

Special And General Relativity With Applications To White Dwarfs Neutron Stars And Black Holes 1st

[#Special Relativity](#) [#General Relativity](#) [#White Dwarfs](#) [#Neutron Stars](#) [#Black Holes](#)

This comprehensive book explores the fundamental principles of Special and General Relativity, demonstrating their crucial applications to the most extreme phenomena in astrophysics. Readers will gain a deep understanding of the physics governing White Dwarfs, Neutron Stars, and Black Holes, and how these cosmic objects are shaped by the laws of relativity.

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Special and General Relativity

Special and General Relativity are concisely developed together with essential aspects of nuclear and particle physics. Problem sets are provided for many chapters, making the book ideal for a course on the physics of white dwarf and neutron star interiors. Norman K. Glendenning is Senior Scientist Emeritus at the Nuclear Science Division, Institute for Nuclear and Particle Astrophysics, Lawrence Berkeley National Laboratory at the University of California, Berkeley. He is the author of numerous books.

Black Holes, White Dwarfs, and Neutron Stars

This self-contained textbook brings together many different branches of physics--e.g. nuclear physics, solid state physics, particle physics, hydrodynamics, relativity--to analyze compact objects. The latest astronomical data is assessed. Over 250 exercises.

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The Neutron Star

Proceedings of the NATO Advanced Study Institute, Elounda, Crete, Greece, 7-18 June 1999

General Relativity, Astrophysics, and Cosmology

For about half a century the general theory of relativity attracted little attention from physicists. However, the discovery of compact objects such as quasars and pulsars, as well as candidates for black holes on the one hand, and the microwave background radiation on the other hand completely changed the picture. In addition, developments in elementary particle physics, such as predictions of the behavior of matter at the ultrahigh energies that might have prevailed in the early stages of the big bang, have greatly enhanced the interest in general relativity. These developments created a large body of readers interested in general relativity, and its applications in astrophysics and cosmology. Having neither the time nor the inclination to delve deeply into the technical literature, such readers need a general introduction to the subject before exploring applications. It is for these readers that the present volume is intended. Keeping in mind the broad range of interests and wanting to avoid mathematical complications as much as possible, we have ventured to combine all three topics relativity, astrophysics, and cosmology in a single volume. Naturally, we had to make a careful selection of topics to be discussed in order to keep the book to a manageable length.

Applications of General Relativity

The aim of this textbook is to present in a comprehensive way several advanced topics of general relativity, including gravitational waves, tests of general relativity, time delay, spinors in curved spacetime, Hawking radiation, and geodetic precession to mention a few. These are all important topics in today's research activities from both a theoretical and experimental point of view. This textbook is designed for advanced undergraduate and graduate students to strengthen the knowledge acquired during the core courses on General Relativity. The author developed the book from a series of yearly lectures with the intention of offering a gentle introduction to the field. This book helps understanding the more specialized literature and can be used as a first reading to get quickly into the field when starting research. Chapter-end exercises complete the learning material to master key concepts.

Physics, Formation and Evolution of Rotating Stars

Rotation is ubiquitous at each step of stellar evolution, from star formation to the final stages, and it affects the course of evolution, the timescales and nucleosynthesis. Stellar rotation is also an essential prerequisite for the occurrence of Gamma-Ray Bursts. In this book the author thoroughly examines the basic mechanical and thermal effects of rotation, their influence on mass loss by stellar winds, the effects of differential rotation and its associated instabilities, the relation with magnetic fields and the evolution of the internal and surface rotation. Further, he discusses the numerous observational signatures of rotational effects obtained from spectroscopy and interferometric observations, as well as from chemical abundance determinations, helioseismology and asteroseismology, etc. On an introductory level, this book presents in a didactical way the basic concepts of stellar structure and evolution in "track 1" chapters. The other more specialized chapters form an advanced course on the graduate level and will further serve as a valuable reference work for professional astrophysicists.

White Dwarfs--black Holes

Second edition of a widely-used textbook providing the first step into general relativity for undergraduate students with minimal mathematical background.

A First Course in General Relativity

Introduces the physics of general relativity in relation to modern topics such as gamma-ray bursts, black holes, and gravitational waves.

Modern General Relativity

This book is based on a set of 18 class-tested lectures delivered to fourth-year physics undergraduates at Griffith University in Brisbane, and the book presents new discoveries by the Nobel-prize winning LIGO collaboration. The author begins with a review of special relativity and tensors and then develops the basic elements of general relativity (a beautiful theory that unifies special relativity and gravitation via geometry) with applications to the gravitational deflection of light, global positioning systems, black holes, gravitational waves, and cosmology. The book provides readers with a solid understanding of the underlying physical concepts; an ability to appreciate and in many cases derive important applications of the theory; and a solid grounding for those wishing to pursue their studies further. General Relativity: An Introduction to Black Holes, Gravitational Waves, and Cosmology also connects general relativity

with broader topics. There is no doubt that general relativity is an active and exciting field of physics, and this book successfully transmits that excitement to readers.

General Relativity

This book contains a set of articles based on a session of the annual meeting of the American Association for the Advancement of Science held in San Francisco in February, 1974. The reason for the meeting arose from the need to communicate to the largest possible scientific community the dramatic advances which have been made in recent years in the understanding of collapsed objects: neutron stars and black holes. Thanks to an unprecedented resonance between X-ray, y-ray, radio and optical astronomy and important new theoretical developments in relativistic astro physics, a new deep understanding has been acquired of the physical processes occurring in the late stages of evolution of stars. This knowledge may be one of the greatest conquests of man's understanding of nature in this century. This book aims to give an essential and up-to-date view in this field. The analysis of the physics and astrophysics of neutron stars and black holes is here attacked from both theoretical and experimental points of view. In the experimental field we range from the reviews and catalogues of galactic X-ray sources (R. Gursky and E. Schreier) and pulsars (E. Groth) to the observations of the optical counter part of X-ray sources (P. Boynton) to finally the recently discovered gamma-ray bursts (I. Strong) and pulse astronomy R. B. Partridge).

Neutron Stars, Black Holes and Binary X-Ray Sources

The foundations are thoroughly developed together with the required mathematical background from differential geometry developed in Part III. The author also discusses the tests of general relativity in detail, including binary pulsars, with much space is devoted to the study of compact objects, especially to neutron stars and to the basic laws of black-hole physics. This well-structured text and reference enables readers to easily navigate through the various sections as best matches their backgrounds and perspectives, whether mathematical, physical or astronomical. Very applications oriented, the text includes very recent results, such as the supermassive black-hole in our galaxy and first double pulsar system

General Relativity

The birth of a completely new branch of observational astronomy is a rare and exciting occurrence. For a long time, our theories about gravitational waves—proposed by Albert Einstein and others more than a hundred years ago—could never be fully proven, since we lacked the proper technology to do it. That all changed when, on September 14, 2015, instruments at the LIGO Observatory detected gravitational waves for the first time. This book explores the nature of gravitational waves—what they are, where they come from, why they are so significant and why nobody could prove they existed before now. Written in plain language and interspersed with additional explanatory tutorials, it will appeal to lay readers, science enthusiasts, physical science students, amateur astronomers and to professional scientists and astronomers.

Understanding Gravitational Waves

Modern comprehensive introduction and overview of the physics of White Dwarfs, Neutron Stars and Black Holes, including all relevant observations. Contains a basic introduction to General Relativity, including the modern 3+1 split of spacetime and of Einstein's equations. The split is used for the first time to derive the structure equations for rapidly rotating neutron stars and Black Holes. Detailed discussions and derivations of current theoretical results. In particular also the most recent equations of state for neutron star matter are explained. Topics , such as colour superconductivity are discussed and used for modelling. A book for graduate students and researchers. Contains exercises and some solutions.

Compact Objects in Astrophysics

'Gravity, a Geometrical Course' presents general relativity (GR) in a systematic and exhaustive way, covering three aspects that are homogenized into a single texture: i) the mathematical, geometrical foundations, exposed in a self consistent contemporary formalism, ii) the main physical, astrophysical and cosmological applications, updated to the issues of contemporary research and observations, with glimpses on supergravity and superstring theory, iii) the historical development of scientific ideas underlying both the birth of general relativity and its subsequent evolution. The book, divided in two

volumes, is a rich resource for graduate students and those who wish to gain a deep knowledge of the subject without an instructor. Volume One is dedicated to the development of the theory and basic physical applications. It guides the reader from the foundation of special relativity to Einstein field equations, illustrating some basic applications in astrophysics. A detailed account of the historical and conceptual development of the theory is combined with the presentation of its mathematical foundations. Differentiable manifolds, fibre-bundles, differential forms, and the theory of connections are covered, with a sketchy introduction to homology and cohomology. (Pseudo)-Riemannian geometry is presented both in the metric and in the vielbein approach. Physical applications include the motions in a Schwarzschild field leading to the classical tests of GR (light-ray bending and periastron advance) discussion of relativistic stellar equilibrium, white dwarfs, Chandrasekhar mass limit and polytropes. An entire chapter is devoted to tests of GR and to the indirect evidence of gravitational wave emission. The formal structure of gravitational theory is at all stages compared with that of non gravitational gauge theories, as a preparation to its modern extension, namely supergravity, discussed in the second volume. Pietro Frè is Professor of Theoretical Physics at the University of Torino, Italy and is currently serving as Scientific Counsellor of the Italian Embassy in Moscow. His scientific passion lies in supergravity and all allied topics, since the inception of the field, in 1976. He was professor at SISSA, worked in the USA and at CERN. He has taught General Relativity for 15 years. He has previously two scientific monographs, "Supergravity and Superstrings" and "The N=2 Wonderland", He is also the author of a popular science book on cosmology and two novels, in Italian.

Nuclear Science Abstracts

Albert Einstein's General Theory of Relativity, published in 1915, made a remarkable prediction: gravitational radiation. Just like light (electromagnetic radiation), gravity could travel through space as a wave and affect any objects it encounters by alternately compressing and expanding them. However, there was a problem. The force of gravity is around a trillion, trillion, trillion times weaker than electromagnetism so the calculated compressions and expansions were incredibly small, even for gravity waves resulting from a catastrophic astrophysical event such as a supernova explosion in our own galaxy. Discouraged by this result, physicists and astronomers didn't even try to detect these tiny, tiny effects for over 50 years. Then, in the late 1960s and early 1970s, two events occurred which started the hunt for gravity waves in earnest. The first was a report of direct detection of gravity waves thousands of times stronger than even the most optimistic calculation. Though ultimately proved wrong, this result started scientists thinking about what instrumentation might be necessary to detect these waves. The second was an actual, though indirect, detection of gravitational radiation due to the effects it had on the period of rotation of two 'neutron stars' orbiting each other. In this case, the observations were in exact accord with predictions from Einstein's theory, which confirmed that a direct search might ultimately be successful. Nevertheless, it took another 40 years of development of successively more sensitive detectors before the first real direct effects were observed in 2015, 100 years after gravitational waves were first predicted. This is the story of that hunt, and the insight it is producing into an array of topics in modern science, from the creation of the chemical elements to insights into the properties of gravity itself.

Gravity, a Geometrical Course

The supermassive black hole in the center of our Milky Way is the nearest such object and relatively easy to observe and study. Not surprisingly therefore, it is the best studied supermassive black hole. Many astrophysical and even general relativistic effects can be investigated in great detail. The Galactic Black Hole: Lectures on General Relativity and Astrophysics provides a systematic introduction to the physics/astrophysics and mathematics of black holes at a level suitable for graduate students, postdocs, and researchers in physics, astrophysics, astronomy, and applied mathematics. The focus is mainly on the supermassive black hole in the center of our Milky Way but the results can be easily generalized taking it as an example. Leading international experts provide first-hand accounts of the observational and theoretical aspects of this black hole. Topics range from the properties of the Schwarzschild metric and the collapse of a black hole, to quantum gravity, and from the structure of the Galaxy to accretion of matter and the emission properties of the Galactic Center black hole.

Neutron Stars, Black Holes, and Gravitational Waves

Astronomy and Astrophysics Abstracts, which has appeared in semi-annual volumes since 1969, is devoted to the recording, summarizing and indexing of astronomical publications throughout the world.

It is prepared under the auspices of the International Astronomical Union (according to a resolution adopted at the 14th General Assembly in 1970). Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of literature in all fields of astronomy and astrophysics. Every effort will be made to ensure that the average time interval between the date of receipt of the original literature and publication of the abstracts will not exceed eight months: This time interval is near to that achieved by monthly abstracting journals, compared to which our system of accumulating abstracts for about six months offers the advantage of greater convenience for the user. I, 1980; some older Volume 27 contains literature published in 1980 and received before August literature which was received late and which is not recorded in earlier volumes is also included. We acknowledge with thanks contributions to this volume by Dr. J. Bouska, Prague, who surveyed journals and publications in Czech and supplied us with abstracts in English.

The Galactic Black Hole

This is a highly interdisciplinary book straddling physics and complex systems such as living organisms. The presentation is from the perspective of physics, in a manner accessible to those interested in scientific knowledge integrated within its socio-cultural and philosophical backgrounds. Two key areas of human understanding, namely physics and conscious complex systems, are presented in simple language. An optional technical presentation is also given in parallel where it is needed. Contents: Part I. The Nature of Physical Law: A Bird's Eye View of Our Quest An Epistemic Hunt for Scientific Truth The Laws of Nature and the Supremacy of Symmetry Maxwell's Magical Trinity — Electricity, Magnetism and Light The Theory of Relativity The Quantum World and 'Reality' Entanglement, Measurement and Quantum Paradoxes Many Particle Systems and the Classical Limit Energy, Entropy and Emergent Properties Part II. Complex Systems and Consciousness: Bio-Molecules, the Sub-Slime of Astrochemistry The Cell as the Basic Unit of Life Specialized Cells for Sight, Insight, and Information Exotic, Quantum Explanations of Consciousness Addressing the Enigmatic Questions Readership: General audience with interest in physics and complex systems biology as well as science academics. Keywords: Laws of Physics; Epistemology of Science; Scientific Revolutions; Relativity; Quantum Theory; Bohmian Picture; Paradoxes in Physics; Density Functional Theory; Decoherence; Thermodynamics; Determinism and Free Will; Emergent Properties; Evolution; Origin of life; Memory; Consciousness Key Features: The book traces developments in astrochemistry and the origin of life, and it provides the reader with our modern understanding of memory and consciousness

Literature 1980, Part 1

"This book is composed of two parts: First part describes basics in numerical relativity, that is, the formulations and methods for a solution of Einstein's equation and general relativistic matter field equations. This part will be helpful for beginners of numerical relativity who would like to understand the content of numerical relativity and its background. The second part focuses on the application of numerical relativity. A wide variety of scientific numerical results are introduced focusing in particular on the merger of binary neutron stars and black holes."--

Sources of Gravitational Radiation

A whole decades research collated, organised and synthesised into one single book! Following a 60-page review of the seminal treatises of Misner, Thorne, Wheeler and Weinberg on general relativity, Glendenning goes on to explore the internal structure of compact stars, white dwarfs, neutron stars, hybrids, strange quark stars, both the counterparts of neutron stars as well as of dwarfs. This is a self-contained treatment and will be of interest to graduate students in physics and astrophysics as well as others entering the field.

A Physicist's View of Matter and Mind

Relativity, apart from quantum mechanics, is the greatest wonder in science, unfolded single-handedly in the 20th century by Albert Einstein. The scientist developed general relativity as a logical sequel to special relativity. This comprehensive book presents explication of the conceptual evolution and mathematical derivations of the theories of special and general relativity. The book follows an Einsteinian approach while explaining the concepts and the theories of relativity. Divided into 14 chapters, the revised edition of the book covers elementary concepts of Special relativity, as well as the advanced studies on General relativity. The recent theories like Kerr geometry, Sagnac effect, Vaidya geometry, Raychaudhuri equation and Gravitation physics vis-à-vis Quantum physics are presented

in easy-to-understand language and simple style. In addition to it, the book gives an in-depth analysis on the applications of advanced theories like Vaidya-Krori-Barua solution from author's own research works. Apart from that, the book also discusses some of the isotropic and anisotropic cosmological models, in detail. The salient topics discussed in the revised edition of the book are extrinsic curvature, detection of gravitational waves, early universe, evolution of a dead star into a white dwarf or a neutron star or a black hole, dark matter and dark energy. This book is intended for the undergraduate and postgraduate students of Physics and Mathematics. KEY FEATURES • Step-by-step derivation of equations • Easy demagogic approach • Review questions to widen the analytical understanding of the students

Numerical Relativity

Numerical Methods for Hyperbolic Equations is a collection of 49 articles presented at the International Conference on Numerical Methods for Hyperbolic Equations: Theory and Applications (Santiago de Compostela, Spain, 4-8 July 2011). The conference was organized to honour Professor Eleuterio Toro in the month of his 65th birthday. The topics cover

Curriculum Handbook with General Information Concerning ... for the United States Air Force Academy

"Astronomy and Astrophysics Abstracts" appearing twice a year has become one of the fundamental publications in the fields of astronomy, astrophysics and neighbouring sciences. It is the most important English-language abstracting journal in the mentioned branches. The abstracts are classified under more than a hundred subject categories, thus permitting a quick survey of the whole extended material. The AAA is a valuable and important publication for all students and scientists working in the fields of astronomy and related sciences. As such it represents a necessary ingredient of any astronomical library all over the world.

Compact Stars

The articles included in this Volume represent a broad and highly qualified view on the present state of general relativity, quantum gravity, and their cosmological and astrophysical implications. As such, it may serve as a valuable source of knowledge and inspiration for experts in these fields, as well as an advanced source of information for young researchers. The occasion to gather together so many leading experts in the field was to celebrate the centenary of Einstein's stay in Prague in 1911-1912. It was in fact during his stay in Prague that Einstein started in earnest to develop his ideas about general relativity that fully developed in his paper in 1915. Approaching soon the centenary of his famous paper, this volume offers a precious overview of the path done by the scientific community in this intriguing and vibrant field in the last century, defining the challenges of the next 100 years. The content is divided into four broad parts: (i) Gravity and Prague, (ii) Classical General Relativity, (iii) Cosmology and Quantum Gravity, and (iv) Numerical Relativity and Relativistic Astrophysics.

FUNDAMENTALS OF SPECIAL AND GENERAL RELATIVITY, Revised Edition

Spacetime physics -- Physics in flat spacetime -- The mathematics of curved spacetime -- Einstein's geometric theory of gravity -- Relativistic stars -- The universe -- Gravitational collapse and black holes -- Gravitational waves -- Experimental tests of general relativity -- Frontiers

Numerical Methods for Hyperbolic Equations

The discovery 25 years ago of the remarkable astronomical objects known as pulsars--and their identification as neutron stars--fulfilled a prediction made more than 30 years earlier. Over 550 pulsars are now known, almost all detected at radio frequencies which capture their distinctive bursts of electromagnetic energy. These pulse periods range from 1.5 milliseconds to several seconds. Most pulsars are single neutron stars but they can also exist in a binary orbit with a companion. Observations have revealed a wealth of detail about the structure and evolution of pulsars and the pulse-emission process, giving new insight into the behavior of matter in the presence of extreme gravitational and electromagnetic fields. In fact, pulsars have unique physical properties which make them nearly ideal as probes for a wide range of physical studies. This volume gathers together up-to-date findings in this area, representing a valuable resource for theoretical and particle physicists as well astrophysicists

and astronomers. The contributors are recognized experts in the field, and include such well-known authorities as Joe Taylor who describes his Nobel-Prize winning work (Physics 1993).

Literature 1992, Part 1

Astronomy and Astrophysics Abstracts is devoted to the recording, summarizing and indexing of astronomical publications throughout the world. Two volumes are scheduled to appear per year. Volume 67 records 10,903 papers covering besides the classical fields of astronomy and astrophysics such matters as space flights related to astronomy, lunar and planetary probes and satellites, meteorites and interplanetary matter, X rays and cosmic rays, quasars and pulsars. The abstracts are classified under more than one hundred subject categories thus permitting quick surveying of the bulk of material published on the same topic within six months. For instance, this volume records 119 papers on minor planets, 155 papers on supernovae, and 554 papers on cosmology.

General Relativity, Cosmology and Astrophysics

The ICGA series of conferences is specially aimed to serve the needs of the workers in this research area in the Asia-Pacific region. The previous conferences of this series have attracted a growing number of local, regional and international participants. 2005 was an auspicious year. Not only was it the International Year of Physics, commemorating Einstein's great achievements of 1905, it also was the anniversary of Einstein's development of General Relativity: he submitted the final form of his field equations on 25 November, 1915. Nine decades years later, around 40 Taiwan-based participants were joined by over 40 distinguished visitors from Canada, China, France, Japan, Korea, Russia, and the USA, and this volume includes many of the papers that were presented. The depth and breadth of these contributions reflect the high quality of the meeting and the development of the field in the Asia-Pacific region. Sample Chapter(s). Chapter 1: Progress in Testing Newtonian Inverse Square Law (234 KB). Contents: Experimental Tests of Gravity; Numerical Relativity; Cosmology; Astrophysics; Quantum Gravity; Classical Gravity. Readership: Graduate students and researchers in astrophysics, gravitation, cosmology and theoretical physics.

Gravitation

This textbook is designed to serve as a link between the basic disciplines of physics and the frontier topics within high energy astrophysics, aiming at a level of difficulty congruent with that of other physics topics studied at undergraduate level. Therefore, this preparatory and introductory text serves as a gateway to a more detailed study of many of the most interesting and complex phenomena being investigated by contemporary astrophysics. Among others, these include: the evolution of stars, supernovae, neutron stars, black holes, solar neutrinos, and - importantly - the exciting new field of gravitational wave astronomy. The book is supplemented by a collection of problems with which students can test their understanding of the material presented.

Pulsars as Physics Laboratories

The 1972 Banff lectures attempted a systematic exposition of the ideas underlying recent developments in general relativity and its astronomical applications at a level accessible and useful to graduate students having some previous acquaintance with the subject. To our regret, it was not possible to include any printed record of Peebles' beautiful lectures on observational cosmology or of the many stimulating seminars on special topics contributed by the participants. What remains is nevertheless a reasonably self-contained and compact introduction to Einstein's theory in its modern incarnation, and we hope it will be found useful by the many physicists, astronomers, and mathematicians who wish to update and deepen their understanding of the theory. On behalf of the organizing committee, I should like to express appreciation to a number of people whose help was crucial to the success of the enterprise: to Jan van Kranendonk, who initiated the idea of a Banff summer school on general relativity; to him and to David Rowe and Don Betts for inspiration and moral support; to our indefatigable secretaries Olwyn Buckland and Leslie Hughes; and to Garry Nash, Richard Sigal, Tim Spanos, and Gordon Wilson who helped in a variety of ways to keep the wheels running. How much we owe to the splendid cooperative effort of the lecturers will be clear to any reader of the following pages.

Literature 1997, Part 1

Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of the literature concerning all aspects of astronomy, astrophysics, and their border fields. It is devoted to the recording, summarizing, and indexing of the relevant publications throughout the world. Astronomy and Astrophysics Abstracts is prepared by a special department of the Astronomisches Rechen-Institut under the auspices of the International Astronomical Union. Volume 39 records literature published in 1985 and received before August 15, 1985. Some older documents which we received late and which are not surveyed in earlier volumes are included too. We acknowledge with thanks contributions of our colleagues all over the world. We also express our gratitude to all organizations, observatories, and publishers which provide us with complimentary copies of their publications. On account of the introduction of an object index the scope of index information will be considerably enlarged beginning with this volume. In connection with the subject index an additional source to satisfy the needs of retrieval is opened up. Starting with Volume 33, all the recording, correction, and data processing work was done by means of computers. The recording was done by our technical staff members Ms. Helga Ballmann, Ms. Mona El-Choura, Ms. Monika Kohl, Ms. Sylvia Matyssek, Ms. Karin Burkhardt, Ms. Susanne Schlotelburg, and Mr. Stefan Wagner supported our task by careful proofreading. It is a pleasure to thank them all for their encouragement. Heidelberg, September 1985 The Editors Contents Introduction

Gravitation and Astrophysics

Astronomy and Astrophysics Abstracts aims to present a comprehensive documentation of the literature concerning all aspects of astronomy, astrophysics, and their border fields. It is devoted to the recording, summarizing, and indexing of the relevant publications throughout the world. Astronomy and Astrophysics Abstracts is prepared by a special department of the Astronomisches Rechen-Institut under the auspices of the International Astronomical Union. Volume 43 records literature published in 1987 and received before August 15, 1987. Some older documents which we received late and which are not surveyed in earlier volumes are included too. We acknowledge with thanks contributions of our colleagues all over the world. We also express our gratitude to all organizations, observatories, and publishers which provide us with complimentary copies of their publications. Starting with Volume 33, all the recording, correction, and data processing work was done by means of computers. The recording was done by our technical staff members Ms. Helga Ballmann, Ms. Beate Gobel, Ms. Monika Kohl, Ms. Sylvia Matyssek, Ms. Doris Schmitz-Braunstein, Ms. Uta-Barbara Stegemann. Mr. Jochen Heidt and Mr. Kristopher Polzine supported our task by careful proof reading. It is a pleasure to thank them all for their encouragement. Heidelberg, October 1987 The Editors Contents Introduction 1
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High-Energy Astrophysics

This textbook develops general relativity and its associated mathematics from a minimum of prerequisites, leading to a physical understanding of the theory in some depth.

Relativity, Astrophysics and Cosmology

What is a black hole? How many of them are in our Universe? Can black holes be created in a laboratory or in particle colliders? Can objects similar to black holes be used for space and time travel? This book discusses these and many other questions providing the reader with the tools required to explore the Black Hole Land independently.

Literature 1985, Part 1

Literature 1987, Part 1