Relativity Gravitation And Cosmology A Basic Introduction Oxford Master Series In Physics

As recognized, adventure as competently as experience roughly lesson, amusement, as without difficulty as concord can be gotten by just checking out a ebook **Relativity Gravitation And Cosmology A Basic Introduction Oxford Master Series In Physics** afterward it is not directly done, you could tolerate even more around this life, on the order of the world.

We offer you this proper as without difficulty as simple pretentiousness to acquire those all. We find the money for Relativity Gravitation And Cosmology A Basic Introduction Oxford Master Series In Physics and numerous ebook collections from fictions to scientific research in any way. among them is this Relativity Gravitation And Cosmology A Basic Introduction Oxford Master Series In Physics that can be your partner.

Introduction to Modern Dynamics David D. Nolte 2019-08-29 The best parts of physics are the last topics that our students ever see. These are the exciting new frontiers of nonlinear and complex systems that are at the forefront of university research and are the basis of many high-tech businesses. Topics such as traffic on the World Wide Web, the spread of epidemics through globally-mobile populations, or how the synchronization of global economies are governed by universal principles just as profound as Newton's laws. Nonetheless, the conventional university physics curriculum reserves most of these topics for graduate study because of the assumed need for advanced mathematics. However, by using only linear algebra and calculus, combined with exploratory computer simulations, all of these topics become accessible to advanced undergraduate students. The structure of this book combines the three main topics of modern dynamics - chaos theory, dynamics on complex networks, and general relativity - into a coherent framework. By taking a geometric view of physics, concentrating on the time evolution of physical systems as trajectories through abstract spaces, these topics share a common and simple mathematical language through which any student can gain a unified physical intuition. Given the growing importance of complex dynamical systems in many areas of science and technology, this text provides students with an up-to-date foundation for their future careers. This second edition has an updated introductory chapter and has added key topics to help students prepare for their GRE physics subject exam. It also has expanded chapters on Hamiltonian dynamics, Hamiltonian chaos, and Econophysics, while increasing the number of homework problems at the end of each chapter. The second edition is designed to fulfill the textbook needs of any advanced undergraduate course in mechanics.

General Relativity Without Calculus Jose Natario 2011-08-01 “General Relativity Without Calculus” offers a compact but mathematically correct introduction to the general theory of relativity, assuming only a basic knowledge of high school mathematics and physics. Targeted at first year undergraduates (and advanced high school students) who wish to learn Einstein’s theory beyond popular science accounts, it covers the basics of special relativity, Minkowski space-time, non-Euclidean geometry, Newtonian gravity, the Schwarzschild solution, black holes and cosmology. The quick-paced style is balanced by over 75 exercises (including full solutions), allowing readers to test and consolidate their understanding.

Physics

General Relativity Hans Stephani 1982 This book is an introduction to the theory of gravitation. It deals in an elementary way with those parts of the theory that are essential to the beginning student of general relativity, giving all the mathematics necessary to an understanding of the theory. Starting from the foundations of Riemannian geometry and the tensor calculus, the author formulates and works out the essential laws of physics in a Riemannian space. Next, the Einstein field equations are derived. All important applications of the theory are dealt with, including issues of current importance, in particular the Schwarzchild metric, gravitational waves, gravitational collapse, black holes and cosmological models. All the associated basic physical problems are fully discussed, but many results that draw heavily on mathematics are given without derivation. In the rather more demanding chapters on selected vector fields, groups of motion and the Petrov classification, methods are discussed which have proved to be especially fruitful in modern research.

Modified Gravity and Cosmology Emmanuel N. Saridakis 2021-12-10 With a focus on modified gravity this book presents a review of the recent developments in the fields of gravity and cosmology, presenting the state of the art, high-lighting the open problems, and outlining the directions of future research. General Relativity and the ΛCDM framework are currently the standard lore and constitute the concordance paradigm of cosmology. Nevertheless, long-standing open theoretical issues, as well as possible new observational ones arising from the explosive development of cosmology in the last two decades, offer the motivation and lead a large amount of research to be devoted in constructing various extensions and modifications. In this review all extended theories and scenarios are first examined under the light of theoretical consistency, and are then applied in various geometrical backgrounds, such as the cosmological and the spherical symmetric ones. Their predictions at both the background and perturbation levels, and concerning cosmology at early, intermediate and late times, are then confronted with the huge amount of observational data that astrophysics and cosmology has been able to offer in the last two decades. Theories, scenarios and models that successfully and efficiently pass the above steps are classified as viable and are candidates for the description of Nature, allowing readers to get a clear overview of the state of the art and where the field of modified gravity is likely to go. This work was performed in the framework of the COST European Action “Cosmology and Astrophysics Network for Theoretical Advances and Training Actions” - CANTATA.

A College Course on Relativity and Cosmology Ta-Pei Cheng 2015 This advanced undergraduate text introduces Einstein's general theory of relativity. The topics covered include geometric formulation of special relativity, the principle of equivalence, Einstein's field equation and its spherical-symmetric solution, as well as cosmology. An emphasis is placed on physical examples and simple applications without the full tensor apparatus. It begins by examining the physics of the equivalence principle and looks at how it inspired Einstein's idea of curved spacetime as the gravitational field. At a more mathematically accessible level, it provides a metric description of a warped space, allowing the reader to study many interesting phenomena such as gravitational time dilation, GPS operation, light deflection, precession of Mercury's perihelion, and black holes. Numerous modern topics in cosmology are discussed from primordial inflation and cosmic microwave background to the dark energy that propels an accelerating universe. Building on Cheng's previous book, 'Relativity, Gravitation and Cosmology: A Basic Introduction', this text has been tailored to the advanced student. It concentrates on the core elements of the subject making it suitable for a one-semester course at the undergraduate level. It can also serve as an accessible introduction of general relativity and cosmology for those readers who want to study the subject on their own. The proper tensor formulation of Einstein's field equation is presented in an appendix chapter for those wishing to glimpse further at the mathematical details. To request a copy of the Solutions Manual, visit http://global.oup.com/uk/academic/physics/admin/solutions.

Fundamental Principles of General Relativity Theories H. Treder 1980 The present monograph is not a self-contained introductory text. Instead it presupposes to a large extent that the reader is not only thoroughly familiar with the special theory of relativity, but that he or she has studied the standard aspects of the general theory, as well. Starting from local and global formulations of the principlcs of inertia and relativity, we discuss the microscopic ancl telcscopic aspects of gravitation. Our central goal has been to demonstrate that the foundations of gravitational theory laid by Newton and Einstein imply questions on thc relation betwecn the micro- and macrocosm. The discussions surrounding these physical points can be rather weH understood without an elaborate mathcmatical formalism. All the same, we have attempted to make the main theme of our presentation accessible also to readers outside the circle of pundits by including two appendixes of a largely instructional nature. Appendix A gives a brief review of the basic concepts of four-dimensional spaces, for the convenience of readers

who need 9 Preface such a recapitulation, while Appendix B deals with the more exotic notions of tetrad theory, which admittedly stands in wider need of elucidation. Both appendixes are meant in any event to serve the useful purpose of establishing our notation and collecting formulas for easy reference in the main body of the book. The general reader may accordingly find it helpful first to peruse one or both of the appendixes before turning to the Introduction and Chapter 1. H. -j.

Progress in Mathematical Relativity, Gravitation and Cosmology Alfonso García-Parrado 2013-11-26 This book contains contributions from the Spanish Relativity Meeting, ERE 2012, held in Guimarães, Portugal, September 2012. It features more than 70 papers on a range of topics in general relativity and gravitation, from mathematical cosmology, numerical relativity and black holes to string theory and quantum gravity. Under the title "Progress in Mathematical Relativity, Gravitation and Cosmology," ERE 2012 was attended by an exceptional international list of over a hundred participants from the five continents and over forty countries. ERE is organized every year by one of the Spanish or Portuguese groups working in this area and is supported by the Spanish Society of Gravitation and Relativity (SEGRE). This book will be of interest to researchers in mathematics and physics.

Introduction to General Relativity and Cosmology Christian G. Böhmer 2016-10-06 Introduction to General Relativity and Cosmology gives undergraduate students an overview of the fundamental ideas behind the geometric theory of gravitation and spacetime. Through pointers on how to modify and generalise Einstein's theory to enhance understanding, it provides a link between standard textbook content and current research in the field. Chapters present complicated material practically and concisely, initially dealing with the mathematical foundations of the theory of relativity, in particular differential geometry. This is followed by a discussion of the Einstein field equations and their various properties. Also given is analysis of the important Schwarzschild solutions, followed by application of general relativity to cosmology. Questions with fully worked answers are provided at the end of each chapter to aid comprehension and guide learning. This pared down textbook is specifically designed for new students looking for a workable, simple presentation of some of the key theories in modern physics and mathematics.

Spacetime and Geometry Sean M. Carroll 2019-08-08 An accessible introductory textbook on general relativity, covering the theory's foundations, mathematical formalism and major applications.

General Relativity Michael J W Hall 2018-03-23 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 M. P. Hobson 2006-02-02 An advanced textbook providing a clear mathematical introduction to general relativity and its physical applications.

Teach Yourself Physics Jakob Schwichtenberg 2020-02-12 This is a handbook containing all the advice and recommendations about learning physics I wished someone had told me when I was younger. It is neither a career guide nor a comprehensive textbook. What’s inside? - Understand why self-learning is an effective strategy. Learn why most university students never develop a deep understanding and what alternatives are possible. - Grasp the internal structure of physics. Learn how the fundamental theories of physics are connected and why physics works at all. - Develop an understanding of the landscape. Read bird's eye overviews that give a first taste of what the various theories of physics are all about. - Everything you need to get started. Read detailed reading and learning recommendations that allow you to carve out a personal learning path.

Relativity, Gravitation, Cosmology Valeriy V. Dvoeglazov 2018-11-16 The authors continue the book series entitled Contemporary Fundamental Physics. Edited by Professor Doctor V. V. Dvoeglazov from Universidad de Zacatecas, Mexico, this thematic issue Relativity, Gravitation, Cosmology: Beyond Foundations contains chapters related to contemporary problems of modern physics. This book includes an Editorial Introduction and eleven chapters, commentary, and several reprints. This book may also be considered as the continuation of past publications found in the authors own series concerning relativity. This issue includes contributions from M. Land, V. V. Varlamov, E. Kapuscik, I. A. Vernigora and Yu. G. Rudoy, E. M. Ovsiyuk, V. V. Kisel and V. M. Redkov, O. V. Veko, S. I. Kruglov, B. G. Sidharth, A. Gutierrez-Rodriguez, M. A. Hernandez-Ruiz and A. Gonzalez-Sanchez, and V. V. Dvoeglazov. Older research concerns quantum field theory and gravitation theories. Recent research has been presented at the XI Workshop (2015) and the X and XI Schools (2014 and 2016) of the Gravitation Division of the Sociedad Mexicana de Fisica. The book will be useful to researchers, professors, and students of physics and mathematics.

GRAVITATION AND COSMOLOGY: PRINCIPLES AND APPLICATIONS OF THE GENERAL THEORY OF RELATIVITY STEVEN WEINBERG 2008-07-01 · Preliminaries · The General Theory of Relativity · Applications of Feneral Relativity · Formal Developments · Cosmology

Elements of Cosmological Thermodynamics Subhajit Saha 2018-11-20 Based on the author’s own work and results obtained by renowned cosmologists, this short book provides a concise introduction to the relatively new research field of cosmological thermodynamics. Starting with a brief overview of basic cosmology and thermodynamics, the text gives an interesting account of the application of horizon thermodynamics to the homogeneous and isotropic Friedmann-Lemaitre-Robertson-Walker (FLRW) model, the inhomogeneous (Lemaitre-Tolman-Bondi) LTB model, and the gravitationally induced adiabatic particle creation scenario which is considered to be a viable alternative to the concordance Lambda-CDM model of the Universe. Both seasoned and new researchers in this field will appreciate the lucid presentation and the rich bibliography.

Special Relativity Michael Tsamparlis 2019-11-26 This textbook develops Special Relativity in a systematic way and offers the unique feature of having more than 200 problems with detailed solutions to empower students to gain a real understanding of this core subject in physics. This new edition has been thoroughly updated and has new sections on relativistic fluids, relativistic kinematics and on four-acceleration. The problems and solution section has been significantly expanded and short history sections have been included throughout the book. The approach is structural in the sense that it develops Special Relativity in Minkowski space following the parallel steps as the development of Newtonian Physics in Euclidian space. A second characteristic of the book is that it discusses the mathematics of the theory independently of the physical principles, so that the reader will appreciate their role in the development of the physical theory. The book is intended to be used both as a textbook for an advanced undergraduate teaching course in Special Relativity but also as a reference book for the future. In that respect it is linked to an online repository with more than 200 problems, carefully classified according to subject area and solved in detail, providing an independent problem book on Special Relativity.

Physics Qualifying Examination Horacio A. Farach 2010-03-08 Designed for use in tandem with the 'Handbook of Physics', this volume is nonetheless self-contained and can be used on its own. The chapters are based on lectures delivered annually by Professor Poole in a course to prepare students for their PhD qualifying examination in the physics department at the University of South Carolina. The book contains 120 selected problems (and answers) that appeared in these examinations, and each one refers to the chapter in the Handbook that discusses the background for it. Professor Farach has kept a record of all the qualifying examinations in the department since 1981. It covers all relevant physics subjects, which are otherwise scattered in different preparation publications or university scripts, including: * Atomic and General Physics * Condensed Matter Physics * Classical Mechanics * Electricity and Magnetism * Elementary Particle Physics * Nuclear Physics * Optics and Light * Quantum Mechanics * Relativity and Astrophysics * Thermo and Statistical Mechanics An excellent self-study approach to prepare physics PhD candidates for their qualifying examinations.

Relativiteit Albert Einstein 1986 De opsteller van de relativiteitstheorie (1879-1955) behandelt ruimte- en tijdproblemen en de geldigheid van basisnatuurwetten in bewegende coördinaatstelsels.

Gravitation and cosmology. Proceedings of the Spanish Relativity Meeting Alberto Lobo 2003

Beyond the Standard Model Cocktail Yann Gouttenoire 2023-01-01 This book provides a remarkable and complete survey of important questions at the interface between theoretical particle physics and cosmology. After discussing the theoretical and experimental physics revolution that led to the rise of the Standard Model in the past century, the author reviews all the major open puzzles, among them the hierarchy problem, the small value of the cosmological constant, the matter-antimatter asymmetry, and the dark matter enigma, including the state-of-the-art regarding proposed solutions. Also addressed are the rapidly expanding fields of thermal dark matter, cosmological first-order phase transitions and gravitational-wave signatures. In addition, the book presents the original and interdisciplinary PhD research work of the author relating to Weakly-Interacting-Massive-Particles around the TeV scale, which are among the most studied dark matter candidates. Motivated by the absence of experimental evidence for such particles, this thesis explores the possibility that dark matter is much heavier than what is conventionally assumed.

Physical Mathematics Kevin Cahill 2019-08-07 Unique in its clarity, examples, and range, Physical Mathematics explains simply and succinctly the mathematics that graduate students and professional physicists need to succeed in their courses and research. The book illustrates the mathematics with numerous physical examples drawn from contemporary research. This second edition has new chapters on vector calculus, special relativity and artificial intelligence and many new sections and examples. In addition to basic subjects such as linear algebra, Fourier analysis, complex variables, differential equations, Bessel functions, and spherical harmonics, the book explains topics such as the singular value decomposition, Lie algebras and group theory, tensors and general relativity, the central limit theorem and Kolmogorov's theorems, Monte Carlo methods of experimental and theoretical physics, Feynman's path integrals, and the standard model of cosmology.

Relativity, Gravitation and Cosmology Robert J. Lambourne 2010-06 The textbook introduces students to basic geometric concepts, such as metrics, connections and curvature, before examining general relativity in more detail. It shows the observational evidence supporting the theory, and the description general relativity provides of black holes and cosmological spacetimes. --

Einstein Gravity in a Nutshell A. Zee 2013-05-05 An ideal introduction to Einstein's general theory of relativity This unique textbook provides an accessible introduction to Einstein's general theory of relativity, a subject of breathtaking beauty and supreme importance in physics. With his trademark blend of wit and incisiveness, A. Zee guides readers from the fundamentals of Newtonian mechanics to the most exciting frontiers of research today, including de Sitter and anti-de Sitter spacetimes, Kaluza-Klein theory, and brane worlds. Unlike other books on Einstein gravity, this book emphasizes the action principle and group theory as guides in constructing physical theories. Zee treats various topics in a spiral style that is easy on beginners, and includes anecdotes from the history of physics that will appeal to students and experts alike. He takes a friendly approach to the required mathematics, yet does not shy away from more advanced mathematical topics such as differential forms. The extensive discussion of black holes includes rotating and extremal black holes and Hawking radiation. The ideal textbook for undergraduate and graduate students, Einstein Gravity in a Nutshell also provides an essential resource for professional physicists and is accessible to anyone familiar with classical mechanics and electromagnetism. It features numerous exercises as well as detailed appendices covering a multitude of topics not readily found elsewhere. Provides an accessible introduction to Einstein's general theory of relativity Guides readers from Newtonian mechanics to the frontiers of modern research Emphasizes symmetry and the Einstein-Hilbert action Covers topics not found in standard textbooks on Einstein gravity Includes interesting historical asides Features numerous exercises and detailed appendices Ideal for students, physicists, and scientifically minded lay readers Solutions manual (available only to teachers)

Gravitation and Spacetime Hans C. Ohanian 2013-04-08 This text provides a quantitative introduction to general relativity for advanced undergraduate and graduate students.

General Relativity Hans Stephani 1990-06-29 This is an excellent introduction to the subjects of gravitation and space-time structure. It discusses the foundations of Riemann geometry; the derivation of Einstein field equations; linearised theory; far fields and gravitational waves; the invariant characterisation of exact solutions; gravitational collapse; cosmology as well as alternative gravitational theories and the problem of quantum gravity.

Introduction to General Relativity, Black Holes, and Cosmology Yvonne Choquet-Bruhat 2015 General Relativity is a beautiful geometric theory, simple in its mathematical formulation but leading to numerous consequences with striking physical interpretations: gravitational waves, black holes, cosmological models, and so on. This introductory textbook is written for mathematics students interested in physics and physics students interested in exact mathematical formulations (or for anyone with a scientific mind who is curious to know more of the world we live in), recent remarkable experimental and observational results which confirm the theory are clearly described and no specialised physics knowledge is required. The mathematical level of Part A is aimed at undergraduate students and could be the basis for a course on General Relativity. Part B is more advanced, but still does not require sophisticated mathematics. Based on Yvonne Choquet-Bruhat's more advanced text, General Relativity and the Einstein Equations, the aim of this book is to give with precision, but as simply as possible, the foundations and main consequences of General Relativity. The first five chapters from General Relativity and the Einstein Equations have been updated with new sections and chapters on black holes, gravitational waves, singularities, and the Reissner-Nordstrom and interior Schwarzchild solutions. The rigour behind this book will provide readers with the perfect preparation to follow the great mathematical progress in the actual development, as well as the ability to model, the latest astrophysical and cosmological observations. The book presents basic General Relativity and provides a basis for understanding and using the fundamental theory.

A Most Incomprehensible Thing Peter Collier 2017-04-01 A straightforward, enjoyable guide to the mathematics of Einstein's relativity To really understand Einstein's theory of relativity – one of the cornerstones of modern physics – you have to get to grips with the underlying mathematics. This self-study guide is aimed at the general reader who is motivated to tackle that not insignificant challenge. With a user-friendly style, clear step-by-step mathematical derivations, many fully solved problems and numerous diagrams, this book provides a comprehensive introduction to a fascinating but complex subject. For those with minimal mathematical background, the first chapter gives a crash course in foundation mathematics. The reader is then taken gently by the hand and guided through a wide range of fundamental topics, including Newtonian mechanics; the Lorentz transformations; tensor calculus; the Einstein field equations; the Schwarzschild solution (which gives a good approximation of the spacetime of our Solar System); simple black holes, relativistic cosmology and gravitational waves. Special relativity helps explain a huge range of non-gravitational physical phenomena and has some strangely counter-intuitive consequences. These include time dilation, length contraction, the relativity of simultaneity, mass-energy equivalence and an absolute speed limit. General relativity, the leading theory of gravity, is at the heart of our understanding of cosmology and black holes. "I must observe that the theory of relativity resembles a building consisting of two separate stories, the special theory and the general theory. The special theory, on which the general theory rests, applies to all physical phenomena with the exception of gravitation; the general theory provides the law of gravitation and its relations tothe other forces of nature." – Albert Einstein, 1919 Understand even the basics of Einstein's amazing theory and the world will never seem the same again. Contents: Preface Introduction 1 Foundation mathematics 2 Newtonian mechanics 3 Special relativity 4 Introducing the manifold 5 Scalars, vectors, one-forms and tensors 6 More on curvature 7 General relativity 8 The Newtonian limit 9 The Schwarzschild metric 10 Schwarzschild black holes 11 Cosmology 12 Gravitational waves Appendix: The Riemann curvature tensor Bibliography Acknowledgements January 2019. This third edition has been revised to make the material even more accessible to the enthusiastic general reader who seeks to understand the mathematics of relativity.

Problem Book in Relativity and Gravitation Alan P. Lightman 2017-09-29 An essential resource for learning about general relativity and much more, from four leading experts Important and useful to every student of relativity, this book is a unique collection of some 475 problems--with solutions--in the fields of special and general relativity, gravitation, relativistic astrophysics, and cosmology. The problems are expressed in broad physical terms to enhance their pertinence to readers with diverse backgrounds. In their solutions, the authors have attempted to convey a mode of approach to these kinds of problems, revealing procedures that can reduce the labor of calculations while avoiding the pitfall of too much or too powerful formalism. Although well suited for individual use, the volume may also be used with one of the modem

textbooks in general relativity.

Gravity James B. Hartle 2021-06-24 Best-selling, accessible physics-first introduction to GR uses minimal new mathematics and begins with the essential physical applications.

Fundamental Principles of General Relativity Theories H. Treder 2013-02-13 The present monograph is not a self-contained introductory text. Instead it presupposes to a large extent that the reader is not only thoroughly familiar with the special theory of relativity, but that he or she has studied the standard aspects of the general theory, as well. Starting from local and global formulations of the principlcs of inertia and relativity, we discuss the microscopic ancl telcscopic aspects of gravitation. Our central goal has been to demonstrate that the foundations of gravitational theory laid by Newton and Einstein imply questions on thc relation betwecn the micro- and macrocosm. The discussions surrounding these physical points can be rather weH understood without an elaborate mathcmatical formalism. All the same, we have attempted to make the main theme of our presentation accessible also to readers outside the circle of pundits by including two appendixes of a largely instructional nature. Appendix A gives a brief review of the basic concepts of four-dimensional spaces, for the convenience of readers who need 9 Preface such a recapitulation, while Appendix B deals with the more exotic notions of tetrad theory, which admittedly stands in wider need of elucidation. Both appendixes are meant in any event to serve the useful purpose of establishing our notation and collecting formulas for easy reference in the main body of the book. The general reader may accordingly find it helpful first to peruse one or both of the appendixes before turning to the Introduction and Chapter 1. H. -j.

Introducing Einstein's Relativity Ray d'Inverno 2022-01-12 There is little doubt that Einstein's theory of relativity captures the imagination. Not only has it radically altered the way we view the universe, but the theory also has a considerable number of surprises in store. This is especially so in the three main topics of current interest that this book reaches, namely: black holes, gravitational waves, and cosmology. The main aim of this textbook is to provide students with a sound mathematical introduction coupled to an understanding of the physical insights needed to explore the subject. Indeed, the book follows Einstein in that it introduces the theory very much from a physical point of view. After introducing the special theory of relativity, the basic field equations of gravitation are derived and discussed carefully as a prelude to first solving them in simple cases and then exploring the three main areas of application. This new edition contains a substantial extension content that considers new and updated developments in the field. Topics include coverage of the advancement of observational cosmology, the detection of gravitational waves from colliding black holes and neutron stars, and advancements in modern cosmology. Einstein's theory of relativity is undoubtedly one of the greatest achievements of the human mind. Yet, in this book, the author makes it possible for students with a wide range of abilities to deal confidently with the subject. Based on both authors' experience teaching the subject this is achieved by breaking down the main arguments into a series of simple logical steps. Full details are provided in the text and the numerous exercises while additional insight is provided through the numerous diagrams. As a result this book makes an excellent course for any reader coming to the subject for the first time while providing a thorough understanding for any student wanting to go on to study the subject in depth

Einstein's Physics Ta-Pei Cheng 2013-01-31 Many regard Albert Einstein as the greatest physicist since Newton. What exactly did he do that is so important in physics? We provide an introduction to his physics at a level accessible to an undergraduate physics student. All equations are worked out in detail from the beginning. Einstein's doctoral thesis and his Brownian motion paper were decisive contributions to our understanding of matter as composed of molecules and atoms. Einstein was one of the founding fathers of quantum theory: his photon proposal through the investigation of blackbody radiation, his quantum theory of photoelectric effect and specific heat, his calculation of radiation fluctuation giving the first statement of wave-particle duality, his introduction of probability in the description of quantum radiative transitions, and finally the quantum statistics and Bose-Einstein condensation. Einstein's special theory of relativity gave us the famous $E=mc^2$ relation and the new kinematics leading to the idea of the 4-dimensional spacetime as the arena in which physical events take place. Einstein's geometric theory of gravity, general relativity, extends Newton's theory to time-dependent and strong gravitational fields. It laid the ground work for the study of black holes and cosmology. This is a physics book with material presented in the historical context. We do not stop at Einstein's discovery, but carry the discussion onto some of the later advances: Bell's theorem, quantum field theory, gauge theories and Kaluza-Klein unification in a spacetime with an extra spatial dimension. Accessibility of the material to a modern-day reader is the goal of our presentation. Although the book is written with primarily a physics readership in mind (it can also function as a textbook), enough pedagogical support material is provided that anyone with a solid background in introductory physics can, with some effort, understand a good part of this presentation.

Relativity, Gravitation and Cosmology Ta-Pei Cheng 2010 An introduction to Einstein's general theory of relativity, this work is structured so that interesting applications, such as gravitational lensing, black holes and cosmology, can be presented without the readers having to first learn the difficult mathematics of tensor calculus.

Introduction To General Relativity And Cosmology Christian G Boehmer 2016-10-06 Introduction to General Relativity and Cosmology gives undergraduate students an overview of the fundamental ideas behind the geometric theory of gravitation and spacetime. Through pointers on how to modify and generalise Einstein's theory to enhance understanding, it provides a link between standard textbook content and current research in the field.Chapters present complicated material practically and concisely, initially dealing with the mathematical foundations of the theory of relativity, in particular differential geometry. This is followed by a discussion of the Einstein field equations and their various properties. Also given is analysis of the important Schwarzschild solutions, followed by application of general relativity to cosmology. Questions with fully worked answers are provided at the end of each chapter to aid comprehension and guide learning. This pared down textbook is specifically designed for new students looking for a workable, simple presentation of some of the key theories in modern physics and mathematics.

An Introduction to the Relativistic Theory of Gravitation Petr Hajicek 2008-12-15 The contemporary theoretical physics consists, by and large, of two independent parts. The rst is the quantum theory describing the micro-world of elementary p- ticles, the second is the theory of gravity that concerns properties of macroscopic systems such as stars, galaxies, and the universe. The relativistic theory of gr- itation which is known as general relativity was created, at the beginning of the last century, by more or less a single man from pure idea combinations and bold guessing. The task was to “marry” the theory of gravity with the theory of special relativity. The rst attempts were aimed at considering the gravitational potential as a eld in Minkowski space–time. All those attempts failed; it took 10 years until Einstein nally solved the problem. The dif culty was that the old theory of gravity as well as the young theory of special relativity had to be modi ed. The next 50 years were dif cult for this theory because its experimental basis remained weak and its complicated mathematical structure was not well understood. However, in the subsequent period this theory ourished. Thanks to improvements in the te- nology and to the big progress in the methods of astronomical observations, the amount of observable facts to which general relativity is applicable was consid- ably enlarged. This is why general relativity is, today, one of the best experimentally tested theories while many competing theories could be disproved. Also the conc- tual and mathematical fundamentals are better understood now.

De ontrafeling van de kosmos Brian Greene 2013-10-10 Een zoektocht naar de theorie van alles Ruimte en tijd zijn de basiselementen van de kosmos. Maar wat zijn ruimte en tijd eigenlijk? Is ruimte een reëel bestaand iets? Waarom heeft tijd een richting? Zou het universum zonder ruimte en tijd kunnen bestaan? En de centrale vraag: hoe zit de kosmos in elkaar? De ontrafeling van de kosmos neemt de lezer mee op reis naar nieuwe lagen van de werkelijkheid, met briljant gebruik van analogieën én met humor. Van de inzichten van Newton en Einstein tot de meest recente ideeën op het gebied van de supersnaar- en M-theorie. Na het lezen van dit boek bekijkt u de werkelijkheid met andere ogen. Brian Greene (1963) studeerde aan Harvard University en Oxford University. Hij geldt als een groot deskundige op het gebied van de supersnaartheorie en geeft over de hele wereld lezingen. The Times noemt hem ‘De nieuwe Hawking, maar dan beter’.

Gravity, Black Holes, and the Very Early Universe Tai L. Chow 2010-10-29 Here it is, in a nutshell: the history of one genius’s most crucial work – discoveries that were to change the face of modern physics. In the early 1900s, Albert Einstein formulated two theories that would forever change the landscape of physics: the Special Theory of Relativity and the General Theory of Relativity. Respected American

academic Professor Tai Chow tells us the story of these discoveries. He details the basic ideas of Einstein, including his law of gravitation. Deftly employing his inimitable writing style, he goes on to explain the physics behind black holes, weaving into his account an explanation of the structure of the universe and the science of cosmology.

Zeven korte beschouwingen over natuurkunde Carlo Rovelli 2016-01-15 Ons verlangen om te willen weten is oneindig: wat is de oorsprong van het heelal, wat is tijd, wat zijn zwarte gaten, hoe zit de kosmos in elkaar? Deze vragen vormen het uitgangspunt van Carlo Rovelli's Zeven korte beschouwingen over natuurkunde. In dit overzichtelijke boek behandelt hij de belangrijkste ontwikkelingen in de twintigste-eeuwse natuurkunde. Zo bespreekt hij Einsteins relativiteitstheorie, de kwantummechanica en zwarte gaten, de architectuur van het heelal en andere brandende kwesties met betrekking tot de fysische wereld. Carlo Rovelli (1956) is een gerenommeerd Italiaans natuurkundige en schrijver. Hij is een autoriteit op het gebied van de kwantumgravitatie _ een belangrijk onderwerp in de natuurkunde van dit moment. Rovelli is verbonden aan het Centrum voor theoretische natuurkunde van de Universiteit van Aix-Marseille. Van Zeven korte beschouwingen over natuurkunde zijn in Italië al meer dan 200.000 exemplaren verkocht. 'Door Carlo Rovelli's Zeven korte beschouwingen over natuurkunde zijn de relativiteitstheorie en de kwantumfysica veranderd in bestsellermateriaal.' La Repubblica 'Natuurkunde wordt altijd al gepopulariseerd, maar professor Rovelli's boek doet meer: zijn stijl onderscheidt zich doordat die zowel authentiek als aantrekkelijk is, en hij behandelt vraagstukken die zijn lezers werkelijk interesseren.' Corriere della Sera 'Net zo ongecompliceerd als de titel impliceert.' The Guardian

An Introduction to Relativistic Gravitation Remi Hakim 1999-05-20 This is an introductory textbook on applications of general relativity to astrophysics and cosmology. The aim is to provide graduate students with a toolkit for understanding astronomical phenomena that involve velocities close to that of light or intense gravitational fields. The approach taken is first to give the reader a thorough grounding in special relativity, with space-time the central concept, following which general relativity presents few conceptual difficulties. Examples of relativistic gravitation in action are drawn from the astrophysical domain. The book can be read on two levels: first as an introductory fast-track course, and then as a detailed course reinforced by problems which illuminate technical examples. The book has extensive links to the literature of relativistic astrophysics and cosmology.