

Astrophysics Is Easy An Introduction For The Amateur Astronomer The Patrick Moore Practical Astronomy Series

How to predict and calculate the positions of stars, planets, the sun, the moon, and satellites using a personal computer and high school mathematics. Our knowledge of the universe is expanding rapidly, as space probes launched decades ago begin to send information back to earth. There has never been a better time to learn about how planets, stars, and satellites move through the heavens. This book is for amateur astronomers who want to move beyond pictures of constellations in star guides and solve the mysteries of a starry night. It is a book for readers who have wondered, for example, where Saturn will appear in the night sky, when the sun will rise and set, or how long the space station will be over their location. In *Celestial Calculations*, J. L. Lawrence shows readers how to find the answers to these and other astronomy questions with only a personal computer and high school math. Using an easy-to-follow step-by-step approach, Lawrence explains what calculations are required, why they are needed, and how they all fit together. Lawrence begins with basic principles: unit of measure conversions, time conversions, and coordinate systems. He combines these concepts into a computer program that can calculate the location of a star, and uses the same methods for predicting the locations of the sun, moon, and planets. He then shows how to use these methods for locating the many satellites we have sent into orbit. Finally, he describes a variety of resources and tools available to the amateur astronomer, including star charts and astronomical tables. Diagrams illustrate the major concepts, and computer programs that implement the algorithms are included. Photographs of actual celestial objects accompany the text, and interesting astronomical facts are interspersed throughout. Source code (in Python 3, JAVA, and Visual Basic) and executables for all the programs and examples presented in the book are available for download at <https://CelestialCalculations.github.io>.

This extensively illustrated book presents the astrophysics of galaxies since their beginnings in the early Universe. It has been thoroughly revised to take into account the most recent observational data, and recent discoveries such as dark energy. There are new sections on galaxy clusters, gamma ray bursts and supermassive black holes. The authors explore the basic properties of stars and the Milky Way before working out towards nearby galaxies and the distant Universe. They discuss the structures of galaxies and how galaxies have developed, and relate this to the evolution of the Universe. The book also examines ways of observing galaxies across the whole electromagnetic spectrum, and explores dark matter and its gravitational pull on matter and light. This book is self-contained and includes several homework problems with hints. It is ideal for advanced undergraduate students in astronomy and astrophysics. 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

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nature of space and time, celebrated astrophysicist and science communicator Neil deGrasse Tyson breaks down the mysteries of the cosmos into bite-sized pieces. *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.

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

Astrophysics Is Easy! An Introduction for the Amateur Astronomer Springer
Radiative Processes in Astrophysics: This clear, straightforward, and fundamental introduction is designed to present—from a physicist's point of view—radiation processes and their applications to astrophysical phenomena and space science. It covers such topics as radiative transfer theory, relativistic covariance and kinematics, bremsstrahlung radiation, synchrotron radiation, Compton scattering, some plasma effects, and radiative transitions in atoms. Discussion begins with first principles, physically motivating and deriving all results rather than merely presenting finished formulae. However, a reasonably good physics background (introductory quantum mechanics, intermediate electromagnetic theory, special relativity, and some statistical mechanics) is required. Much of this prerequisite material is provided by brief reviews, making the book a self-contained reference for workers in the field as well as the ideal text for senior or first-year graduate students of astronomy, astrophysics, and related physics courses. *Radiative Processes in Astrophysics* also contains about 75 problems, with solutions, illustrating applications of the material and methods for calculating results. This important and integral section emphasizes physical intuition by presenting important results that are used throughout the main text; it is here that most of the practical astrophysical applications become apparent. *Astronomy* is written in clear non-technical language, with the occasional touch of humor and a wide range of clarifying illustrations. It has many analogies drawn from everyday life to help non-science majors appreciate, on their own terms, what our modern exploration of the universe is revealing. The book can be used for either a one-semester or two-semester introductory course (bear in mind, you can customize your version and include only those chapters or sections you will be teaching.) It is made available free of charge in electronic form (and low cost in printed form) to students around the world. If you have ever thrown up your hands in despair over the spiraling cost of astronomy textbooks, you owe your students a good look at this one. Coverage and Scope *Astronomy* was written, updated, and reviewed by a broad range of astronomers and astronomy

educators in a strong community effort. It is designed to meet scope and sequence requirements of introductory astronomy courses nationwide. Chapter 1: Science and the Universe: A Brief Tour Chapter 2: Observing the Sky: The Birth of Astronomy Chapter 3: Orbits and Gravity Chapter 4: Earth, Moon, and Sky Chapter 5: Radiation and Spectra Chapter 6: Astronomical Instruments Chapter 7: Other Worlds: An Introduction to the Solar System Chapter 8: Earth as a Planet Chapter 9: Cratered Worlds Chapter 10: Earthlike Planets: Venus and Mars Chapter 11: The Giant Planets Chapter 12: Rings, Moons, and Pluto Chapter 13: Comets and Asteroids: Debris of the Solar System Chapter 14: Cosmic Samples and the Origin of the Solar System Chapter 15: The Sun: A Garden-Variety Star Chapter 16: The Sun: A Nuclear Powerhouse Chapter 17: Analyzing Starlight Chapter 18: The Stars: A Celestial Census Chapter 19: Celestial Distances Chapter 20: Between the Stars: Gas and Dust in Space Chapter 21: The Birth of Stars and the Discovery of Planets outside the Solar System Chapter 22: Stars from Adolescence to Old Age Chapter 23: The Death of Stars Chapter 24: Black Holes and Curved Spacetime Chapter 25: The Milky Way Galaxy Chapter 26: Galaxies Chapter 27: Active Galaxies, Quasars, and Supermassive Black Holes Chapter 28: The Evolution and Distribution of Galaxies Chapter 29: The Big Bang Chapter 30: Life in the Universe Appendix A: How to Study for Your Introductory Astronomy Course Appendix B: Astronomy Websites, Pictures, and Apps Appendix C: Scientific Notation Appendix D: Units Used in Science Appendix E: Some Useful Constants for Astronomy Appendix F: Physical and Orbital Data for the Planets Appendix G: Selected Moons of the Planets Appendix H: Upcoming Total Eclipses Appendix I: The Nearest Stars, Brown Dwarfs, and White Dwarfs Appendix J: The Brightest Twenty Stars Appendix K: The Chemical Elements Appendix L: The Constellations Appendix M: Star Charts and Sky Event Resources

A concrete, mid-level treatment, this readable and authoritative translation from the French provides an excellent guide to observational astrophysics. Methods of research and observation receive as much attention as results. Topics include stellar photometry and spectroscopy, classification and properties of normal stars, construction of Hertzsprung- Russell diagrams, Yerkes two-dimensional classification, and much more. Reprint of *Introduction à l'astrophysique: les étoiles*, Max Leclerc et Cie, 1961.

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.

Since the dawn of humankind, people have looked upward to the heavens and tried to understand them. This encyclopedia takes you on an expedition through time and space to discover our place in the universe. We invite you to take a journey through the wonders of the universe. Explore the cosmos, from planets to black holes, the Big Bang, and everything in-between! Get ready to discover the story of the universe one page at a time! This educational book for young adults will launch you on a wild trip through the cosmos and the incredible discoveries throughout history. Filled to the brim with beautifully illustrated flowcharts, graphics, and jargon-free language, The Astronomy Book breaks down hard-to-grasp concepts to guide you in understanding almost 100 big astronomical ideas. Big Ideas How do we measure the universe? Where is the event horizon? What is dark matter? Now you can find out all the answers to these questions and so much more in this inquisitive book about our universe! Using incredibly clever visual learning devices like step-by-step diagrams, you'll learn more about captivating topics from the Copernican Revolution. Dive into the mind-boggling theories of recent science in a user-friendly format that makes the information easy to follow. Explore the biographies, theories, and discoveries of key astronomers through the ages such as Ptolemy, Galileo, Newton, Hubble, and Hawking. To infinity and beyond! Journey through space and time with us: - From Myth to Science 600 BCE - 1550 CE - The Telescope Revolution 1550 - 1750 - Uranus to Neptune 1750 - 1850 - The Rise of Astrophysics 1850 - 1915 - Atom, Stars, And Galaxies 1915 - 1950 - New Windows on The Universe 1950 - 1917 - The Triumph of Technology 1975 - Present The Series Simply Explained With over 7 million copies sold worldwide to date, The Astronomy Book is part of the award-winning Big Ideas Simply Explained series from DK Books. It uses innovative graphics along with engaging writing to make complex subjects easier to understand. Shortlisted: A Young Adult Library Services Association Outstanding Books for the College Bound and Lifelong Learners list selection A Mom's Choice Awards® Honoring Excellence Gold Seal of Approval for Young Adult Books A Parents' Choice Gold Award winner

A thorough introduction to modern ideas on cosmology and on the physical basis of the general theory of relativity, An Introduction to the Science of Cosmology explores various theories and ideas in big bang cosmology, providing insight into current problems. Assuming no previous knowledge of astronomy or cosmology, this book takes you beyond introductory texts to the point where you are able to

read and appreciate the scientific literature, which is broadly referenced in the book. The authors present the standard big bang theory of the universe and provide an introduction to current inflationary cosmology, emphasizing the underlying physics without excessive technical detail. The book treats cosmological models without reliance on prior knowledge of general relativity, the necessary physics being introduced in the text as required. It also covers recent observational evidence pointing to an accelerating expansion of the universe. The first several chapters provide an introduction to the topics discussed later in the book. The next few chapters introduce relativistic cosmology and the classic observational tests. One chapter gives the main results of the hot big bang theory. Next, the book presents the inflationary model and discusses the problem of the origin of structure and the correspondingly more detailed tests of relativistic models. Finally, the book considers some general issues raised by expansion and isotropy. A reference section completes the work by listing essential formulae, symbols, and physical constants. Beyond the level of many elementary books on cosmology, *An Introduction to the Science of Cosmology* encompasses numerous recent developments and ideas in the area. It provides more detailed coverage than many other titles available, and the inclusion of problems at the end of each chapter aids in self study and makes the book suitable for taught courses.

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) High-energy astrophysics covers cosmic phenomena that occur under the most extreme physical conditions. It explores the most violent events in the Universe: the explosion of stars, matter falling into black holes, and gamma-ray bursts - the most luminous explosions since the Big Bang. Driven by a wealth of observations, there has been a large leap forward in our understanding of these phenomena. Exploring modern topics of high-energy astrophysics, such as supernovae, neutron stars, compact binary systems, gamma-ray bursts, and active galactic nuclei, this 2007 textbook is ideal for undergraduate students in high-energy astrophysics. It is a self-contained, relevant overview of this exciting field of research. Assuming a familiarity with basic physics, it introduces all other concepts, such as gas dynamics or radiation processes, in an instructive way. An extended appendix gives an overview of some of the most important high-energy astrophysics instruments, and each chapter ends with exercises.

A contemporary and complete introduction to astrophysics for astronomy and physics majors taking a two-semester survey course.

Radio astronomy is an active and rapidly expanding field due to advances in computing techniques, with several important new instruments on the horizon. This text provides a thorough introduction to radio astronomy and its contribution to our understanding of the universe, bridging the gap between basic introductions and research-level treatments. It begins by covering the fundamentals physics of radio techniques, before moving on to single-dish telescopes and aperture synthesis arrays. Fully updated and extensively rewritten, the fourth edition places greater emphasis on techniques, with detailed discussion of interferometry in particular, and comprehensive coverage of digital techniques in the appendices. The science sections are fully revised, with new author Peter N. Wilkinson bringing added expertise to the sections on pulsars, quasars and active galaxies. Spanning the entirety of radio astronomy, this is an engaging introduction for students and researchers approaching radio astronomy for the first time.

Beginning from first principles and adopting a modular structure, this book develops the fundamental physical methods needed to describe and understand a wide range of seemingly very diverse astrophysical phenomena and processes. For example, the discussion of radiation processes including their spectra is based on Larmor's equation and extended by the photon picture and the internal dynamics of radiating quantum systems, leading to the shapes of spectral lines and the ideas of radiation transport. Hydrodynamics begins with the concept of

phase-space distribution functions and Boltzmann's equation and develops ideal, viscous and magneto-hydrodynamics all from the vanishing divergence of an energy-momentum tensor, opening a natural extension towards relativistic hydrodynamics. Linear stability analysis is introduced and used as a common and versatile tool throughout the book. Aimed at students at graduate level, lecturers teaching courses in theoretical astrophysics or advanced topics in modern astronomy, this book with its abundant examples and exercises also serves as a reference and an entry point for more advanced researchers wanting to update their knowledge of the physical processes that govern the behavior and evolution of astronomical objects.

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.

This book is an introduction to “multi-messenger” astrophysics. It covers the many different aspects connecting particle physics with astrophysics and cosmology and introduces astrophysics using numerous experimental findings recently obtained through the study of high-energy particles. Taking a systematic approach, it comprehensively presents experimental aspects from the most advanced laboratories and detectors, as well as the theoretical background. The book is aimed at graduate students and post-graduate researchers with a basic understanding of particle and nuclear physics. It will also be of interest to particle physicists working in accelerator/collider physics who are keen to understand the mechanisms of the largest accelerators in the Universe. The book draws on the extensive lecturing experience of Professor Maurizio Spurio from the University of Bologna.

As in all other fields of astronomy, progress in instrumentation and observational techniques has in recent years brought a wealth of new information about the sun. This introduction presents a complete overview of solar physics, of what we know and would like to know. The increasing number of observations of solar phenomena on neighbouring stars makes this book valuable not only for students specializing in solar physics but also for researchers interested in stellar structure and the solar-stellar connection.

Every atom of our bodies has been part of a star. Our very own star, the Sun, is crucial to the development and sustainability of life on Earth. This Very Short Introduction presents a modern, authoritative examination of how stars live, producing all the chemical elements beyond helium, and how they die, sometimes spectacularly, to end as remnants such as black holes. Andrew King shows how understanding the stars is key to understanding the galaxies they inhabit, and thus the history of our entire

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Universe, as well as the existence of planets like our own. King presents a fascinating exploration of the science of stars, from the mechanisms that allow stars to form and the processes that allow them to shine, as well as the results of their inevitable death. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable.

A coherent introduction for researchers in astronomy, particle physics, and cosmology on the formation and evolution of galaxies.

Fans of Chris Ferrie's ABCs of Biology, ABCs of Space, and Quantum Physics for Babies will love this introduction to aerospace engineering for babies and toddlers! Help your future genius become the smartest baby in the room! It only takes a small spark to ignite a child's mind. Written by an expert, Rocket Science for Babies is a colorfully simple introduction to aerospace engineering. Babies (and grownups!) will learn about the basics of how lift and thrust make things fly. With a tongue-in-cheek approach that adults will love, this installment of the Baby University board book series is the perfect way to introduce basic concepts to even the youngest scientists. After all, it's never too early to become a rocket scientist! If you're looking for engineer board books, infant science books, or more Baby University board books to surprise your little one, look no further! Rocket Science for Babies offers fun early learning for your little scientist!

"Telescopes and Techniques" has proved itself in its first edition, having become probably one of the most widely used astronomy texts, both for numerate amateur astronomers and for astronomy and astrophysics undergraduates. The first and second editions of the book were widely used as set texts for introductory practical astronomy courses in many universities. This book guides the reader through the mathematics, physics and practical techniques needed to use telescopes (from small amateur models to the larger instruments installed in many colleges) and to observe objects in the sky. Mathematics to around Advanced Placement standard (US) or A level (UK) is assumed, although High School Diploma (US) or GCSE-level (UK) mathematics plus some basic trigonometry will suffice most of the time. Most of the physics and engineering involved is described fully and requires no prior knowledge or experience. This is a 'how to' book that provides the knowledge and background required to understand how and why telescopes work. Equipped with the techniques discussed in this book, the observer will be able to operate with confidence his or her telescope and to optimize its performance for a particular purpose. In principle the observer could calculate his or her own predictions of planetary positions (ephemerides), but more realistically the observer will be able to understand the published data lists properly instead of just treating them as 'recipes.' When the observer has obtained measurements, he/she will be able to analyze them in a scientific manner and to understand the significance and meaning of the results. "Telescopes and Techniques, 3rd Edition" fills a niche at the start of an undergraduate astronomer's university studies, as shown by it having been widely adopted as a set textbook. This third edition is now needed to update its material with the many new observing developments and study areas that have come into prominence since it was published. The book concentrates on the knowledge needed to understand how small(ish) optical telescopes function, their main designs and how to

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set them up, plus introducing the reader to the many ways in which objects in the sky change their positions and how they may be observed. Both visual and electronic imaging techniques are covered, together with an introduction to how data (measurements) should be processed and analyzed. A simple introduction to radio telescopes is also included. Brief coverage of the most advanced topics of photometry and spectroscopy are included, but mainly to enable the reader to see some of the developments possible from the basic observing techniques covered in the main parts of the book.

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.

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

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 interpr

This is a book about the physics of stars and starlight. The story of starlight is truly fascinating. Astronomers analyze and interpret the light from stars using photometry and spectroscopy, then inspirational detective work combines with the laws of physics to reveal the temperatures, masses, luminosities and outer structure of these far away points of light. The laws of physics themselves enable us to journey to the very center of a star and to understand its inner structure and source of energy! Starlight provides an in-depth study of stellar astrophysics that requires only basic high school mathematics and physics, making it accessible to all amateur astronomers. Starlight teaches amateur astronomers about the physics of stars and starlight in a friendly, easy-to-read way. The reader will take away a profoundly deeper understanding of this truly fascinating subject – and find his practical observations more rewarding and fulfilling as a result.

This 2000 Edition of Sir Patrick Moore's classic book has been completely revised in the light of changes in technology. Not only do these changes include commercially available astronomical telescopes and software, but also what we know and understand about the universe. There are many new photographs and illustrations. Packs a great deal of valuable information into appendices which make up almost half the book.

These are hugely comprehensive and provide hints and tips, as well as data (year 2000 onwards) for pretty well every aspect of amateur astronomy. This is probably the only

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book in which all this information is collected in one place.

Astrophysics is often - with some justification - regarded as incomprehensible without at least degree-level mathematics. Consequently, many amateur astronomers skip the math, and miss out on the fascinating fundamentals of the subject. In *Astrophysics Is Easy!* Mike Inglis takes a quantitative approach to astrophysics that cuts through the incomprehensible mathematics, and explains the basics of astrophysics in accessible terms. The reader can view objects under discussion with commercial amateur equipment.

This book invites the reader to understand our Universe, not just marvel at it. From the clock-like motions of the planets to the catastrophic collapse of a star into a black hole, gravity controls the Universe. Gravity is central to modern physics, helping to answer the deepest questions about the nature of time, the origin of the Universe and the unification of the forces of nature. Linking key experiments and observations through careful physical reasoning, the author builds the reader's insight step-by-step from simple but profound facts about gravity on Earth to the frontiers of research. Topics covered include the nature of stars and galaxies, the mysteries of dark matter and dark energy, black holes, gravitational waves, inflation and the Big Bang. Suitable for general readers and for undergraduate courses, the treatment uses only high-school level mathematics, supplemented by optional computer programs, to explain the laws of physics governing gravity.

Working physicists, and especially astrophysicists, value a good 'back-of-the-envelope' calculation, meaning a short, elegant computation or argument that starts from general principles and leads to an interesting result. This book guides students on how to understand astrophysics using general principles and concise calculations -- endeavouring to be elegant where possible and using short computer programs where necessary. The material proceeds in approximate historical order. The book begins with the Enlightenment-era insight that the orbits of the planets is easy, but the orbit of the Moon is a real headache, and continues to deterministic chaos. This is followed by a chapter on spacetime and black holes. Four chapters reveal how microphysics, especially quantum mechanics, allow us to understand how stars work. The last two chapters are about cosmology, bringing us to 21st-century developments on the microwave background and gravitational waves.

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 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 is the physics of the stars, and more widely the physics of the Universe. It

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enables us to understand the structure and evolution of planetary systems, stars, galaxies, interstellar gas, and the cosmos as a whole. In this Very Short Introduction, the leading astrophysicist James Binney shows how the field of astrophysics has expanded rapidly in the past century, with vast quantities of data gathered by telescopes exploiting all parts of the electromagnetic spectrum, combined with the rapid advance of computing power, which has allowed increasingly effective mathematical modelling. He illustrates how the application of fundamental principles of physics - the consideration of energy and mass, and momentum - and the two pillars of relativity and quantum mechanics, has provided insights into phenomena ranging from rapidly spinning millisecond pulsars to the collision of giant spiral galaxies. This is a clear, rigorous introduction to astrophysics for those keen to cut their teeth on a conceptual treatment involving some mathematics. ABOUT THE SERIES: The Very Short Introductions series from Oxford University Press contains hundreds of titles in almost every subject area. These pocket-sized books are the perfect way to get ahead in a new subject quickly. Our expert authors combine facts, analysis, perspective, new ideas, and enthusiasm to make interesting and challenging topics highly readable. Along with classic papers by Fowler, Hoyle, and the Burbidges, this work stands as a key foundation in the development of nuclear astrophysics. Long out of print and very hard to find, this remarkable work has been edited and re-typeset by an atomic expert. Now available in an affordable paperback edition for the very first time, it addresses interrelated questions — What are stars? How does the sun shine? Why is gold so rare, and where did the elements come from? — that have puzzled observers from time immemorial. Edited and re-typeset reprint of the original Atomic Energy of Canada, Ltd., 1957 edition.

Jo Dunkley combines her expertise as an astrophysicist with her talents as a writer and teacher to present an elegant introduction to the structure, history, and enduring mysteries of the universe. Among the cutting-edge phenomena discussed are the accelerating expansion of the universe and the possibility that our universe is only one of many.

"In *An Introduction to Nuclear Astrophysics*, Richard N. Boyd includes basic nomenclature and information so that students from astronomy or physics can quickly orient themselves. Subsequent chapters describe earthbound and spaceborne instruments operating in service to nuclear astrophysics worldwide; background topics such as nuclear and neutrino physics, scattering formalism, and thermonuclear reaction rates; and information on galactic chemical evolution, solar nucleosynthesis, s- and r-processes, and gamma-ray bursts. Each chapter includes problem sets against which students may test their knowledge before moving ahead, and Boyd has included copious references intended to guide students to further study"--Jacket.

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.

Astrophysics is often –with some justification – regarded as incomprehensible without the use of higher mathematics. Consequently, many amateur astronomers miss out on

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some of the most fascinating aspects of the subject. *Astrophysics Is Easy!* cuts through the difficult mathematics and explains the basics of astrophysics in accessible terms. Using nothing more than plain arithmetic and simple examples, the workings of the universe are outlined in a straightforward yet detailed and easy-to-grasp manner. The original edition of the book was written over eight years ago, and in that time, advances in observational astronomy have led to new and significant changes to the theories of astrophysics. The new theories will be reflected in both the new and expanded chapters. A unique aspect of this book is that, for each topic under discussion, an observing list is included so that observers can actually see for themselves the concepts presented –stars of the spectral sequence, nebulae, galaxies, even black holes. The observing list has been revised and brought up-to-date in the Second Edition.

Introduction to Astronomy & Cosmology is a modern undergraduate textbook, combining both the theory behind astronomy with the very latest developments. Written for science students, this book takes a carefully developed scientific approach to this dynamic subject. Every major concept is accompanied by a worked example with end of chapter problems to improve understanding. Includes coverage of the very latest developments such as double pulsars and the dark galaxy. Beautifully illustrated in full colour throughout. Supplementary web site with many additional full colour images, content, and latest developments.

This practical manual provides essential material for the extensive world-wide community of non-professional astronomers. Every page of the book is alive with the infectious enthusiasm of the author whose expertise, knowledge and teaching experience provides easy access to the fascination and enjoyment of sky-watching. Provides essential material for the extensive world-wide community of non-professional astronomers. The author's enthusiasm is reflected in every page, and his expertise, knowledge and teaching experience provides easy access to the fascination and enjoyment of sky-watching. Includes chapters on the celestial sphere, the sun and sundials, star positions, star maps, planispheres and nomograms, and light and basic optics

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