Lorentzian Wormholes From Einstein To Hawking Aip Series In Computational And Applied Mathematical Physics

Design Methodologies for Space Transportation Systems
What Is Relativity?
Ask the Experts: Astronomy
The Thirteenth Marcel Grossmann Meeting
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Hypothetical Spacecraft and Interstellar Travel
The General Theory of Relativity
A New Class of Solutions to the Einstein-equations Lorentzian Wormholes with Rotating Throat
Claudio Bunster Festschrift
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Advanced Concepts in Particle and Field Theory
Lorentzian Wormholes
Health Physics in the 21st Century
Extensions of f(R) Gravity
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Causality-Violating Lorentzian Manifolds Admitting a Shear-Free Timelike Flow
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Eighth Marcel Grossmann Meeting, The: On Recent Developments In Theoretical And Experimental General Relativity, Gravitation, And Relativistic Field Theories - Proceedings Of The Meeting (In 2 Parts)
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Varna, Bulgaria, June 2015
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100 Years Of Relativity: Space-time Structure - Einstein And Beyond
A Relativist's Toolkit
Frontiers of Fundamental Physics
The Science of Interstellar Transport and Absurdly Benign Wormholes
Lectures on Astrophysics

MORENO SKYLAR

Design Methodologies for Space Transportation Systems Columbia University Press
Lorentzian WormholesFrom Einstein to HawkingAmerican Institute of Physics
What Is Relativity? AIAA
Discusses what people understand about space and time and how science fiction is becoming less fictional as time goes on.
Ask the Experts: Astronomy W. W. Norton & Company
A collection of personal essays in philosophy of science (physics, especially gravity), philosophy of information and communication technology, current social issues (emotional intelligence, COVID-19 pandemic, eugenics, intelligence), philosophy of art, and logic and philosophy of language. The distinction between falsification and refutation in the demarcation problem of Karl Popper Imre Lakatos - Heuristics and methodological tolerance Isaac Newton on the action at a distance in gravity: With or without God? Causal Loops in Time Travel The singularities as ontological limits of the general relativity Epistemology of Experimental Gravity - Scientific Rationality Philosophy of Blockchain Technology - Ontologies Big Data Ethics in Research Emotions and Emotional Intelligence in Organizations COVID-19 Pandemic - Philosophical Approaches Evolution and Ethics of Eugenics Epistemology of Intelligence Agencies Solaris, directed by Andrei Tarkovsky - Psychological and philosophical aspects Causal theories of reference for proper names CONTENTS: The distinction between falsification and refutation in the demarcation problem of Karl Popper - - - Abstract - - - Introduction - - - 1 The demarcation problem - - - 2 Pseudoscience - - - 3 Falsifiability - - - 4 Falsification and refutation - - - 5 Extension of falsifiability - - - 6 Criticism of falsifiability - - - 7 Support of falsifiability - - - 8 The current trend - - - Conclusions - - - Bibliography - - - Notes Imre Lakatos - Heuristics and methodological tolerance - - - Rational reconstruction of science through research programmes - - - Dogmatic Falsificationism - - - Justificationism - - - Bibliography Isaac Newton vs. Robert Hooke on the law of universal gravitation - - - Abstract - - - Introduction - - - Robert Hooke's contribution to the law of universal gravitation - - - Isaac Newton's contribution to the law of universal gravitation - - - Robert Hooke's claim of his priority on the law of universal gravitation - - - Newton's defense - - - The controversy in the opinion of other contemporary scientists - - - What the supporters of Isaac Newton say - - - What the supporters of Robert Hooke say - - - Conclusions - - - Bibliography - - - Notes Isaac Newton on the action at a distance in gravity: With or without God? - - - Abstract - - - Introduction - - - Principia - - - Correspondence with Richard Bentley - - - Queries in Opticks - - - Conclusions - - - Bibliography Causal Loops in Time Travel - - - Abstract - - - Introduction - - - History of the concept of time travel - - - Grandfather paradox - - - The philosophy of time travel - - - Causal loops - - - Conclusions - - - Bibliography - - - Notes The singularities as ontological limits of the general relativity - - - Abstract - - - Introduction - - - - - - Classical Theory and Special Relativity - - - - - - General Relativity (GR) - - - 1 Ontology of General Relativity - - - 2 Singularities - - - - - - Black Holes - - - - - - - - - Event Horizon - - - - - - Big Bang - - - - - - Are there Singularities? - - - 3 Ontology of Singularities - - - - - - Ontology of black holes - - - - - - The hole argument - - - - - - There are no singularities - - - Conclusions - - - Notes - - - Bibliography Epistemology of Experimental Gravity - Scientific Rationality - - - Introduction - - - - - - Gravity - - - - - - Gravitational tests - - - - - - Methodology of Lakatos - Scientific rationality - - - - - - The natural extension of the Lakatos methodology - - - - - - - - - Bifurcated programs - - - - - - - - - Unifying programs - - - 1. 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The Thirteenth Marcel Grossmann Meeting Springer

Do you know the basics of general relativity? Do you want to know something of what more there is? Do you wonder how the theory of relativity came into being? Then this book is for you! Partial contents: - Black holes and gravitational collapse - Cosmological solutions of Einstein's field equations - Gravitational waves - Space-time singularities - The problem of motion for massive particles - A collection of exact solutions of Einstein's field equations - A history of Einstein's creation of the theory of relativity in the years 1905-1915 - A short course for repetition of the basics of general relativity - Bibliography, references, and index The book, although not very advanced, covers a number of topics not often seen in text books. The selection, of course, refelects my own interests. The different chapters may to a large extent, though not completely, be read in any desired order. The author has a PhD in theoretical physics and is lecturer of mathematics. He has for many years taught physics and mathematics at senior high school as well as university level.

From Einstein to Hawking Cambridge University Press

The General Theory of Relativity: A Mathematical Exposition will serve readers as a modern mathematical introduction to the general theory of relativity. Throughout the book, examples, worked-out problems, and exercises (with hints and solutions) are furnished. Topics in this book include, but are not limited to: tensor analysis the special theory of relativity the general theory of relativity and Einstein’s field equations spherically symmetric solutions and experimental confirmations static and stationary space-time domains black holes cosmological models algebraic classifications and the Newman-Penrose equations the coupled Einstein-Maxwell-Klein-Gordon equations appendices covering mathematical supplements and special topics Mathematical rigor, yet very clear presentation of the topics make this book a unique text for both university students and research scholars. Anadijiban Das has taught courses on Relativity Theory at The University College of Dublin, Ireland, Jadavpur University, India, Carnegie-Mellon University, USA, and Simon Fraser University, Canada. His major areas of research include, among diverse topics, the mathematical aspects of general relativity theory. Andrew DeBenedictis has taught courses in Theoretical Physics at Simon Fraser University, Canada, and is also a member of The Pacific Institute for the Mathematical Sciences. His research interests include quantum gravity, classical gravity, and semi-classical gravity.

Hypothetical Spacecraft and Interstellar Travel Springer Science & Business Media

The story of physicists' quest to answer a mind-boggling question: How can we travel through time? Since H. G. Wells' 1895 classic The Time Machine, readers of science fiction have puzzled over the paradoxes of time travel. What would happen if a time traveler tried to change history? Would some force or law of nature prevent him? Or would his action produce a "new" history, branching away from the original?In the last decade of the twentieth century a group of theoretical physicists at the California Institute of Technology undertook a serious investigation of the possibility of pastward time travel, inspiring a serious and sustained study that engaged more than thirty physicists working at universities and institutes around the world.Many of the figures involved are familiar: Einstein, Stephen Hawking and Kip Thorne; others are names known mostly to physicists. These are the new time travelers, and this is the story of their work--a profoundly human endeavor marked by advances, retreats, and no small share of surprises. It is a fantastic journey to the frontiers of physics. Some images in the ebook are not displayed owing to permissions issues.

OUP Oxford

The Marcel Grossmann Meetings seek to further the development of the foundations and applications of Einstein's general relativity by promoting theoretical understanding in the relevant fields of physics, mathematics, astronomy and astrophysics and to direct future technological, observational, and experimental efforts. The meetings discuss recent developments in classical and quantum aspects of gravity, and in cosmology and relativistic astrophysics, with major emphasis on mathematical foundations and physical predictions, having the main objective of gathering scientists from diverse backgrounds for deepening our understanding of spacetime structure and reviewing the current state of the art in the theory, observations and experiments pertinent to relativistic gravitation. The range of topics is broad, going from the more abstract classical theory, quantum gravity, branes and strings, to more concrete relativistic astrophysics observations and modeling. The three volumes of the proceedings of MG13 give a broad view of all aspects of gravitational physics and astrophysics, from mathematical issues to recent observations and experiments. The scientific program of the meeting included 33 morning plenary talks during 6 days, and 75 parallel sessions over 4 afternoons. Volume A contains plenary and review talks ranging from the mathematical foundations of classical and quantum gravitational theories including recent developments in string/brane theories, to precision tests of general relativity including progress towards the detection of gravitational waves, and from supernova cosmology to relativistic astrophysics including such topics as gamma ray bursts, black hole physics both in our galaxy and in active galactic nuclei in other galaxies, and neutron star and pulsar astrophysics. Volumes B and C include parallel sessions which touch on dark matter, neutrinos, X-ray sources, astrophysical black holes, neutron stars, binary systems, radiative transfer, accretion disks, quasors, gamma ray bursts, supernovas, alternative gravitational theories, perturbations of collapsed objects, analog models, black hole thermodynamics, numerical relativity, gravitational lensing, large scale structure, observational cosmology, early universe models and cosmic microwave background anisotropies, inhomogeneous cosmology, inflation, global structure, singularities, chaos, Einstein–Maxwell systems, wormholes, exact solutions of Einstein's equations, gravitational waves, gravitational wave detectors and data analysis, precision gravitational measurements, quantum gravity and loop quantum gravity, quantum cosmology, strings and branes, self-gravitating systems, gamma ray astronomy, and cosmic rays and the history of general relativity. Contents:On the Cosmological Singularity (Vladimir A Belinski)GRB Afterglow Discovery with Bepposax: Its Story 15 Years Later (Filippo Frontera)Rotation, Convection, and Core Collapse (W David Arnett)Spacetime Singularities: Recent Developments (Claes Uggla)Hidden Symmetries: From BKL to Kac–Moody (Philipp Fleig & Hermann Nicolai)Recent Results in Mathematical GR (Sergiu Klainerman)Higher Dimensional Black Holes (Harvey S Reall)Causal Dynamical Triangulations and the Search for a Theory of Quantum Gravity (Jan Ambjorn, Andrzej Görlich, Jerzy Jurkiewicz & Renate Loll)On Quantum Gravity, Asymptotic Safety, and Paramagnetic Dominance (Andreas Nink & Martin Reuter)Perturbative Quantum Gravity as a Double Copy of Gauge Theory and Implications for UV Properties (Zvi Bern)Type Ia Supernova Cosmology: Past and Future (Ariel Goobar)The Energetic Universe: A Nobel Surprise (Robert P Kirshner)Strong, Weak, Electromagnetic and Gravitational Interactions in Neutron Stars (Jorge Rueda & Remo Ruffini)Gravitational-Wave Physics and Astronomy Using Ground-Based Interferometers (David H Reitze & David H Shoemaker)Gamma-Ray Burst Prompt Emission (Bing Zhang)Black Holes, Supernovae and Gamma Ray Bursts (Remo Ruffini)Precisions Tests of Theories of Gravity Using Pulsars (Michael Kramer)The Planck Mission: Recent Results, Cosmological and Fundamental Physics Perspectives (Nazzareno Mandolesi, Carlo Burigana, Alessandro Gruppuso & Paolo Natoli)Observation of a New Boson at a Mass of 125 GeV with the CMS Experiment at the LHC (Chiara Mariotti)Unavoidable CMB Spectral Features and Blackbody Photosphere of Our Universe (Rashid Sunyaev & Rishi Khatri)Search for the Standard Model Higgs Boson with the ATLAS Detector (Domizia Orestano) Readership: Graduate students in astronomy, astrophysics and cosmology, and scientists interested in general relativity, gravitation, astrophysics, quantum gravity, particle physics, cosmology and theoretical physics. Keywords:General Relativity;Gravitation;Astrophysics;Quantum Gravity;Particle Physics;Cosmology;Theoretical Physics

The General Theory of Relativity Cambridge University Press

Annotation "Design Methodologies for Space Transportation Systems is a sequel to the author's earlier text, "Space Transportation: A Systems Approach to Analysis and Design. Both texts represent the most comprehensive exposition of the existing knowledge and practice in the design and project management of space transportation systems, and they reflect a wealth of experience by the author with the design and management of space systems. The text discusses new conceptual changes in the design philosophy away from multistage expendable vehicles to winged, reusable launch vehicles and presents an overview of the systems engineering and vehicle design process as well as systems trades and analysis. Individual chapters are devoted to specific disciplines such as aerodynamics, aerothermal analysis, structures, materials, propulsion, flight mechanics and trajectories, avionics and computers, and control systems. The final chapters deal with human factors, payload, launch and mission operations, safety, and mission assurance. The two texts by the author provide a valuable source of information for the space transportation community of designers, operators, and managers. A companion CD-ROM succinctly packages some oversized figures and tables, resources for systems engineering and launch ranges, and a compendium of software programs. The computer programs include the USAF AIRPLANE AND MISSILE DATCOM CODES (with extensive documentation); COSTMODL for software costing; OPGUID launch vehicle trajectory generator; SUPERFLO-a series of 11 programs intended for solving compressible flow problems in ducts and pipes found in industrial facilities; and a wealth of Microsoft Excel spreadsheet programs covering thedisciplines of statistics, vehicle trajectories, propulsion performance, math utilities,

A New Class of Solutions to the Einstein-equations Lorentzian Wormholes with Rotating Throat Springer Science & Business Media

For going on two decades, Scientific American's "Ask the Experts" column has been answering reader questions on all fields of science. We've taken your questions from the basic to the esoteric and reached out to top scientists, professors and researchers to find out why the sky is blue or whether we really only use 10% of our brains. Now, we've combed through our archives and have compiled some of the most interesting questions (and answers) into a series of eBooks. Organized by subject, each eBook provides short, easily digestible answers to questions on that particular branch of the sciences. The second eBook in our series – Astronomy – looks skyward and explains a variety of universal phenomena and theories. Are you curious about how planets acquire rings or what creates those gorgeous spiral arms around galaxies? Or maybe you want to know why the Big Bang didn't collapse into a black hole. Astrophysicists, professors and scientists tackle questions about stars, planets, asteroids, galaxies and nebulae, the expanding universe as well as the oddities – black holes, wormholes and dark matter. Look inside and find out what we know and what we don't know about these wonders.

Claudio Bunster Festschrift Penguin

About the possibility of time traveling based on several specialized works, including those of Nicholas J. J. Smith ("Time Travel"), William Grey (”Troubles with Time Travel”), Ulrich Meyer (”Explaining causal loops”), Simon Keller and Michael Nelson (”Presentists should believe in time-travel”), Frank Arntzenius and Tim Maudlin ("Time Travel and Modern Physics"), and David Lewis (“The Paradoxes of Time Travel”). The article begins with an Introduction in which I make a short presentation of the time travel, and continues with a History of the concept of time travel, main physical aspects of time travel, including backward time travel in the past in general relativity and quantum physics, and time travel in the future, then a presentation of the Grandfather paradox that is approached in almost all specialized works, followed by a section dedicated to the Philosophy of time travel, and a section in which I analyze Causal loops for time travel. I finish my work with Conclusions, in which I sustain my personal opinions on the time travel, and the Bibliography on which the work is based. Keywords: time travel, grandfather paradox, causal loops, temporal paradoxes, causality CONTENTS Abstract Introduction History of the concept of time travel Grandfather paradox The philosophy of time travel Causal loops Conclusions Bibliography Notes DOI: 10.13140/RG.2.2.17802.31680

- paperbound edition - Enslow Publishing, LLC

The Sixth International Symposium "Frontiers of Fundamental and Computational Physics", Udine, Italy, 26-29 September 2004, aimed at providing a platform for a wide range of physicists to meet and share thoughts on the latest trends in various, mainly cross-disciplinary research areas. This includes the exploration of frontier lines in High Energy Physics, Theoretical Physics, Gravitation and Cosmology, Astrophysics, Condensed Matter Physics, Fluid Mechanics. Such frontier lines were unified by the use of computers as an, often primary, research instruments, or dealing with issues related to information theory. The book contains contributions by Nobel Laureates Leon N. Cooper (1972) and Gerard ‘t Hooft (1999), and concludes with two interesting chapters on new approaches to Physics Teaching. Audience Graduate students, lecturers and researches in Physics

Advanced Concepts in Particle and Field Theory Princeton University Press

This book focuses on the analysis of various passages across enclosures and the spacetime continuum in science fiction literature. It provides a rich arsenal of analytical instruments for the study of these very popular concepts in the genre of science fiction, and synthesizes current practical and theoretical approaches in science fiction written by active researchers and practitioners in this field. Taking this into consideration, this book will serve as a bedrock to help educators, researchers and students to conduct their research in the field of literature in general and in science fiction in particular. The volume brings together cutting-edge research in the fields of narrative analysis, literary and linguistic analysis, quantum physics, and astrophysics, among others, while the complexity and novelty of the eight essays gathered here offer fresh views on the topic and will stimulate the intellectual curiosity of various readers across different fields of research.

Lorentzian Wormholes Lulu.com

With his unique knack for making cutting-edge theoretical science effortlessly accessible, world-renowned physicist Paul Davies now tackles an issue that has boggled minds for centuries: Is time travel possible? The answer, insists Davies, is definitely yes—once you iron out a few kinks in the space-time continuum. With tongue placed firmly in cheek, Davies explains the theoretical physics that make visiting the future and revisiting the past possible, then proceeds to lay out a four-stage process for assembling a time machine and making it work. Wildly inventive and theoretically sound, How to Build a Time Machine is creative science at its best—illuminating, entertaining, and thought provoking.

Health Physics in the 21st Century World Scientific

Adopting a proactive approach and focusing on emerging radiation-generating technologies, Health Physics in the 21st Century meets the growing need for a presentation of the relevant radiological characteristics and hazards. As such, this monograph discusses those technologies that will affect the health physics and radiation protection profession over the decades to come. After an introductory overview, the second part of this book looks at fission and fusion energy, followed by a section devoted to accelerators, while the final main section deals with radiation on manned space missions. Throughout, the author summarizes the relevant technology and scientific basis, while providing over 200 problems plus solutions to illustrate and amplify the text. Twelve appendices add further background material to support and enrich the topics addressed in the text, making this invaluable reading for students and lecturers in physics, biophysicists, clinical, nuclear and radiation physicists, as well as physicists in industry.

Extensions of f(R) Gravity World Scientific

Top researchers in the field of gravitation present the state-of-the-art topics outlined in this book, ranging from the stability of rotating wormholes solutions supported by ghost scalar fields, modified gravity applied to wormholes, the study of novel semi-classical and nonlinear energy conditions, to the applications of quantum effects and the superluminal version of the warp drive in modified spacetime. Based on Einstein's field equations, this cutting-edge research area explores the more far-fetched theoretical outcomes of General Relativity and relates them to quantum field theory. This includes quantum energy inequalities, flux energy conditions, and wormhole curvature, and sheds light on not just the theoretical physics but also on the possible applications to warp drives and time travel. This book extensively explores the physical properties and characteristics of these 'exotic spacetimes,' describing in detail the general relativistic geometries that generate closed timelike curves.

The New Time Travelers: A Journey to the Frontiers of Physics American Institute of Physics

A wormhole is a tube-like distortion of time and space connecting distant places in the universe. Wormholes have been featured in many movies, but can they really exist? Wormholes are a prediction of scientific theories, and the precision of mathematics allows them to be described, even before they have ever been seen. Untangling complex physics theories with accessible language and captivating imagery, this book explores the development and evaluation of scientific theories behind wormholes. Supporting the Next Generation Science Standards' emphasis on scientific collection and analysis of data and evidence-based theories, this book will help students grasp the importance of mathematical models of reality, laying the groundwork for a deeper understanding of the nature of science.

The Science of Interstellar Cambridge University Press

Recent cosmological observations have posed a challenge for traditional theories of gravity: what is the force driving the accelerated expansion of the universe? What if dark energy or dark matter do not exist and what we observe is a modification of the gravitational interaction that dominates the universe at large scales? Various extensions to Einstein's General Theory of Relativity have been proposed, and this book presents a detailed theoretical and phenomenological analysis of several leading, modified theories of gravity. Theories with generalised curvature-matter couplings are first explored, followed by hybrid metric-Palatini gravity. This timely book first discusses key motivations behind the development of these modified gravitational theories, before presenting a detailed overview of their subsequent development, mathematical structure, and cosmological and astrophysical implications. Covering recent developments and with an emphasis on astrophysical and cosmological applications, this is the perfect text for graduate students and researchers.

The Perfect Wave W. W. Norton & Company

A journey through the otherworldly science behind Christopher Nolan’s award-winning film, Interstellar, from executive producer and Nobel Prize-winning physicist Kip Thorne. Interstellar, from acclaimed filmmaker Christopher Nolan, takes us on a fantastic voyage far beyond our solar system. Yet in The Science of Interstellar, Kip Thorne, the Nobel prize-winning physicist who assisted Nolan on the scientific aspects of Interstellar, shows us that the movie’s jaw-dropping events and stunning, never-before-attempted visuals are grounded in real science. Thorne shares his experiences working as the science adviser on the film and then moves on to the science itself. In chapters on wormholes, black holes, interstellar travel, and much more, Thorne’s scientific insights—many of them triggered during the actual scripting and shooting of Interstellar—describe the physical laws that govern our universe and the truly astounding phenomena that those laws make possible. Interstellar and all related characters and elements are trademarks of and © Warner Bros. Entertainment Inc. (s14).

Time Travel and Warp Drives World Scientific

An accessible introduction to modern physics that focuses on wormholes and discusses among other topics their structure, stability, dynamics, operation as time machines, utility as portals to parallel universes, and their implications for the distant future of humanity. Read the wormhole FAQ and the bullet point "principles" scattered throughout to quickly absorb the basics of wormhole physics. Go back and read the interstitial material for greater depth. Written by a physicist with years of experience in gently introducing physics to the mathematically challenged, it also covers the history of wormhole physics and delineates the unsolved problems at the forefront of research.

The Physics of Stargates Giulio Prisco

A groundbreaking textbook on twenty-first-century statistical physics and its applications Kip Thorne and Roger Blandford’s monumental Modern Classical Physics is now available in five stand-alone volumes that make ideal textbooks for individual graduate or advanced undergraduate courses on statistical physics; optics; elasticity and fluid dynamics; plasma physics; and relativity and cosmology. Each volume teaches the fundamental concepts, emphasizes modern, real-world applications, and gives students a physical and intuitive understanding of the subject. Statistical Physics is an essential introduction that is different from others on the subject because of its unique approach, which is coordinate-independent and geometric; embraces and elucidates the close quantum–classical connection and the relativistic and Newtonian domains; and demonstrates the power of statistical techniques—particularly statistical mechanics—by presenting applications not only to the usual kinds of things, such as gases, liquids, solids, and magnetic materials, but also to a much wider range of phenomena, including black holes, the universe, information and communication, and signal processing amid noise. Includes many exercise problems Features color figures, suggestions for further reading, extensive cross-references, and a detailed index Optional “Track 2” sections make this an ideal book for a one-quarter, half-semester, or full-semester course An online illustration package is available to professors