An Introduction To Modern Stellar Astrophysics

#stellar astrophysics #modern astrophysics #astrophysics introduction #physics of stars #celestial mechanics

Dive into the foundational concepts of modern stellar astrophysics with this comprehensive introduction. Explore the fundamental principles governing the birth, life, and death of stars, unraveling the complex physics behind celestial phenomena and understanding our place in the vast cosmos. This guide is perfect for anyone seeking a foundational understanding of the universe's most brilliant objects.

An Introduction to Modern Astrophysics

"An Introduction to Modern Astrophysics, "Second Edition has been thoroughly revised to reflect the dramatic changes and advancements in astrophysics that have occurred over the past decade. The Second Edition of this market-leading book has been updated to include the latest results from relevant fields of astrophysics and advances in our theoretical understanding of astrophysical phenomena. The Tools of Astronomy: The Celestial Sphere, Celestial Mechanics, The Continuous Spectrum of Light, The Theory of Special Relativity, The Interaction of Light and Matter, Telescopes; The Nature of Stars: Binary Systems and Stellar Parameters, The Classification of Stellar Spectra, Stellar Atmospheres, The Interiors of Stars, The Sun, The Process of Star Formation, Post-Main-Sequence Stellar Evolution, Stellar Pulsation, Supernovae, The Degenerate Remnants of Stars, Black Holes, Close Binary Star Systems; Planetary Systems: Physical Processes in the Solar System, The Terrestrial Planets, The Jovian Worlds, Minor Bodies of the Solar System, The Formation of Planetary Systems; Galaxies and the Universe: The Milky Way Galaxy, The Nature of Galaxies, Galactic Evolution, The Structure of the Universe, Active Galaxies, Cosmology, The Early Universe; Astronomical and Physical Constants, Unit Conversions Between SI and cgs, Solar System Data, The Constellations, The Brightest Stars, The Nearest Stars, Stellar Data, The Messier Catalog, Constants, A Constants Module for Fortran 95 (Available as a C++ header file), Orbits, A Planetary Orbit Code (Available as Fortran 95 and C++ command line versions, and Windows GUI), TwoStars, A Binary Star Code (Generates synthetic light and radial velocity curves; available as Fortran 95 and C++ command line versions, and Windows GUI), StatStar, A Stellar Structure Code (Available as Fortran 95 and C++ command line versions, and Windows GUI), StatStar, Stellar Models, Galaxy, A Tidal Interaction Code (Available as Java), WMAP Data. For all readers interested in moden astrophysics.

An Introduction to Modern Stellar Astrophysics

This exciting text opens the entire field of modern astrophysics to the reader by using only the basic tools of physics. Designed for the junior- level astrophysics course, each topic is approached in the context of the major unresolved questions in astrophysics. The core chapters have been designed for

a course in stellar structure and evolution, while the extended chapters provide additional coverage of the solar system, galactic structure, dynamics, evolution, and cosmology.

An Introduction to Modern Astrophysics

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

A comprehensive and engaging textbook, covering the entire astrophysics curriculum in one volume.

An Introduction to Stellar Astrophysics

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 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.

An Introduction to Modern Galactic Astrophysics and Cosmology

"This exciting text opens the entire field of modern astrophysics to the reader by using only the basic tools of physics. Designed for the junior- level astrophysics course, each topic is approached in the context of the major unresolved questions in astrophysics. The core chapters have been designed for a course in stellar structure and evolution, while the extended chapters provide additional coverage of the solar system, galactic structure, dynamics, evolution, and cosmology." -- Publisher's description.

Introduction to Modern Astrophysics, An: Pearson New International Edition PDF eBook

The full text downloaded to your computer With eBooks you can: search for key concepts, words and phrases make highlights and notes as you study share your notes with friends eBooks are downloaded to your computer and accessible either offline through the Bookshelf (available as a free download), available online and also via the iPad and Android apps. Upon purchase, you'll gain instant access to this eBook. Time limit The eBooks products do not have an expiry date. You will continue to access your digital ebook products whilst you have your Bookshelf installed. An Introduction to Modern Astrophysics, reflects the dramatic changes and advancements in astrophysics that have occurred over the past decade. The Second Edition includes the latest results from relevant fields of astrophysics and advances in our theoretical understanding of astrophysical phenomena.

Introduction to Stellar Astrophysics: Volume 3

This book is the final one in a series of three texts which together provide a modern, complete and authoritative account of our present knowledge of the stars. It discusses the internal structure and the evolution of stars, and is completely self-contained. There is an emphasis on the basic physics

governing stellar structure and the basic ideas on which our understanding of stellar structure is based. The book also provides a comprehensive discussion of stellar evolution. Careful comparison is made between theory and observation, and the author has thus provided a lucid and balanced introductory text for the student. As for volumes 1 and 2, volume 3 is self-contained and can be used as an independent textbook. The author has not only taught but has also published many original papers in this subject. Her clear and readable style should make this text a first choice for undergraduate and beginning graduate students taking courses in astronomy and particularly in stellar astrophysics.

An Introduction to the Theory of Stellar Structure and Evolution

Using fundamental physics, the theory of stellar structure and evolution can predict how stars are born, how their complex internal structure changes, what nuclear fuel they burn, and their ultimate fate. This textbook is a stimulating introduction for undergraduates in astronomy, physics and applied mathematics, taking a course on the physics of stars. It uniquely emphasises the basic physical principles governing stellar structure and evolution. This second edition contains two new chapters on mass loss from stars and interacting binary stars, and new exercises. Clear and methodical, it explains the processes in simple terms, while maintaining mathematical rigour. Starting from general principles, this textbook leads students step-by-step to a global, comprehensive understanding of the subject. Fifty exercises and full solutions allow students to test their understanding. No prior knowledge of astronomy is required, and only a basic background in physics and mathematics is necessary.

Foundations of Astrophysics

"This book provides a contemporary and complete introduction to astrophysics for astronomy and physics majors."--

An Introduction to Modern Astrophysics

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

An Introduction to Modern Cosmology Third Edition is an accessible account of modern cosmological ideas. The Big Bang Cosmology is explored, looking at its observational successes in explaining the expansion of the Universe, the existence and properties of the cosmic microwave background, and the origin of light elements in the universe. Properties of the very early Universe are also covered, including the motivation for a rapid period of expansion known as cosmological inflation. The third edition brings this established undergraduate textbook up-to-date with the rapidly evolving observational situation. This fully revised edition of a bestseller takes an approach which is grounded in physics with a logical flow of chapters leading the reader from basic ideas of the expansion described by the Friedman equations to some of the more advanced ideas about the early universe. It also incorporates up-to-date results from the Planck mission, which imaged the anisotropies of the Cosmic Microwave Background radiation over the whole sky. The Advanced Topic sections present subjects with more detailed mathematical approaches to give greater depth to discussions. Student problems with hints for solving them and numerical answers are embedded in the chapters to facilitate the reader’s understanding and learning. Cosmology is now part of the core in many degree programs. This current, clear and concise introductory text is relevant to a wide range of astronomy programs worldwide and is essential reading for undergraduates and Masters students, as well as anyone starting research in cosmology. The accompanying website for this text, http://booksupport.wiley.com, provides additional material designed to enhance your learning, as well as errata within the text.

Stellar Evolution and Nucleosynthesis

An ideal bridging text for astrophysics and physics majors looking to move on from the introductory texts.

Astrophysics for Physicists

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.

Stellar Structure and Evolution

A complete and comprehensive treatment of the physics of the stellar interior and the underlying fundamental processes and parameters. The text presents an overview of the models developed to explain the stability, dynamics and evolution of the stars, and great care is taken to detail the various stages in a star's life. The authors have succeeded in producing a unique text based on their own pioneering work in stellar modeling. Since its publication, this textbook has come to be considered a classic by both readers and teachers in astrophysics. This study edition is intended for students in astronomy and physics alike.

Theory of Stellar Atmospheres

The most authoritative synthesis of the quantitative spectroscopic analysis of stellar atmospheres This book provides an in-depth and self-contained treatment of the latest advances achieved in quantitative spectroscopic analyses of the observable outer layers of stars and similar objects. Written by two leading researchers in the field, it presents a comprehensive account of both the physical foundations and numerical methods of such analyses. The book is ideal for astronomers who want to acquire deeper insight into the physical foundations of the theory of stellar atmospheres, or who want to learn about modern computational techniques for treating radiative transfer in non-equilibrium situations. It can also serve as a rigorous yet accessible introduction to the discipline for graduate students. Provides a comprehensive, up-to-date account of the field Covers computational methods as well as the underlying physics Serves as an ideal reference book for researchers and a rigorous yet accessible textbook for graduate students An online illustration package is available to professors at press.princeton.edu

Stellar Interiors

That trees should have been cut down to provide paper for this book was an ecological afIront. From a book review. - Anthony Blond (in the Spectator, 1983) The first modern text on our subject, Structure and Evolution of the Stars, was published over thirty years ago. In it, Martin Schwarzschild described numerical experiments that successfully reproduced most of the observed properties of the majority of stars seen in the sky. He also set the standard for a lucid description of the physics of stellar interiors. Ten years later, in 1968, John P. Cox's tw~volume monograph Principles of Stellar Structure appeared, as did the more specialized text Principles of Stellar Evolution and Nuc1eosynthesis by Donald D. Clayton-and what a difference ten years had made. The field had matured into the basic form that it remains today. The past twenty-plus years have seen this branch of astrophysics flourish and develop into a fundamental pillar of modern astrophysics that addresses an enormous variety of phenomena. In view of this it might seem foolish to offer another text of finite length and expect it to cover any more than a fraction of what should be discussed to make it a thorough and self-contained reference. Well, it doesn't. Our specific aim is to introduce only the fundamentals of stellar astrophysics. You will find little reference here to black holes, millisecond pulsars, and other "sexy" objects.

Extragalactic Astronomy and Cosmology

This second edition has been updated and substantially expanded. Starting with the description of our home galaxy, the Milky Way, this cogently written textbook introduces the reader to the astronomy of galaxies, their structure, active galactic nuclei, evolution and large scale distribution in the Universe.

After an extensive and thorough introduction to modern observational and theoretical cosmology, the focus turns to the formation of structures and astronomical objects in the early Universe. The basics of classical astronomy and stellar astrophysics needed for extragalactic astronomy are provided in the appendix. While this book has grown out of introductory university courses on astronomy and astrophysics and includes a set of problems and solutions, it will not only benefit undergraduate students and lecturers; thanks to the comprehensive coverage of the field, even graduate students and researchers specializing in related fields will appreciate it as a valuable reference work.

Astrophysics in a Nutshell

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 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)

Introduction to Cosmology

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

Fundamentals of Astrophysics

Introduces students with calculus-based physics, to fundamental astrophysical concepts, for a one-semester introduction to astrophysics.

Introduction to Stellar Astrophysics

Donald D. Clayton's Principles of Stellar Evolution and Nucleosynthesis remains the standard work on the subject, a popular textbook for students in astronomy and astrophysics and a rich sourcebook for researchers. The basic principles of physics as they apply to the origin and evolution of stars and physical processes of the stellar interior are thoroughly and systematically set out. Clayton's new preface, which includes commentary and selected references to the recent literature, reviews the most important research carried out since the book's original publication in 1968.

Principles of Stellar Evolution and Nucleosynthesis

This advanced 1998 textbook on stellar astrophysics provides a comprehensive and self-contained introduction for graduate students.

Advanced Stellar Astrophysics

This comprehensive textbook conveys the basic physical ideas and laws used in the study of the outer layers of a star. The stellar atmosphere emits the light which we see. The only layers of a star where we can get direct information about temperature, pressure and composition are in the atmosphere. This complete account first introduces stellar magnitudes, spectra and temperatures. This is followed by a full discussion of radiative transfer in a stellar atmosphere, which leads to descriptions of line formation, the spectrum of hydrogen, and spectral analysis. Finally the structural components that are accessible, such as the convestion zone, chromosphere, corona, and mass outflow are described. The book will interest any student with a knowledge of physics and mathematics who needs to learn about stellar atmospheres.

Introduction to Stellar Astrophysics

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 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.

Introduction to Stellar Astrophysics: Volume 2

Galaxies, along with their underlying dark matter halos, constitute the building blocks of structure in the Universe. Of all fundamental forces, gravity is the dominant one that drives the evolution of structures from small density seeds at early times to the galaxies we see today. The interactions among myriads of stars, or dark matter particles, in a gravitating structure produce a system with fascinating connotations to thermodynamics, with some analogies and some fundamental differences. Ignacio Ferreras presents a concise introduction to extragalactic astrophysics, with emphasis on stellar dynamics, and the growth of density fluctuations in an expanding Universe. Additional chapters are devoted to smaller systems (stellar clusters) and larger ones (galaxy clusters). Fundamentals of Galaxy Dynamics, Formation and Evolution is written for advanced undergraduates and beginning postgraduate students, providing a useful tool to get up to speed in a starting research career. Some of the derivations for the most important results are presented in detail to enable students appreciate the beauty of maths as a tool to understand the workings of galaxies. Each chapter includes a set of problems to help the student advance with the material.

Essential Astrophysics

This textbook introduction to the basic elements of fundamental astronomy and astrophysics serves as a foundation for understanding the structure, evolution, and observed properties of stars. The first half of the book explains how stellar motions, distances, luminosities, colors, radii, masses and temperatures are measured or derived. The author then shows how data of these sorts can be arranged to classify stars through their spectra. Stellar rotation and stellar magnetic fields are introduced. Stars with peculiar spectra and pulsating stars also merit special attention. The endpoints of stellar evolutions are briefly described. There is a separate chapter on the Sun and a final one on interstellar absorption. The usefulness of this text is enhanced by the inclusion of problems for students, tables of astronomical constants, and a selective bibliography. This is an excellent textbook for undergraduate and beginning graduate students studying astronomy and astrophysics.

Fundamentals of Galaxy Dynamics, Formation and Evolution

Astronomy is the field of science devoted to the study of astronomical objects, such as stars, galaxies, and nebulae. Astronomers have gathered a wealth of knowledge about the universe through hundreds of years of painstaking observations. These observations are interpreted by the use of physical and chemical laws familiar to mankind. These interpretations supply information about the nature of these astronomical objects, allowing for the deduction of their surface and interior conditions. The science associated with these interpretations is called astrophysics. An Introduction to Astronomy and Astrophysics offers a comprehensive introduction to astronomy and astrophysics, complete with illustrative examples and illuminating homework problems. Requiring a familiarity with basic physics and mathematics, this undergraduate-level textbook: Addresses key physics concepts relevant to stellar observations, including radiation, electromagnetic spectrum, photometry, continuous and discrete spectrum, and spectral lines. Describes instruments used for astronomical observations as well as how the radiation received is characterized and interpreted to determine the properties of stars. Examines the structure of stars, the basic equations that explain stars in equilibrium, and the fusion reactions occurring in stellar cores. Discusses the evolution of stars, the solar system, the dynamics of galaxies, and the fundamentals of modern cosmology. Explores the universe at high redshifts, where it is dominated by objects such as active galaxies. An Introduction to Astronomy and Astrophysics teaches students how to interpret the night sky, providing them with a critical understanding of the stars and sun, solar system, extrasolar planets, stars, and galaxies. The book is thoroughly revised to make it an essential textbook for students. The Second edition introduces the following changes: New solutions are provided at the end of all the chapters. The number of problems has increased. Major chapters have been considerably revised and new developments in this field have been introduced.

Introduction to Stellar Astrophysics: Volume 1, Basic Stellar Observations and Data

A thorough presentation of the fundamental concepts of stellar dynamics that bridges the gap between standard texts and advanced treatises.

An Introduction to Astronomy and Astrophysics

Guiding the reader through all the stages that lead to the formation of a star such as our Sun, this advanced textbook provides students with a complete overview of star formation. It examines the underlying physical processes that govern the evolution from a molecular cloud core to a main-sequence star, and focuses on the formation of solar-mass stars. Each chapter combines theory and observation, helping readers to connect with and understand the theory behind star formation. Beginning with an explanation of the interstellar medium and molecular clouds as sites of star formation, subsequent chapters address the building of typical stars and the formation of high-mass stars, concluding with a discussion of the by-products and consequences of star formation. This is a unique, self-contained text with sufficient background information for self-study, and is ideal for students and professional researchers alike.

Introduction to Stellar Dynamics

A self-contained graduate-level introduction to the physical processes that shape planetary systems, covering all stages of planet formation.

An Introduction to Star Formation

Providing students with an in-depth account of the astrophysics of high energy phenomena in the Universe, the third edition of this well-established textbook is ideal for advanced undergraduate and beginning graduate courses in high energy astrophysics. Building on the concepts and techniques taught in standard undergraduate courses, this textbook provides the astronomical and astrophysical background for students to explore more advanced topics. Special emphasis is given to the underlying physical principles of high energy astrophysics, helping students understand the essential physics. The third edition has been completely rewritten, consolidating the previous editions into one volume. It covers the most recent discoveries in areas such as gamma-ray bursts, ultra-high energy cosmic rays and ultra-high energy gamma rays. The topics have been rearranged and streamlined to make them more applicable to a wide range of different astrophysical problems.

Astrophysics of Planet Formation

The major strength of the book is that the author does not evade the problems presented by some hard physics and astrophysics, but sorts them out with a minimum of fuss. The Physics of Stars shows how the study of stars can play an important role in physics education by providing a framework for seeing physics in action. All students of physics, astrophysics and astronomy will find it useful.

High Energy Astrophysics

to the Second Edition The development of astronomy in the last ten years has been nothing short of explosive. This second edition of The New Cosmos, considerably revised and enlarged, tries to share this development with its readers. Let us mention a few key words: from mo on landings, planetary probes, aild continental drift through pulsars, X-ray and y-ray sources, interstellar molecules, quasars, and the structure and evolution of stars and stellar systems right up to cosmological models. As before, the most important task of this book is to give a not too difficult introduction to present-day astronomy and astrophysics, both to the student of astronomy and to the specialist from a neighboring discipline. We therefore draw to the attention of the reader, as an essential part of our description, the numerous illustrations-many of them new-and their detailed captions. As far as possible we link a description of important observations with basic features of the theory. On the other hand, when it comes to detail we often content ourselves with abrief description, leaving the detailed explanation to the specialist literature. The transition to the specialist literature should be eased by the Bibliography at the end of the book. Important new investigations are noted in the text by their year, not so much for historical reasons as to enable the original work to be found in the Astronomy and Astrophysics Abstracts (1969 on).

The Physics of Stars

Introduces hydrodynamics to undergraduate students in physics and astrophysics. Stellar winds are a common phenomenon in the life of stars, from the dwarfs like the Sun to the red giants and hot supergiants, constituting one of the basic aspects of modern astrophysics. Stellar winds are a hydrodynamic phenomenon in which circumstellar gases expand towards the interstellar medium. This book presents an elementary introduction to the fundamentals of hydrodynamics with an application to the study of stellar winds. The principles of hydrodynamics have many other applications, so that the book can be used as an introduction to hydrodynamics for students of physics, astrophysics and other related areas.

The New Cosmos

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 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).

Hydrodynamics and Stellar Winds

The study of stars and their spectra is central to an understanding of classical and modern astronomy. The principal tool for investigating the nature of stars is to observe and interpret their spectra. In this lucid book, James Kaler clearly explains the alphabet of stellar astronomy - from the cool M stars to hot O stars - and tells the story of the evolution of stars and their place in the Universe. Before embarking on a fascinating voyage of cosmic discovery, we are introduced to the fundamental properties of stars, and how they can be categorised. Next, the structure of atoms and the formation of spectra is discussed, as

a prelude to a full description of the spectral classification itself. The heart of the book examines each star type in turn and explores their spectra in detail. Notable discoveries and features related to each class sustain the story. There is also a review of unusual stars that cannot easily be classified. Finally, the book closes with a skilful integration of all the data - tracing the paths of birth, life and death of stars on the Hertzsprung-Russell diagram. This book is based on a widely acclaimed series of articles on stellar astronomy which appeared in the magazine Sky and Telescope. It provides an invaluable introduction for observers and students.

Introduction to Stellar Astrophysics: Stellar structure and evolution

Principles of Astrophysics