Problem Book In Relativity And Gravitation

Problem Book in Quantum Field Theory
Special Relativity
Introduction To General Relativity And Cosmology
Problems in the General Theory of Relativity and Theory of Group Representations
Mathematics of Relativity
Part 1: Mechanics, Relativity, and Electrodynamics
Geometry, Relativity and the Fourth Dimension
A Guide to Physics Problems
Introduction to Relativity
Motion and Relativity
Relativity, Gravitation and Cosmology
The Search for Life in the Depths of Space
For Physicists and Astronomers
Unsolved Problems in Special and General Relativity
General Relativity
Alien Oceans
A First Course in General Relativity
Foundations and Philosophy of Science and Technology Series
Special, General, and Cosmological
The Cauchy Problem in General Relativity
A Guide to Physics Problems
Numerical Relativity
An Introduction with 200 Problems and Solutions
The Problem of Time
Problem book in relativity and gravitation
The Evolution Problem in General Relativity

Special Relativity, Electrodynamics, and General Relativity
A Relativist's Toolkit
A Basic Introduction
300 Problems in Special and General Relativity
Relativity and Geometry
Relativity Reexamined
Part 1: Mechanics, Relativity, and Electrodynamics
Numerical Relativity: Starting from Scratch
Introduction to General Relativity
Relativity
On Hilbert’s Sixth Problem
Mathematical Problems of General Relativity I
General Relativity
From Newton to Einstein

ROWE CANTRELL

Problem Book in Quantum Field Theory Cambridge University Press
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.
Special Relativity Elsevier
A pedagogical and accessible introduction to numerical relativity, the key tool to model gravitational waves and black hole mergers.
Introduction To General Relativity And Cosmology Cambridge University Press
Second edition of a widely-used textbook providing the first step into general relativity for undergraduate students with minimal mathematical background.

Problems in the General Theory of Relativity and Theory of Group Representations Courier Corporation
Concise treatment, based on ideas of Einstein and Minkowski, geared toward advanced undergraduates and graduate students of physics. Topics include old physics, new geometry, special relativity, curved space, and general relativity. 1950 edition.
Mathematics of Relativity Oxford University Press on Demand
The main goal of this work is to revisit the proof of the global stability of Minkowski space by D. Christodoulou and S. Klainerman, [Ch-Kl]. We provide a new self-contained proof of the main part of that result, which concerns the full solution of the radiation problem in vacuum, for arbitrary asymptotically flat initial data sets. This can also be interpreted as a proof of the global stability of the external region of Schwarzschild spacetime. The proof, which is a significant modification of the arguments in [Ch-Kl], is based on a double null foliation of spacetime instead of the mixed null-maximal foliation used in [Ch-Kl]. This approach is more naturally adapted to the radiation features of the Einstein equations and leads to important technical simplifications. In the first chapter we review some basic notions of differential geometry that are sys tematically used in all the remaining chapters. We then introduce the Einstein equations and the initial data sets and discuss some of the basic features of the initial value problem in general relativity. We shall review, without proofs, well-established results concerning local and global existence and uniqueness and formulate our main result. The second chapter provides the technical motivation for the proof of our main theorem.
Part 1: Mechanics, Relativity, and Electrodynamics Springer Nature
Relativity Reexamined examines relativity from a new angle and with an unconventional perspective. Topics covered range from quantum theory and relativity to gravitation and relativity quantized atomic clocks, as well as special relativity Doppler effect and spherical symmetry. A distinction is also made between mathematical coordinates and physical frames of reference. This book is comprised of eight chapters and begins by considering the development of scientific theories in general, citing examples to show how scientists' viewpoints have progressively changed. Some of the problems that have emerged, and which even Albert Einstein was unable to foresee, are highlighted. The first chapter reviews the historical sequence of events that led to quantum theory and relativity, while the second chapter focuses on some problems about restricted relativity, paying particular attention to the meaning of potential energy and the importance of field theory in relativistic theories. The following chapters analyze a variety of experimental evidences that challenge many basic assumptions in theoretical physics, focusing on the fundamental importance of the Mössbauer effect and of atomic clocks; the link between gravitation and relativity; classical problems of theoretical mechanics; and special relativity Doppler effect. A gravistatic problem with spherical symmetry is also described. This monograph will be of interest to physicists and students of physics.
Geometry, Relativity and the Fourth Dimension Courier Corporation
Inside the epic quest to find life on the water-rich moons at the

outer reaches of the solar system Where is the best place to find life beyond Earth? We often look to Mars as the most promising site in our solar system, but recent scientific missions have revealed that some of the most habitable real estate may actually lie farther away. Beneath the frozen crusts of several of the small, ice-covered moons of Jupiter and Saturn lurk vast oceans that may have existed for as long as Earth, and together may contain more than fifty times its total volume of liquid water. Could there be organisms living in their depths? Alien Oceans reveals the science behind the thrilling quest to find out. Kevin Peter Hand is one of today's leading NASA scientists, and his pioneering research has taken him on expeditions around the world. In this captivating account of scientific discovery, he brings together insights from planetary science, biology, and the adventures of scientists like himself to explain how we know that oceans exist within moons of the outer solar system, like Europa, Titan, and Enceladus. He shows how the exploration of Earth's oceans is informing our understanding of the potential habitability of these icy moons, and draws lessons from what we have learned about the origins of life on our own planet to consider how life could arise on these distant worlds. Alien Oceans describes what lies ahead in our search for life in our solar system and beyond, setting the stage for the transformative discoveries that may await us.

A Guide to Physics Problems Springer Science & Business Media
Introduction to Relativity is intended to teach physics and astronomy majors at the freshman, sophomore or upper-division levels how to think about special and general relativity in a fundamental, but accessible, way. Designed to render any reader a "master of relativity", everything on the subject is comprehensible and derivable from first principles. The book emphasizes problem solving, contains abundant problem sets, and is conveniently organized to meet the needs of both student and instructor. Simplicity: the book teaches space and time in relativity in a physical fashion with minimal mathematics Conciseness: the book teaches relativity by emphasizing the basic simplicity of the principles at work Visualization: space-time diagrams (Minkowski) illustrate phenomena from simultaneity to the resolution of the twin paradox in a concrete fashion Worked problems: two chapters of challenging problems solved in several ways illustrate and teach the principles Problem sets: each chapter is accompanied by a full set of problems for the student that teach the principles and some new phenonmena

Introduction to Relativity Princeton University Press
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.

Motion and Relativity Problem Book in Relativity and Gravitation

A textbook-neutral problems-and-solutions book that complements any relativity textbook at advanced undergraduate or masters level.

Relativity, Gravitation and Cosmology Courier Corporation

"The general theory of relativity is a theory of manifolds equipped with Lorentz metrics and fields which describe the matter content. Einstein's equations equate the Einstein tensor (a curvature quantity associated with the Lorentz metric) with the stress energy tensor (an object constructed using the matter fields). In addition, there are equations describing the evolution of the matter. Using symmetry as a guiding principle, one is naturally led to the Schwarzschild and Friedmann-Lemaãitre-Robertson-Walker solutions, modelling an isolated system and the entire universe respectively. In a different approach, formulating Einstein's equations as an initial value problem allows a closer study of their solutions. This book first provides a definition of the concept of initial data and a proof of the correspondence between initial data and development. It turns out that some initial data allow non-isometric maximal developments, complicating the uniqueness issue. The second half of the book is concerned with this and related problems, such as strong cosmic censorship. The book presents complete proofs of several classical results that play a central role in mathematical relativity but are not easily accessible to those wishing to enter the subject. Prerequisites are a good knowledge of basic measure and integration theory as well as the fundamentals of Lorentz geometry. The necessary background from the theory of partial differential equations and Lorentz geometry is included."--Publisher's description.

The Search for Life in the Depths of Space University of Chicago Press

Exposition of fourth dimension, concepts of relativity as Flatland characters continue adventures. Topics include curved space time as a higher dimension, special relativity, and shape of space-time. Includes 141 illustrations.

For Physicists and Astronomers Infinite Study

This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it. This work is in the public domain in the United States of America, and possibly other nations. Within the United States, you may freely copy and distribute this work, as no entity (individual or corporate) has a copyright on the body of the work. Scholars believe, and we concur, that this work is important enough to be preserved, reproduced, and made generally available to the public. To ensure a quality reading experience, this work has been proofread and republished using a format that seamlessly blends the original graphical elements with text in an easy-to-read typeface. We appreciate your support of the preservation process, and thank you for being an important part

of keeping this knowledge alive and relevant.
Unsolved Problems in Special and General Relativity Academic Press
In order to equip hopeful graduate students with the knowledge necessary to pass the qualifying examination, the authors have assembled and solved standard and original problems from major American universities – Boston University, University of Chicago, University of Colorado at Boulder, Columbia, University of Maryland, University of Michigan, Michigan State, Michigan Tech, MIT, Princeton, Rutgers, Stanford, Stony Brook, University of Wisconsin at Madison – and Moscow Institute of Physics and Technology. A wide range of material is covered and comparisons are made between similar problems of different schools to provide the student with enough information to feel comfortable and confident at the exam. Guide to Physics Problems is published in two volumes: this book, Part 1, covers Mechanics, Relativity and Electrodynamics; Part 2 covers Thermodynamics, Statistical Mechanics and Quantum Mechanics. Praise for A Guide to Physics Problems: Part 1: Mechanics, Relativity, and Electrodynamics: "Sidney Cahn and Boris Nadgorny have energetically collected and presented solutions to about 140 problems from the exams at many universities in the United States and one university in Russia, the Moscow Institute of Physics and Technology. Some of the problems are quite easy, others are quite tough; some are routine, others ingenious." (From the Foreword by C. N. Yang, Nobelist in Physics, 1957) "Generations of graduate students will be grateful for its existence as they prepare for this major hurdle in their careers." (R. Shankar, Yale University) "The publication of the volume should be of great help to future candidates who must pass this type of exam." (J. Robert Schrieffer, Nobelist in Physics, 1972) "I was positively impressed ... The book will be useful to students who are studying for their examinations and to faculty who are searching for appropriate problems." (M. L. Cohen, University of California at Berkeley) "If a student understands how to solve these problems, they have gone a long way toward mastering the subject matter." (Martin Olsson, University of Wisconsin at Madison) "This book will become a necessary study guide for graduate students while they prepare for their Ph.D. examination. It will become equally useful for the faculty who write the questions." (G. D. Mahan, University of Tennessee at Knoxville)
General Relativity Springer
The Problem Book in Quantum Field Theory contains about 200 problems with solutions or hints that help students to improve their understanding and develop skills necessary for pursuing the subject. It deals with the Klein-Gordon and Dirac equations, classical field theory, canonical quantization of scalar, Dirac and electromagnetic fields, the processes in the lowest order of perturbation theory, renormalization and regularization. The solutions are presented in a systematic and complete manner. The material covered and the level of exposition make the book appropriate for graduate and undergraduate students in physics, as well as for teachers and researchers.
Alien Oceans Princeton University Press
This book provides an introduction to Einstein's general theory of relativity. A "physics-first" approach is adopted so that interesting applications come before the more difficult task of solving the Einstein equation. The book includes extensive coverage of

cosmology, and is designed to allow readers to study the subject alone.

A First Course in General Relativity Springer

This 2004 textbook fills a gap in the literature on general relativity by providing the advanced student with practical tools for the computation of many physically interesting quantities. The context is provided by the mathematical theory of black holes, one of the most elegant, successful, and relevant applications of general relativity. Among the topics discussed are congruencies of timelike and null geodesics, the embedding of spacelike, timelike and null hypersurfaces in spacetime, and the Lagrangian and Hamiltonian formulations of general relativity. Although the book is self-contained, it is not meant to serve as an introduction to general relativity. Instead, it is meant to help the reader acquire advanced skills and become a competent researcher in relativity and gravitational physics. The primary readership consists of graduate students in gravitational physics. It will also be a useful reference for more seasoned researchers working in this field.

Foundations and Philosophy of Science and Technology Series Elsevier

This book takes the reader from the preliminary ideas of the Special Theory of Relativity (STR) to the doorsteps of the General Theory of Relativity (GTR).The first part explains the main concepts in a layman's language, including STR, the Lorentz transformation, relativistic mechanics. Thereafter the concept of tensors is built up in detail, especially Maxwell's stress tensor with illustrative examples, culminating in the energy-momentum conservation in electromagnetic fields. Mathematical structure of Minkowski's space-time is constructed and explained graphically. The equation of motion is formulated and then illustrated by the example of relativistic rocket. The principle of covariance is explained with the covariant equations of classical electrodynamics. Finally, the book constructs the energy tensor which constitutes the source term in Einstein's field equation, which clears the passage to the GTR.In the book, the concepts of tensors are developed carefully and a large number of numerical examples taken from atomic and nuclear physics. The graphs of important equations are included. This is suitable for studies in classical electrodynamics, modern physics, and relativity.

Special, General, and Cosmological Princeton University Press

Motion and Relativity focuses on the methodologies, solutions, and approaches involved in the study of motion and relativity, including the general relativity theory, gravitation, and approximation. The publication first offers information on notation and gravitational interaction and the general theory of motion. Discussions focus on the notation of the general relativity theory, field values on the world-lines, general statement of the physical problem, Newton's theory of gravitation, and forms for the equation of motion of the second kind. The text then takes a look at the approximation method and the equations of motion and motion and the Newtonian and post-Newtonian approximation. Topics include general remarks on the approximation method, two forms of the equations of motion and integrability conditions, approximation method and coordinate system, and development of the metric field. The manuscript examines the variational principle and the equations of motion of the third kind and the one and two particle problems. The formulation of the problem,

Lagrangian up the sixth order, motion of a test particle in the field of a heavy particle, two-body problem, and motion of rotating bodies are discussed. The text is a dependable reference for readers interested in the methodologies, solutions, and approaches involved in the study of motion and relativity.
The Cauchy Problem in General Relativity World Scientific Publishing Company
In order to equip hopeful graduate students with the knowledge necessary to pass the qualifying examination, the authors have assembled and solved standard and original problems from major American universities – Boston University, University of Chicago, University of Colorado at Boulder, Columbia, University of Maryland, University of Michigan, Michigan State, Michigan Tech, MIT, Princeton, Rutgers, Stanford, Stony Brook, University of Wisconsin at Madison – and Moscow Institute of Physics and Technology. A wide range of material is covered and comparisons are made between similar problems of different schools to provide the student with enough information to feel comfortable and confident at the exam. Guide to Physics Problems is published in two volumes: this book, Part 1, covers Mechanics, Relativity and Electrodynamics; Part 2 covers Thermodynamics, Statistical Mechanics and Quantum Mechanics. Praise for A Guide to Physics Problems: Part 1: Mechanics, Relativity, and Electrodynamics: "Sidney Cahn and Boris Nadgorny have energetically collected and presented solutions to about 140 problems from the exams at many universities in the United States and one university in Russia, the Moscow Institute of Physics and Technology. Some of the problems are quite easy, others are quite tough; some are routine, others ingenious." (From the Foreword by C. N. Yang, Nobelist in Physics, 1957) "Generations of graduate students will be grateful for its existence as they prepare for this major hurdle in their careers." (R. Shankar, Yale University) "The publication of the volume should be of great help to future candidates who must pass this type of exam." (J. Robert Schrieffer, Nobelist in Physics, 1972) "I was positively impressed ... The book will be useful to students who are studying for their examinations and to faculty who are searching for appropriate problems." (M. L. Cohen, University of California at Berkeley) "If a student understands how to solve these problems, they have gone a long way toward mastering the subject matter." (Martin Olsson, University of Wisconsin at Madison) "This book will become a necessary study guide for graduate students while they prepare for their Ph.D. examination. It will become equally useful for the faculty who write the questions." (G. D. Mahan, University of Tennessee at Knoxville)