

## Carroll Spacetime And Geometry New Edition

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**How the Hunt for the Higgs Boson Leads Us to the Edge of a New World** World Scientific Publishing Company

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[A Basic Introduction](#) MIT Press

Learning quantum field theory doesn't have to be hard. What if there were a book that allowed you to see the whole picture and not just tiny parts of it? Thoughts like this are the reason that No-Nonsense Quantum Field Theory now exists. What will you learn from this book? Get to know all fundamental concepts — Grasp what a quantum field is, why we use propagators to describe its behavior, and how Feynman diagrams help us to make sense of field interactions. Learn to describe quantum field theory mathematically — Understand the meaning and origin of the most important equations: the Klein-Gordon equation, the Dirac equation, the Proca equation, the Maxwell equations, and the canonical commutation/anticommutation relations. Master important quantum field theory interactions — Read fully annotated, step-by-step calculations and understand the general algorithm we use to particle interactions. Get an understanding you can be proud of — Learn about advanced topics like renormalization and regularization, spontaneous symmetry breaking, the renormalization group equations, non-perturbative phenomena, and effective field models. No-Nonsense Quantum Field Theory is one of the most student-friendly books on quantum field theory ever written. Here's why. First of all, it's nothing like a formal university lecture. Instead, it's like a casual conversation with a more experienced student. This also means that nothing is assumed to be "obvious" or "easy to see". Each chapter, each section, and each page focuses solely on the goal to help you understand. Nothing is introduced without a thorough motivation and it is always clear where each equation comes from. The book ruthlessly focuses on the fundamentals and makes sure you'll understand them in detail. The primary focus on the readers' needs is also visible in dozens of small features that you won't find in any other textbook. In total, the book contains more than 100 illustrations that help you understand the most important concepts visually. In each chapter, you'll find fully annotated equations and calculations done carefully step-by-step. This makes it much easier to understand what's going on. Whenever a concept is used that was already introduced previously there is a short sidenote that reminds you where it was first introduced and often recites the main points. In addition, there are summaries at the beginning of each chapter that make sure you won't get lost.

*Eavesdropping in the Novel from Austen to Proust* Springer

Spacetime and Geometry is an introductory textbook on general relativity, specifically aimed at students. Using a lucid style, Carroll first covers the foundations of the theory and mathematical formalism, providing an approachable introduction to what can often be an intimidating subject. Three major applications of general relativity are then discussed: black holes, perturbation theory and gravitational waves, and cosmology. Students will learn the origin of how spacetime curves (the Einstein equation) and how matter moves through it (the geodesic equation). They will learn what black holes really are, how gravitational waves are generated and detected, and the modern view of the expansion of the universe. A brief introduction to quantum field theory in curved spacetime is also included. A student familiar with this book will be ready to tackle research-level problems in gravitational physics.

*Visual Differential Geometry and Forms* A&C Black

INSTANT NEW YORK TIMES BESTSELLER A Science News favorite science book of 2019 As you read these words, copies of you are being created. Sean Carroll, theoretical physicist and one of this world's most celebrated writers on science, rewrites the history of 20th century physics. Already hailed as a masterpiece, *Something Deeply Hidden* shows for the first time that facing up to the essential puzzle of quantum mechanics utterly transforms how we think about space and time. His reconciling of quantum mechanics with

Einstein's theory of relativity changes, well, everything. Most physicists haven't even recognized the uncomfortable truth: physics has been in crisis since 1927. Quantum mechanics has always had obvious gaps—which have come to be simply ignored. Science popularizers keep telling us how weird it is, how impossible it is to understand. Academics discourage students from working on the "dead end" of quantum foundations. Putting his professional reputation on the line with this audacious yet entirely reasonable book, Carroll says that the crisis can now come to an end. We just have to accept that there is more than one of us in the universe. There are many, many Sean Carrolls. Many of every one of us. Copies of you are generated thousands of times per second. The Many Worlds Theory of quantum behavior says that every time there is a quantum event, a world splits off with everything in it the same, except in that other world the quantum event didn't happen. Step-by-step in Carroll's uniquely lucid way, he tackles the major objections to this otherworldly revelation until his case is inescapably established. Rarely does a book so fully reorganize how we think about our place in the universe. We are on the threshold of a new understanding—of where we are in the cosmos, and what we are made of.

Spacetime and Geometry Insight Press, Incorporated

This book explains and helps readers to develop geometric intuition as it relates to differential forms. It includes over 250 figures to aid understanding and enable readers to visualize the concepts being discussed. The author gradually builds up to the basic ideas and concepts so that definitions, when made, do not appear out of nowhere, and both the importance and role that theorems play is evident as or before they are presented. With a clear writing style and easy-to-understand motivations for each topic, this book is primarily aimed at second- or third-year undergraduate math and physics students with a basic knowledge of vector calculus and linear algebra.

*A General Relativity Workbook* Penguin

Winner of the prestigious 2013 Royal Society Winton Prize for Science Books "A modern voyage of discovery." —Frank Wilczek, Nobel Laureate, author of *The Lightness of Being* The Higgs boson is one of our era's most fascinating scientific frontiers and the key to understanding why mass exists. The most recent book on the subject, *The God Particle*, was a bestseller. Now, Caltech physicist Sean Carroll documents the doorway that is opening—after billions of dollars and the efforts of thousands of researchers at the Large Hadron Collider in Switzerland—into the mind-boggling world of dark matter. The Particle at the End of the Universe has it all: money and politics, jealousy and self-sacrifice, history and cutting-edge physics—all grippingly told by a rising star of science writing.

*An Introductory Guide to Gravity and General Relativity* Pearson Higher Ed

Vectors and tensors are among the most powerful problem-solving tools available, with applications ranging from mechanics and electromagnetics to general relativity. Understanding the nature and application of vectors and tensors is critically important to students of physics and engineering. Adopting the same approach used in his highly popular *A Student's Guide to Maxwell's Equations*, Fleisch explains vectors and tensors in plain language. Written for undergraduate and beginning graduate students, the book provides a thorough grounding in vectors and vector calculus before transitioning through contra and covariant components to tensors and their applications. Matrices and their algebra are reviewed on the book's supporting website, which also features interactive solutions to every problem in the text where students can work through a series of hints or choose to see the entire solution at once. Audio podcasts give students the opportunity to hear important concepts in the book explained by the author.

*The Soul Hypothesis* Princeton University Press

This introductory textbook on the general theory of relativity presents a solid foundation for those who want to learn about relativity. The subject is presented in a physically intuitive, but mathematically rigorous style. The topic of relativity is covered in a broad and deep manner. Besides, the aim is that after reading the book a student should not feel discouraged when she opens advanced texts on general relativity for further reading. The book consists of three parts: An introduction to the general theory of relativity. Geometrical mathematical background material. Topics that include the action principle, weak gravitational fields and gravitational

waves, Schwarzschild and Kerr solution, and the Friedman equation in cosmology. The book is suitable for advanced graduates and graduates, but also for established researchers wishing to be educated about the field.

*The Geometry of Spacetime* Cambridge University Press

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

*The General Theory of Relativity* Cambridge University Press

Einstein's theory of general relativity is a theory of gravity and, as in the earlier Newtonian theory, much can be learnt about the character of gravitation and its effects by investigating particular idealised examples. This book describes the basic solutions of Einstein's equations with a particular emphasis on what they mean, both geometrically and physically. Concepts such as big bang and big crunch-types of singularities, different kinds of horizons and gravitational waves, are described in the context of the particular space-times in which they naturally arise. These notions are initially introduced using the most simple and symmetric cases. Various important coordinate forms of each solution are presented, thus enabling the global structure of the corresponding space-time and its other properties to be analysed. The book is an invaluable resource both for graduate students and academic researchers working in gravitational physics.

Spacetime, Geometry and Gravitation CRC Press

"Wald's book is clearly the first textbook on general relativity with a totally modern point of view; and it succeeds very well where others are only partially successful. The book includes full discussions of many problems of current interest which are not treated in any extant book, and all these matters are considered with perception and understanding."—S. Chandrasekhar "A tour de force: lucid, straightforward, mathematically rigorous, exacting in the analysis of the theory in its physical aspect."—L. P. Hughston, *Times Higher Education Supplement* "Truly excellent. . . . A sophisticated text of manageable size that will probably be read by every student of relativity, astrophysics, and field theory for years to come."—James W. York, *Physics Today* *Something Deeply Hidden* Penguin

Comprehensive treatment of the essentials of modern differential geometry and topology for graduate students in mathematics and the physical sciences.

*Quantum Field Theory and the Standard Model* Cambridge University Press

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)

Quantum Worlds and the Emergence of Spacetime Princeton University Press

Novel interpretation of the relationship between space, time, gravitation, and their cosmological implications; based on author's discovery of a value in gravitation overlooked by both Newton and Einstein. 1982 edition.

Relativity Made Relatively Easy Cambridge University Press

An inviting, intuitive, and visual exploration of differential geometry and forms Visual Differential Geometry and Forms fulfills two principal goals. In the first four acts, Tristan Needham puts the geometry back into differential geometry. Using 235 hand-drawn diagrams, Needham deploys Newton's geometrical methods to provide geometrical explanations of the classical results. In the fifth act, he offers the first undergraduate introduction to differential forms that treats advanced topics in an intuitive and geometrical manner. Unique features of the first four acts include: four distinct geometrical proofs of the fundamentally important Global Gauss-Bonnet theorem, providing a stunning link between local geometry and global topology; a simple, geometrical proof of Gauss's famous Theorema Egregium; a complete geometrical treatment of the Riemann curvature tensor of an n-manifold; and a detailed geometrical treatment of Einstein's field equation, describing gravity as curved spacetime (General Relativity), together with its implications for gravitational waves, black holes, and cosmology. The final act elucidates such topics as the unification of all the integral theorems of vector calculus; the elegant reformulation of Maxwell's equations of electromagnetism in terms of 2-forms; de Rham cohomology; differential geometry via Cartan's method of moving frames; and the calculation of the Riemann tensor using curvature 2-forms. Six of the seven chapters of Act V can be read completely independently from the rest of the book. Requiring only basic calculus and geometry, Visual Differential Geometry and Forms provocatively rethinks the way this important area of mathematics should be considered and taught.

A Visual Introduction to Differential Forms and Calculus on Manifolds Spacetime and Geometry Vectors, tensors and functions -- Manifolds, vectors and differentiation -- Energy, momentum and Einstein's equations

A Complete Guide to the Laws of the Universe No-Nonsense Books

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 modern textbooks in general relativity.

Exact Space-Times in Einstein's General Relativity University of Chicago Press

In this short book, renowned theoretical physicist and author Carlo Rovelli gives a straightforward introduction to Einstein's General Relativity, our current theory of gravitation. Focusing on conceptual clarity, he derives all the basic results in the simplest way, taking care to explain the physical, philosophical and mathematical ideas at the heart of "the most beautiful of all scientific theories". Some of the main applications of General Relativity are also explored, for example, black holes, gravitational waves and cosmology, and the book concludes with a brief introduction to quantum gravity. Written by an author well known for the clarity of his presentation of scientific ideas, this concise book will appeal to university students looking to improve their understanding of the principal concepts, as well as science-literate readers who are curious about the real theory of General Relativity, at a level beyond a popular science treatment.

A Mathematical Approach Courier Dover Publications

**\*\*WINNER OF THE 2020 NOBEL PRIZE IN PHYSICS\*\*** The Road to Reality is the most important and ambitious work of science for a generation. It provides nothing less than a comprehensive account of the physical universe and the essentials of its underlying mathematical theory. It assumes no particular specialist knowledge on the part of the reader, so that, for example, the early chapters give us the vital mathematical background to the physical theories explored later in the book. Roger Penrose's purpose is to describe as clearly as possible our present understanding of the universe and to convey a feeling for its deep beauty and philosophical implications, as well as its intricate logical interconnections. The Road to Reality is rarely less than challenging, but the book is leavened by vivid descriptive passages, as well as hundreds of hand-drawn diagrams. In a single work of colossal scope one of the world's greatest scientists has given us a complete and unrivalled guide to the glories of the universe that we all inhabit. 'Roger Penrose is the most important physicist to work in relativity theory except for Einstein. He is one of the very few people I've met in my life who, without reservation, I call a genius' Lee Smolin

A Student's Guide to Vectors and Tensors Cambridge University Press

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

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