

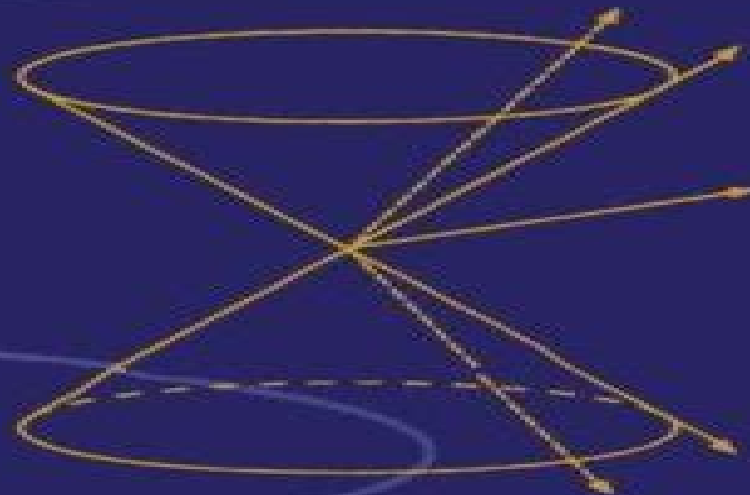
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SHORT  
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IN

# General Relativity



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**Reinhard Hentschke, Christian Hölbling**



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derived from an in Einstein Equations: Physical and Mathematical Aspects of General Relativity Sergio Cacciatori, Batu Güneysu, Stefano Pigola, 2019-11-23 This book is based on lectures given at the first edition of the Domoschool the International Alpine School in Mathematics and Physics held in Domodossola Italy in July 2018 It is divided into two parts Part I consists of four sets of lecture notes These are extended versions of lectures given at the Domoschool written by well known experts in mathematics and physics related to General Relativity Part II collects talks by selected participants focusing on research related to General Relativity *Deterministic Chaos in General Relativity* David Hobill, Adrian Burd, A.A. Coley, 2013-06-29 Nonlinear dynamical systems play an important role in a number of disciplines The physical biological economic and even sociological worlds are comprised of complex nonlinear systems that cannot be broken down into the behavior of their constituents and then reassembled to form the whole The lack of a superposition principle in such systems has challenged researchers to use a variety of analytic and numerical methods in attempts to understand the interesting nonlinear interactions that occur in the World around us General relativity is a nonlinear dynamical theory par excellence Only recently has the nonlinear evolution of the gravitational field described by the theory been tackled through the use of methods used in other disciplines to study the importance of time dependent nonlinearities The complexity of the equations of general relativity has been and still remains a major hurdle in the formulation of concrete mathematical concepts In the past the imposition of a high degree of symmetry has allowed the construction of exact solutions to the Einstein equations However most of those solutions are nonphysical and of those that do have a physical significance many are often highly idealized or time independent **Mathematical Aspects of Paradoxes in Cosmology** Michal Křížek, Lawrence Somer, 2023-07-05 This book provides a mathematical and numerical analysis of many problems which lead to paradoxes in contemporary cosmology in particular the existence of dark matter and dark energy It is shown that these hypothetical quantities arise from excessive extrapolations of simple mathematical models to the whole physical universe Written in a completely different style to most books on General Relativity and cosmology the important results take the form of mathematical theorems with precise assumptions and statements All theorems are followed by a corresponding proof or an exact reference to the proof Some nonstandard topics are also covered including violation of the causality principle in Newtonian mechanics a critical mathematical and numerical analysis of Mercury's perihelion shift inapplicability of Einstein's equations to the classical two body problem due to computational complexity non uniqueness of the notion of universe the topology of the universe various descriptions of a hypersphere regular tessellations of hyperbolic spaces local Hubble expansion of the universe neglected gravitational redshift in the detection of gravitational waves and the possible distribution of mass inside a black hole The book also dispels some myths appearing in the theory of relativity and in contemporary cosmology For example although the hidden assumption that Einstein's equations provide a good description of the evolution of the whole universe is considered to be obvious it is just a null hypothesis which has not been verified by any experiment

and has only been postulated by excessive extrapolations of many orders of magnitude      **Einstein's Theory** Øyvind Grøn, Arne Næss, 2011-08-30 This book provides an introduction to the theory of relativity and the mathematics used in its processes Three elements of the book make it stand apart from previously published books on the theory of relativity First the book starts at a lower mathematical level than standard books with tensor calculus of sufficient maturity to make it possible to give detailed calculations of relativistic predictions of practical experiments Self contained introductions are given for example vector calculus differential calculus and integrations Second in between calculations have been included making it possible for the non technical reader to follow step by step calculations Thirdly the conceptual development is gradual and rigorous in order to provide the inexperienced reader with a philosophically satisfying understanding of the theory The goal of this book is to provide the reader with a sound conceptual understanding of both the special and general theories of relativity and gain an insight into how the mathematics of the theory can be utilized to calculate relativistic effects

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