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General relativity is now an essential part of undergraduate and graduate

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courses in physics, astrophysics and applied mathematics. This simple, user-friendly introduction to relativity is ideal for a first course in the subject. Beginning with a comprehensive but simple review of special relativity, the book creates a framework from which to launch the ideas of general

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relativity. After describing the basic theory, it moves on to describe important applications to astrophysics, black hole physics, and cosmology. Several worked examples, and numerous figures and images, help students appreciate the underlying concepts. There are also 180

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exercises which test and develop students' understanding of the subject. The textbook presents all the necessary information and discussion for an elementary approach to relativity. Password-protected solutions to the exercises are available to instructors at

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www.cambridge.org/9780521735612.

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

A comprehensive and authoritative introduction to contemporary cosmology for advanced

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undergraduate and graduate students. This concise textbook covers all aspects of the interstellar and intergalactic medium, for graduate students and advanced undergraduates.

Designed for teaching astrophysics to physics students at advanced

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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

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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

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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.

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The Physics of Stars

Galaxy Formation and Evolution

An Inside History of Our Modern

Understanding of the Universe

Galaxies in the Universe

Cosmology

A coherent introduction for

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researchers in astronomy, particle physics, and cosmology on the formation and evolution of galaxies.

This introductory textbook describes modern cosmology at a level suitable for advanced

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undergraduates who are familiar with mathematical methods and basic theoretical physics. An introductory survey of the large scale structure of the universe is followed by an outline of general relativity. This is then used to

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construct the standard models of the universe. The very early and early stages of the Big Bang are described, and this includes primordial nucleosynthesis, grand unified theories, primordial black holes, and the era of quantum

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cosmology. The problem of the formation of structure in the universe is then addressed. This textbook concludes with brief outlines of alternative cosmologies. It includes 400 problems for students to solve,

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and is accompanied by numerous worked examples.

Our Universe is made of a dozen fundamental building blocks.

Among these, neutrinos are the most mysterious - but they are the second most abundant particles

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in the Universe. This book provides detailed discussions of how to describe neutrinos, their basic properties, and the roles they play in nature. This book is a gentle introduction for all those wishing to learn about

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modern views of the cosmos. Our universe originated in a great explosion – the big bang. For nearly a century cosmologists have studied the aftermath of this explosion: how the universe expanded and cooled down, and

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how galaxies were gradually assembled by gravity. The nature of the bang itself has come into focus only relatively recently. It is the subject of the theory of cosmic inflation, which was developed in the last few decades and has led

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to a radically new global view of the universe. Students and other interested readers will find here a non-technical but conceptually rigorous account of modern cosmological ideas - describing what we know, and how we know

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it. One of the book's central themes is the scientific quest to find answers to the ultimate cosmic questions: Is the universe finite or infinite? Has it existed forever? If not, when and how did it come into being? Will it ever

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end? The book is based on the undergraduate course taught by Alex Vilenkin at Tufts University. It assumes no prior knowledge of physics or mathematics beyond elementary high school math. The necessary physics background is

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introduced as it is required. Each chapter includes a list of questions and exercises of varying degree of difficulty. This textbook, derived from courses given by three leading researchers, provides advanced

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undergraduates and graduates with up-to-date coverage of space physics, from the Sun to the interstellar medium. Clear explanations of the underlying physical processes are presented alongside major new discoveries

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and knowledge gained from space missions, ground-based observations, theory, and modelling to inspire students. Building from the basics to more complex ideas, the book contains enough material for a two-

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semester course but the authors also provide suggestions for how the material can be tailored to fit a single semester. End-of-chapter problems reinforce concepts and include computer-based exercises specially developed for

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this textbook package. Free access to the software is available via the book's website and enables students to model the behavior of magnetospheric and solar plasma. An extensive glossary recaps new terms and

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Carefully selected further reading sections encourage students to explore advanced topics of interest.

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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,

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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

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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

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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

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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

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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.

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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

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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

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designed to enhance your learning, as well as errata within the text.

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

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physics and astronomy.

Targeting advanced students of astronomy and physics, as well as astronomers and physicists contemplating research on supernovae or related fields, David Branch and J. Craig

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Wheeler offer a modern account of the nature, causes and consequences of supernovae, as well as of issues that remain to be resolved. Owing especially to (1) the appearance of supernova 1987A in the nearby Large

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Magellanic Cloud, (2) the spectacularly successful use of supernovae as distance indicators for cosmology, (3) the association of some supernovae with the enigmatic cosmic gamma-ray bursts, and (4) the

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discovery of a class of superluminous supernovae, the pace of supernova research has been increasing sharply. This monograph serves as a broad survey of modern supernova research and a guide to the

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current literature. The book's emphasis is on the explosive phases of supernovae. Part 1 is devoted to a survey of the kinds of observations that inform us about supernovae, some basic interpretations of such data, and

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an overview of the evolution of stars that brings them to an explosive endpoint. Part 2 goes into more detail on core-collapse and superluminous events: which kinds of stars produce them, and how do they do it?

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Part 3 is concerned with the stellar progenitors and explosion mechanisms of thermonuclear (Type Ia) supernovae. Part 4 is about consequences of supernovae and some applications to astrophysics and

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cosmology. References are provided in sufficient number to help the reader enter the literature.

This concise textbook, designed specifically for a one-semester course in astrophysics,

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introduces astrophysical concepts to undergraduate science and engineering students with a background in college-level, calculus-based physics. The text is organized into five parts covering: stellar

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properties; stellar structure and evolution; the interstellar medium and star/planet formation; the Milky Way and other galaxies; and cosmology. Structured around short easily digestible chapters, instructors

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have flexibility to adjust their course's emphasis as it suits them. Exposition drawn from the author's decade of teaching his course guides students toward a basic but quantitative understanding, with 'quick

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questions' to spur practice in basic computations, together with more challenging multi-part exercises at the end of each chapter. Advanced concepts like the quantum nature of energy and radiation are developed as

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needed. The text's approach and level bridge the wide gap between introductory astronomy texts for non-science majors and advanced undergraduate texts for astrophysics majors.

Cosmology: The Science of the

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Universe is an introduction to past and present cosmological theory. For much of the world's history, cosmological thought was formulated in religious or philosophical language and was thus theological or metaphysical

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in nature. However, cosmological speculation and theory has now become a science in which the empirical discoveries of the astronomer, theoretical physicist, and biologist are woven into intricate models that

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attempt to account for the universe as a whole. Professor Harrison draws on the discoveries and speculations of these scientists to provide a comprehensive survey of man's current understanding of the

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universe and its history. Tracing the rise of the scientific method, the major aim of this book is to provide an elementary understanding of the physical universe of modern times. Thoroughly revised and updated,

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this second edition extends the much acclaimed first edition taking into account the many developments that have occurred.

An Introduction

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**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**

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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.

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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

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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

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**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**

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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

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**and a handy reference for
teachers and researchers. The
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results Contains a broad and well-**

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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,

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evolution can predict how stars**

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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,

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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

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them with complex math. An approachable writing style and wealth of fresh and imaginative analogies from “everyday” physics are used to make the concepts of cosmology more accessible.

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**Introduction to
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Press

**This is the definitive treatment of
the phenomenology of galaxies--a
clear and comprehensive volume
that takes full account of the**

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extraordinary recent advances in the field. The book supersedes the classic text Galactic Astronomy that James Binney wrote with Dimitri Mihalas, and complements Galactic Dynamics by Binney and Scott Tremaine. It

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will be invaluable to researchers and is accessible to any student who has a background in undergraduate physics. The book draws on observations both of our own galaxy, the Milky Way, and of external galaxies. The two

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sources are complementary, since the former tends to be highly detailed but difficult to interpret, while the latter is typically poorer in quality but conceptually simpler to understand. Binney and Merrifield introduce all

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astronomical concepts necessary to understand the properties of galaxies, including coordinate systems, magnitudes and colors, the phenomenology of stars, the theory of stellar and chemical evolution, and the measurement

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of astronomical distances. The book's core covers the phenomenology of external galaxies, star clusters in the Milky Way, the interstellar media of external galaxies, gas in the Milky Way, the structure and kinematics

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of the stellar components of the Milky Way, and the kinematics of external galaxies. Throughout, the book emphasizes the observational basis for current understanding of galactic astronomy, with references to the

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original literature. Offering both new information and a comprehensive view of its subject, it will be an indispensable source for professionals, as well as for graduate students and advanced undergraduates.

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**An Introduction to Modern
Astrophysics**

**Introduction to Cosmology,
Pearson New International
Edition**

Physical Foundations of

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Cosmology

Galactic Astronomy

Inflationary cosmology has been developed over the last twenty years to remedy serious shortcomings in the standard hot big bang model

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of the universe. This textbook, first published in 2005, explains the basis of modern cosmology and shows where the theoretical results come from. The book is divided into two parts; the first deals with the

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homogeneous and isotropic model of the Universe, the second part discusses how inhomogeneities can explain its structure. Established material such as the inflation and quantum cosmological perturbation

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are presented in great detail, however the reader is brought to the frontiers of current cosmological research by the discussion of more speculative ideas. An ideal textbook for both advanced students of physics

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and astrophysics, all of the necessary background material is included in every chapter and no prior knowledge of general relativity and quantum field theory is assumed.

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*physicist P. J. E. Peebles,
the story of cosmology from
Einstein to today Modern
cosmology began a century
ago with Albert Einstein's
general theory of relativity
and his notion of a
homogenous, philosophically*

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satisfying cosmos.

Cosmology's Century is the story of how generations of scientists built on these thoughts and many new measurements to arrive at a well-tested physical theory of the structure and

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was at the forefront of many of the greatest discoveries of the past century, making fundamental contributions to our understanding of the presence of helium and microwave radiation from the hot big bang, the measures

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of the distribution and motion of ordinary matter, and the new kind of dark matter that allows us to make sense of these results. Taking readers from the field's beginnings, Peebles describes how scientists

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working in independent directions found themselves converging on a theory of cosmic evolution interesting enough to warrant the rigorous testing it passes so well. He explores the major advances—some inspired

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by remarkable insights or perhaps just lucky guesses—as well as the wrong turns taken and the roads not explored. He shares recollections from major players in this story and provides a rare, inside look

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at how natural science is really done. A monumental work, Cosmology's Century also emphasizes where the present theory is incomplete, suggesting exciting directions for continuing research.

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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

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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

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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

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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

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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

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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

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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

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the seminal papers in the field, with further reference to recent applications, results, or specialised literature. This second edition of Introduction to Cosmology is an exciting update of an

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award-winning textbook. It is aimed primarily at advanced undergraduate students in physics and astronomy, but is also useful as a supplementary text at higher levels. It explains modern cosmological

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concepts, such as dark energy, in the context of the Big Bang theory. Its clear, lucid writing style, with a wealth of useful everyday analogies, makes it exceptionally engaging. Emphasis is placed on the

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links between theoretical concepts of cosmology and the observable properties of the universe, building deeper physical insights in the reader. The second edition includes recent observational results,

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fuller descriptions of special and general relativity, expanded discussions of dark energy, and a new chapter on baryonic matter that makes up stars and galaxies. It is an ideal textbook for the

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*era of precision cosmology
in the accelerating
universe.*

*The major strength of the
book is that the author does
not evade the problems
presented by some hard
physics and astrophysics,*

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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

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physics, astrophysics and astronomy will find it useful.

*Essential Astrophysics
Introduction to Cosmology
Supernova Explosions
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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

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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

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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

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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

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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.

The Fourth Edition of Introduction

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to Cosmology provides a concise, authoritative study of cosmology at an introductory level. Starting from elementary principles and the early history of cosmology, the text carefully guides the student on to curved spacetimes, special

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*and general relativity,
gravitational lensing, the thermal
history of the Universe, and
cosmological models, including
extended gravity models, black
holes and Hawking's recent
conjectures on the not-so-black*

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holes. Introduction to Cosmology, Fourth Edition includes: New theoretical approaches and in-depth material on observational astrophysics and expanded sections on astrophysical phenomena Illustrations

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*throughout and comprehensive references with problems at the end of each chapter and a rich index at the end of the book
Latest observational results from WMAP9, ACT, and Planck, and all cosmological parameters have*

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been brought up to date. This text is invaluable for undergraduate students in physics and astrophysics taking a first course in cosmology. Extensively revised, this latest edition extends the chapter on cosmic inflation to the

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recent schism on eternal inflation and multiverses. Dark matter is discussed on galaxy and cluster scales, and dark matter candidates are presented, some requiring a five-dimensional universe and several representing

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various types of exotica. In the context of cosmic structures the cold dark matter paradigm is described. Dark energy models include the cosmological constant, quintessence and other single field models, $f(R)$ models and

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models requiring extra dimensions.

Publisher Description

Noted author Jeremy Bernstein explores the physics of cosmology without focusing on the full machinery of general relativity.

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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

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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

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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-

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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

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researchers alike.

*Introduction To General Relativity
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Astrophysics for Physicists

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An Introduction to the Theory of Stellar Structure and Evolution
The Physics of Stars, Second Edition,
is a concise introduction to the
properties of stellar interiors and
consequently the structure and
evolution of stars. Strongly
emphasising the basic physics,

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simple and uncomplicated theoretical models are used to illustrate clearly the connections between fundamental physics and stellar properties. This text does not intend to be encyclopaedic, rather it tends to focus on the most interesting and important aspects of stellar

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structure, evolution and nucleosynthesis. In the Second Edition, a new chapter on Helioseismology has been added, along with a list of physical constants and extra student problems. There is also new material on the Hertzsprung-Russell diagram, as

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well as a general updating of the entire text. It includes numerous problems at the end of each chapter aimed at both testing and extending student's knowledge.

This extensively illustrated book presents the astrophysics of galaxies since their beginnings in the early

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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

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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

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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.

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This text provides an up-to-date and pedagogical introduction to this exciting area of research.

Introduction to Astronomy & Cosmology is a modern undergraduate textbook, combining both the theory behind astronomy with the very latest developments.

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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

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