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KEY=RELATIVITY - COMPTON MCGEE

The Rotating Fields in General Relativity

LAP Lambert Academic Publishing The black holes of nature are the most perfect macroscopic objects there are in the universe: the only elements in there that constructed our concept of space and time. Black holes are a class of gravitational objects predicted by Einstein's theory of general relativity given by him in 1915. And since the general theory of relativity provides only a single unique family of solutions for their descriptions, they are the simplest objects as well. Due to the gravitational effects on space-time, its most striking property is that there is a region of space around a black hole where light is unable to escape. The unique two-parameter family of solutions which describes the space-time around black hole is the Kerr family discovered by Roy Patrick Kerr in July, 1963. The two parameters are the mass and the angular momentum of the black holes. The static solution, with zero angular momentum was discovered by Karl Schwarzschild in December, 1915. A study of the black holes of nature is then a study of these solutions. It is to this study that this book is devoted.

Rotating Fields in General Relativity

Cambridge University Press The aim of this book is to introduce the reader to research work on a particular aspect of rotating fields in general relativity. The account begins with a short introduction to the relevant aspects of general relativity, written at a level accessible to a beginning graduate student in theoretical physics. There follows a detailed derivation of the Wehl-Lewis-Papapetrou form of the stationary axially symmetric metric. The Kerr and Tomimatsu-Sato forms of the rotating interior and exterior solutions of the Einstein equations are then discussed. The last three chapters of the book illustrate the applications of the theory to rotating neutral dust, rotating Einstein-Maxwell fields, and rotating charged dust. The author has drawn on his own research work to produce a timely discussion of this important area of research.

General Relativity and John Archibald Wheeler

Springer Science & Business Media Observational and experimental data pertaining to gravity and cosmology are changing our view of the Universe. General relativity is a fundamental key for the understanding of these observations and its theory is undergoing a continuing enhancement of its intersection with observational and experimental data. These data include direct observations and experiments carried out in our solar system, among which there are direct gravitational wave astronomy, frame dragging and tests of gravitational theories from solar system and spacecraft observations. This book explores John Archibald Wheeler's seminal and enduring contributions in relativistic astrophysics and includes: the General Theory of Relativity and Wheeler's influence; recent developments in the confrontation of relativity with experiments; the theory describing gravitational radiation, and its detection in Earth-based and space-based interferometer detectors as well as in Earth-based bar detectors; the mathematical description of the initial value problem in relativity and applications to modeling gravitational wave sources via computational relativity; the phenomenon of frame dragging and its measurement by satellite observations. All of these areas were of direct interest to Professor John A. Wheeler and were seminally influenced by his ideas.

Nuclear Science Abstracts

Directions in General Relativity: Volume 2

Proceedings of the 1993 International Symposium, Maryland: Papers in Honor of Dieter Brill

Cambridge University Press Proceedings of the International Symposium on General Relativity, University of Maryland, 1993.

General Relativity

Proceedings of the Forty Sixth Scottish Universities Summer School in Physics, Aberdeen, July 1995

Routledge General Relativity provides an unusually broad survey of the current state of this field. Chapters on mathematical relativity cover many topics, including initial value problems, a new approach to the partial differential equations of physics, and work on exact solutions. The chapters on relativistic cosmology and black holes explore cosmology. Other chapters deal with gravitational waves, experimental relativity, quantum gravity, and aspects of computing in relativity. The book will be useful both to postgraduates and to established workers in the field.

Rotating Relativistic Stars

Cambridge University Press The masses of neutron stars are limited by an instability to gravitational collapse and an instability driven by gravitational waves limits their spin. Their oscillations are relevant to x-ray observations of accreting binaries and to gravitational wave observations of neutron stars formed during the coalescence of double neutron-star systems. This volume includes more than forty years of research to provide graduate students and researchers in astrophysics, gravitational physics and astronomy with the first self-contained treatment of the structure, stability and oscillations of rotating neutron stars. This monograph treats the equations of stellar equilibrium; key approximations, including slow rotation and perturbations of spherical and rotating stars; stability theory and

its applications, from convective stability to the r-mode instability; and numerical methods for computing equilibrium configurations and the nonlinear evolution of their oscillations. The presentation of fundamental equations, results and applications is accessible to readers who do not need the detailed derivations.

Exact Space-Times in Einstein's General 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.

One Hundred Years Of General Relativity: From Genesis And Empirical Foundations To Gravitational Waves, Cosmology And Quantum Gravity - Volume 1

World Scientific The aim of this two-volume title is to give a comprehensive review of one hundred years of development of general relativity and its scientific influences. This unique title provides a broad introduction and review to the fascinating and profound subject of general relativity, its historical development, its important theoretical consequences, gravitational wave detection and applications to astrophysics and cosmology. The series focuses on five aspects of the theory: The first three topics are covered in Volume 1 and the remaining two are covered in Volume 2. While this is a two-volume title, it is designed so that each volume can be a standalone reference volume for the related topic.

General Relativity, Cosmology and Astrophysics

Perspectives 100 years after Einstein's stay in Prague

Springer 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.

Nuclear Science Abstracts

Applied General Relativity

Theory and Applications in Astronomy, Celestial Mechanics and Metrology

Springer Nature In the late 20th and beginning 21st century high-precision astronomy, positioning and metrology strongly rely on general relativity. Supported by exercises and solutions this book offers graduate students and researchers entering those fields a self-contained and exhaustive but accessible treatment of applied general relativity. The book is written in a homogenous (graduate level textbook) style allowing the reader to understand the arguments step by step. It first introduces the mathematical and theoretical foundations of gravity theory and then concentrates on its general relativistic applications: clock rates, clock sychronization, establishment of time scales, astronomical references frames, relativistic astrometry, celestial mechanics and metrology. The authors present up-to-date relativistic models for applied techniques such as Satellite LASER Ranging (SLR), Lunar LASER Ranging (LLR), Globale Navigation Satellite Systems (GNSS), Very Large Baseline Interferometry (VLBI), radar measurements, gyroscopes and pulsar timing. A list of acronyms helps the reader keep an overview and a mathematical appendix provides required functions and terms.

2001: A Relativistic Spacetime Odyssey

Experiments and Theoretical Viewpoints on General Relativity and Quantum Gravity

World Scientific This volume offers a comprehensive overview of our understanding of gravity at both the experimental and the theoretical level. Critical reviews by experts cover topics ranging from astrophysics (anisotropies in the cosmic microwave background, gamma ray bursts, neutron stars and astroparticles), cosmology, the status of gravitational wave sources and detectors, verification of Newton's law at short distances, the equivalence principle, gravito-magnetism, measurement theory, time machines and the foundations of Einstein's theory, to string theory and loop quantum gravity. Contents:Foundations and Classical General Relativity:Space–Time, General Covariance, Dirac–Bergmann Observables and Non-Inertial Frames (L Lusanna)Physics in the Presence of a Time Machine (I D Novikov)Frame-Dragging and Gravitomagnetism: Theory and Experiment (I Ciufolini)New Tests of the Strong Equivalence Principle and of the Inverse Square Law (E G Adelberger)Cosmology:The Inflationary Universe (A Riotto)Imaging the Early Universe with the BOOMERANG Experiment (P De Bernardis et al.)Gravitational Waves:Gravitational Radiation: A Tool for Testing General Relativity (C M Will)What Gravitational Signals Say about the Structure and the Evolution of Astrophysical Sources (V Ferrari)Astrophysics:Computational Relativity: Collisions of Black Holes (R Matzner)Gamma Ray Bursts: Some Facts and Ideas (G Ghisellini)Quantum Gravity:Spin Foams as Feynman Diagrams (M Reisenberger & C Rovelli)Physics with Large Extra Dimensions (I Antoniadis)Field Theories on Canonical and Lie-Algebra Noncommutative Spacetimes (G Amelino-Camelia et al.)and other papers Readership: Quantum, astro-, high-energy and theoretical physicists. Keywords:

Leibniz on Space, Time, and Relativity

Oxford University Press This book presents fresh interpretations of Gottfried Leibniz's theories of time, space, and the relativity of motion, based on a thorough examination of Leibniz's manuscripts as well as his published papers. These are analysed in historical context, but also with an eye to their contemporary relevance.

Physics and Metaphysics

Cambridge Scholars Publishing The central thought of this book is that definite predictions of classical physics can be explained by mathematics of special relativity. The probabilistic nature of quantum mechanics is determined by peculiar mathematics which can only describe the quantum phenomena – this mathematics gives statistical explanations to these phenomena and no other explanations could in principle be given to them; as well, the phenomena of classical physics which are to be described definitely (but not in principle probabilistically) can be described this way only because, in its turn, it is determined by peculiar mathematics and – as it is argued in the book – this simple mathematics can be straightforwardly inferred from the special relativity theory. It is shown that these important results correspond to the approach accepted in modern physics due, in particular, to Bell's inequalities and their tests. However, the author concentrates on the philosophical consequences that should be inferred from these physical results. Naturally, metaphysical views which can be congenial to this kind of physical picture of the world must agree with the concept of non-homogeneity. Such metaphysics was firstly exposed by the author in his work devoted to the non-linearity of natural language: The World and Language: The Ontology for Natural Language (Lanham: University Press of America, 2006). But one does not need to be familiar with this book in order to read Physics and Metaphysics; nor is it necessary for the reader to have any mathematical skill or serious knowledge in physics. This book will be of benefit to those interested in the fields of physics, quantum mechanics and mathematics.

The Genesis of General Relativity

Sources and Interpretations

Springer Science & Business Media This four-volume work represents the most comprehensive documentation and study of the creation of general relativity. Einstein's 1912 Zurich notebook is published for the first time in facsimile and transcript and commented on by today's major historians of science. Additional sources from Einstein and others, who from the late 19th to the early 20th century contributed to this monumental development, are presented here in translation for the first time. The volumes offer detailed commentaries and analyses of these sources that are based on a close reading of these documents supplemented by interpretations by the leading historians of relativity.

Introduction to General Relativity

Cambridge University Press Student-friendly, well illustrated textbook for advanced undergraduate and beginning graduate students in physics and mathematics.

Stars and Relativity

Courier Corporation Two of the greatest astrophysicists of the 20th century explore general relativity, properties of matter under astrophysical conditions, stars, and stellar systems. A valuable resource for physicists, astronomers, graduate students. 1971 edition.

The Universe of General Relativity

Springer Science & Business Media Outgrowth of 6th Int'l Conference on the History of General Relativity, held in Amsterdam on June 26-29, 2002 Contributions from notable experts offer both new and historical insights on gravitation, general relativity, cosmology, unified field theory, and the history of science Topics run gamet from detailed mathematical discussions to more personal recollections of relativity as seen through the eyes of the public and renowned relativists

Light Rays in the Gravitational Field of Rotating Disks of Dust in General Relativity

General Relativity and Relativistic Astrophysics

Springer Science & Business Media In 1979 I gave graduate courses at the University of Zurich and lectured in the 'Troisieme Cycle de la Suisse Romande' (a consortium offour uni versities in the french-speaking part of Switzerland), and these lectures were the basis of the 'Springer Lecture Notes in Physics', Volume 150, published in 1981. This text appeared in German, because there have been few modern expositions of the general theory of relativity in the mother tongue of its only begetter. Soon after the book appeared, W. Thirring asked me to prepare an English edition for the 'Texts and Mono graphs in Physics'. Fortunately E. Borie agreed to translate the original German text into English. An excellent collaboration allowed me to re vise and add to the contents of the book. I have updated and improved the original text and have added a number of new sections, mostly on astrophysical topics. In particular, in collaboration with M. Camenzind I have included a chapter on spherical and disk accretion onto compact objects. This book divides into three parts. Part I develops the mathematical tools used in the general theory of relativity. Since I wanted to keep this part short, but reasonably self-contained, I have adopted the dry style of most modern mathematical texts. Readers who have never before been confronted with differential geometry will find the exposition too ab stract and will miss motivations of the basic concepts and constructions.

Classical Fields

General Relativity and Gauge Theory

World Scientific Publishing Company This invaluable book presents gravitation and gauge fields as interrelated topics with a common physical and mathematical foundation, such as gauge theory of gravitation and other fields, giving emphasis to the physicist's point of view. About half of the material is devoted to Einstein's general relativity theory, and the rest to gauge fields that naturally blend well with gravitation, including spinor formulation, classification of SU(2) gauge fields and null-tetrad formulation of the Yang-Mills field in the presence of gravitation. The text includes a useful introduction to the physical foundation of the theory of gravitation. It also provides the mathematical theory of the geometry of curved space-times needed to describe Einstein's general relativity theory.

Modern General Relativity

Black Holes, Gravitational Waves, and Cosmology

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

Literature 1971, Part 2

Springer Science & Business Media Astronomy and Astrophysics Abstracts, which has appeared in semi-annual volumes since 1969, is de voted 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, com pared to which our system of accumulating abstracts for about six months offers the advantage of greater convenience for the user. Volume 6 contains literature published in 1971 and received before March 15, 1972; some older liter ature which was received late and which is not recorded in earlier volumes is also included.

Gravitational Theories Beyond General Relativity

Springer Despite the success of general relativity in explaining classical gravitational phenomena, several problems at the interface between gravitation and high energy physics still remain open. The purpose of this thesis is to explore quantum gravity and its phenomenological consequences for dark matter, gravitational waves and inflation. A new formalism to classify gravitational theories based on their degrees of freedom is introduced and, in light of this classification, it is argued that dark matter is no different from modified gravity. Gravitational waves are shown to be damped due to quantum degrees of freedom. The consequences for gravitational wave events are also discussed. The non-minimal coupling of the Higgs boson to gravity is studied in connection with Starobinsky inflation and its implications for the vacuum instability problem is analyzed.

Topics in the Foundations of General Relativity and Newtonian Gravitation Theory

University of Chicago Press In Topics in the Foundations of General Relativity and Newtonian Gravitation Theory, David B. Malament presents the basic logical-mathematical structure of general relativity and considers a number of special topics concerning the foundations of general relativity and its relation to Newtonian gravitation theory. These special topics include the geometrized formulation of Newtonian theory (also known as Newton-Cartan theory), the concept of rotation in general relativity, and Gödel spacetime. One of the highlights of the book is a no-go theorem that can be understood to show that there is no criterion of orbital rotation in general relativity that fully answers to our classical intuitions. Topics is intended for both students and researchers in mathematical physics and philosophy of science.

Einstein's General Theory of Relativity

With Modern Applications in Cosmology

Springer Science & Business Media This book introduces the general theory of relativity and includes applications to cosmology. The book provides a thorough introduction to tensor calculus and curved manifolds. After the necessary mathematical tools are introduced, the authors offer a thorough presentation of the theory of relativity. Also included are some advanced topics not previously covered by textbooks, including Kaluza-Klein theory, Israel's formalism and branes. Anisotropic cosmological models are also included. The book contains a large number of new exercises and examples, each with separate headings. The reader will benefit from an updated introduction to general relativity including the most recent developments in cosmology.

The Effect of Angular Momentum on the Gravitational Field of a Rotating Mass in General Relativity

The Expanding Worlds of General Relativity

Springer Science & Business Media The past decade has seen a considerable surge of interest in historical and philo sophical studies of gravitation and relativity, due not only to the tremendous amount of world-wide research in general relativity and its theoretical and observational consequences, but also to an increasing awareness that a collaboration between working scientists, historians and philosophers of science is, in this field, partic ularly promising for all participants. The expanding activity in this field is well documented by recent volumes in this Einstein Studies series on the History of General Relativity as well as by a series of international conferences on this topic at Osgood Hill (1986), Luminy (1988), and Pittsburgh (1991). The fourth of these conferences, hosted by the Max Planck Institute for the History of Science, was held in Berlin from 31 July to 3 August 1995, with a record attendance of some 80 historians and philosophers of science, physicists, mathematicians, and as tronomers. Based on presentations at the Berlin conference, this volume provides an overview of the present state of research in this field, documenting not only the increasing scope of recent investigations in the history of relativity and gravitation but also the emergence of several key issues that will probably remain at the focus of debate in the near future. RELATIVITY IN THE MAKING The papers of this section deal with the origins and genesis of relativity theory.

General Relativity

Springer Science & Business Media The book is based on the course on general relativity given regularly at the Physics Department of Novosibirsk University. The course, lasting for one semester, consists of 32 hours of lectures and 32 hours of tutorials, plus ho- work of 10 – 12 problems. The exam is passed by 30 – 35 students. The results of the homework and exam give good reasons to believe that at least 20 – 25 of these students really digest the subject. The course requires of students the knowledge of analytical mechanics and classical electrodynamics, including special relativity. Only chapters 7 and 10 of the book are in this respect exceptions: the acquaintance with the notion of spin is useful for studying chapter 7, the fundamentals of thermodynamics and quantum mechanics are necessary for the last chapter. But these parts of thebookcanbeskippedwithoutanylossforunderstandingallotherchapters. The book (as well as the course itself) is in?uenced essentially by the monographbyL.D.LandauandE.M.Lifshitz,TheClassicalTheoryofFields, (Butterworth – Heinemann, 1975). However, I strived to make the exposition as close as possible to a common university course of physics, to make it accessible not only for theorists.

Air Force Research Resumés

Mass and Motion in General Relativity

Springer Science & Business Media From the infinitesimal scale of particle physics to the cosmic scale of the universe, research is concerned with the nature of mass. While there have been spectacular advances in physics during the past century, mass still remains a mysterious entity at the forefront of current research. Our current perspective on gravitation has arisen over millennia, through the contemplation of falling apples, lift thought experiments and notions of stars spiraling into black holes. In this volume, the world's leading scientists offer a multifaceted approach to mass by giving a concise and introductory presentation based on insights from their respective fields of research on gravity. The main theme is mass and its motion within general relativity and other theories of gravity, particularly for compact bodies. Within this framework, all articles are tied together coherently, covering post-Newtonian and related methods as well as the self-force approach to the analysis of motion in curved space-time, closing with an overview of the historical development and a snapshot on the actual state of the art. All contributions reflect the fundamental role of mass in physics, from issues related to Newton's laws, to the effect of self-force and radiation reaction within theories of gravitation, to the role of the Higgs boson in modern physics. High-precision measurements are described in detail, modified theories of gravity reproducing experimental data are investigated as alternatives to dark matter, and the fundamental problem of reconciling any theory of gravity with the physics of quantum fields is addressed. Auxiliary chapters set the framework for theoretical contributions within the broader context of experimental physics. The book is based upon the lectures of the CNRS School on Mass held in Orléans, France, in June 2008. All contributions have been anonymously refereed and, with the cooperation of the authors, revised by the editors to ensure overall consistency.

Scientific and Technical Aerospace Reports

Unsolved Problems in Special and General Relativity

Infinite Study

Group Theory and General Relativity

Representations of the Lorentz Group and Their Applications to the Gravitational Field

World Scientific This is the only book on the subject of group theory and Einstein's theory of gravitation. It contains an extensive discussion on general relativity from the viewpoint of group theory and gauge fields. It also puts together in one volume many scattered, original works, on the use of group theory in general relativity theory. There are twelve chapters in the book. The first six are devoted to rotation and Lorentz groups, and their representations. They include the spinor representation as well as the infinite-dimensional representations. The other six chapters deal with the application of groups -- particularly the Lorentz and the SL(2, C) groups -- to the theory of general relativity. Each chapter is concluded with a set of problems. The topics covered range from the fundamentals of general relativity theory, its formulation as an SL(2, C) gauge theory, to exact solutions of the Einstein gravitational field equations. The important Bondi-Metzner-Sachs group, and its representations, conclude the book The entire book is self-contained in both group theory and general relativity theory, and no prior knowledge of either is assumed. The subject of this book constitutes a relevant link between field theoreticians and general relativity theoreticians, who usually work rather independently of each other. The treatise is highly topical and of real interest to theoretical physicists, general relativists and applied mathematicians. It is invaluable to graduate students and research workers in quantum field theory, general relativity and elementary particle theory.

Revisiting the Foundations of Relativistic Physics

Festschrift in Honor of John Stachel

Springer Science & Business Media 2) the globalization of capital has far outstripped the ability of current labor movements, organized at best on a national level, to conduct an effective defense of the interests of labor within capitalism, let alone to seriously challenge the cap italist system. To develop some form-or forms--of international organization of labor, long an ideological challenge ("Workers of the World Unite") has now become an urgent matter of survival for the labor movements of the world. Here is a challenge, on which I think broad agreement is possible: Even those who think capitalism is capable of indefinite survival must agree that it has functioned best in the past-for example, during the long period of post-World War II expansion when the power of capital has been effectively limited by the countervailing power of labor. Effective exercise of that power has always depended on overcoming the seg mentation of labor due to such factors as locality, race, gender, occupation, etc. , which stillremain important. Above, I have singled out the two factors that today seem key to me: the split between mental and manual labor, and segmentation by nationality. Let all concerned about the current state of capitalism work to build up the countervailing power of labor, and let time show whether this results in nothing more than the better functioning of capitalism, or whether a new challenge to the system ultimately emerges.

Gauge Field Theories: Spin One and Spin Two

100 Years After General Relativity

Courier Dover Publications One of the main problems of theoretical physics concerns the unification of gravity with quantum theory. This monograph examines unification by means of the appropriate formulation of quantum gauge invariance. Suitable for advanced undergraduates and graduate students of physics, the treatment requires a basic knowledge of quantum mechanics. Opening chapters introduce the free quantum fields and prepare the field for the gauge structure, describing the inductive construction of the time-ordered products by causal perturbation theory. The analysis of causal gauge invariance follows, with considerations of massless and massive spin-1 gauge fields. Succeeding chapters explore the construction of spin-2 gauge theories, concluding with an examination of nongeometric general relativity that offers an innovate approach to gravity and cosmology.

The Kerr Spacetime

Rotating Black Holes in General Relativity

Cambridge University Press Unique, comprehensive overview for researchers and graduate students in observational and theoretical astrophysics, general relativity, and high-energy physics.

Nonlinear Gravitodynamics

The Lense-Thirring Effect : a Documentary Introduction to Current Research

World Scientific This book gives a detailed, up-to-date account of theLenseOCoThirring effect and its implications for physics andastrophysics. Starting from a profound intuition of Lense and Thirringin 1918, based on a simple solution to the linearized Einstein fieldequations, this has emerged in the past four decades as a phenomenonof extraordinary importance in cosmology, radio jets in quasars, andthe physics of neutron stars and black holes, besides leading to someof the most sophisticated experiments ever performed in the spacesurrounding our planet."

General Relativity and Gravitation

World Scientific ' This authoritative volume provides a snapshot of the state of the art in gravitational physics and related mathematical fields, as well as a review of recent achievements and prospects for future work. With contributing authors among the world leaders in their respective fields, this proceedings volume is a worthy addition to this conference series, which constitutes one of the most important international meetings in the areas general relativity and gravitation. Contents:Towards Detection of Gravitation Waves (B C Barish)Black Holes and The Information Paradox (S Hawking)Probing General Relativity on the Scales of Cosmology (P J E Peebles)Cosmic Superstrings Revisited (J Polchinski)Black Holes in Active Galactic Nuclei (M Rees)Complex Methods, Twistors, and Connection Variables (J Lewandowski)Early Universe (M Sasaki)Dark Energy and The Cosmological Constant (V Sahni)Gravitational Wave Sources: Source Science and Statistical Methods (A Buonanno)Detector Performance, Operation, and Commissioning (E Coccia)Laboratory and Observational Tests of Gravitational Theories (J H Gundlach)Quantum Field Theory on Curved Spacetime (K Fredenhagen)and other papers Readership: Researchers and academics in astrophysics, astronomy, cosmology, quantum physics, theoretical physics and mathematical physics. Keywords:Gravitation;General Relativity;Cosmology;Quantum Gravity;Numerical Relativity;Astrophysics;String TheoryKey Features:Includes the latest developments in all areas of gravitational physicsContributions by world-leading researchers in the fieldContinues the high standard of the general relativity conference proceedings seriesReviews: “… this volume provides a nice summary of a considerable portion of general relativity just after the turn of the century … It contains some thought-provoking articles as well as some useful, thoughtful reviews.” General Relativity and Gravitation '