades. P. J. E. Peebles provides an authoritative overview of the field, showing how observation has combined with theory to establish the science of physical cosmology. He presents the elements of physical cosmology, including the history of the discovery of the expanding universe; surveys the cosmological tests that measure the geometry of space-time, with a discussion of general relativity as the basis for these tests; and reviews the origin of galaxies and the large-scale structure of the universe. Now featuring Peebles's 2019 Nobel

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lecture, Principles of Physical Cosmology remains an indispensable reference for students and researchers alike.

Astrophysics in a Nutshell

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.

A Student's Guide to the Mathematics of Astronomy

Principles of Astrophysics

This book is the essential new introduction to modern string theory, by one of the world's authorities on the subject. Concise, clearly presented, and up-to-date, String Theory in a Nutshell brings together the best understood and most important aspects of a theory that has been evolving since the early 1980s. A core model of physics that substitutes one-dimensional extended "strings" for zero-dimensional point-like particles (as in quantum field theory), string theory has been the leading candidate for a theory that would successfully unify all fundamental forces of nature, including gravity. Starting with the basic definitions of the theory, Elias Kiritsis guides readers through classic and modern topics. In particular, he treats perturbative string theory and its Conformal Field Theory (CFT) tools in detail while also developing nonperturbative aspects and exploring the unity of string interactions. He presents recent topics including black holes, their microscopic entropy, and the AdS/CFT correspondence. He also describes matrix model tools for string theory. In all, the book contains nearly five hundred exercises for the

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graduate-level student, and works as a self-contained and detailed guide to the literature. String Theory in a Nutshell is the staple one-volume reference on the subject not only for students and researchers of theoretical high-energy physics, but also for mathematicians and physicists specializing in theoretical cosmology and QCD.

The Physical Universe

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The Universe in a Nutshell

The author explores recent scientific breakthroughs in the fields of supergravity, supersymmetry, quantum theory, superstring theory, and p-branes as he searches for the Theory of Everything that lies at the heart of the cosmos.

Introduction to Cosmology

An Introduction to Modern Astrophysics is a comprehensive, well-organized and engaging text covering every major area of modern astrophysics, from the solar

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system and stellar astronomy to galactic and extragalactic astrophysics, and cosmology. Designed to provide students with a working knowledge of modern astrophysics, this textbook is suitable for astronomy and physics majors who have had a first-year introductory physics course with calculus. Featuring a brief summary of the main scientific discoveries that have led to our current understanding of the universe; worked examples to facilitate the understanding of the concepts presented in the book; end-of-chapter problems to practice the skills acquired; and computational exercises to numerically model astronomical systems, the second edition of *An Introduction to Modern Astrophysics* is the go-to textbook for learning the core astrophysics curriculum as well as the many advances in the field.

An Introduction to Stellar Astrophysics

A substantial update of this award-winning and highly regarded cosmology textbook, for advanced undergraduates in physics and astronomy.

String Theory in a Nutshell

A concise but thorough introduction to the observational data and theoretical concepts underlying modern astronomy, *Astrophysics in a Nutshell* is designed for

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advanced undergraduate science majors taking a one-semester course. This well-balanced and up-to-date textbook covers the essentials of modern astrophysics--from stars to cosmology--emphasizing the common, familiar physical principles that govern astronomical phenomena, and the interplay between theory and observation. In addition to traditional topics such as stellar remnants, galaxies, and the interstellar medium, Astrophysics in a Nutshell introduces subjects at the forefront of modern research, including black holes, dark matter, gravitational lensing, and dark energy, all updated with some of the latest observational results. To aid physical understanding, mathematical derivations are kept as simple, short, and clear as possible, and order-of-magnitude estimates, dimensional analysis, and scaling arguments are frequently used. These no-nonsense, "back-of-the-envelope" calculations train students to think like physicists. The book is amply illustrated with simple, clear figures and each chapter ends with a set of problems. 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 up-to-date astrophysics textbook for science majors Contains a broad and well-balanced choice of traditional subjects and current research topics Uses simple, short, and clear derivations of physical results Trains students in the essential skills of order-of-magnitude analysis Includes teaching problems with each chapter

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