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An Introduction to Modern Cosmology Oct 06 2023 An Introduction to Modern Cosmology Third Edition is an accessible account of modern cosmological ideas. The Big Bang Cosmology is explored, looking at its observational successes in explaining the expansion of the Universe, the existence and properties of the cosmic microwave background, and the origin of light elements in the universe. Properties of the very early Universe are also covered, including the motivation for a rapid period of expansion known as cosmological inflation. The third edition brings this established undergraduate textbook up-to-date with the rapidly evolving observational situation. This fully revised edition of a bestseller takes an approach which is grounded in physics with a logical flow of chapters leading the reader from basic ideas of the expansion described by the Friedman equations to some of the more advanced ideas about the early universe. It also incorporates up-to-date results from the Planck mission, which imaged the anisotropies of the Cosmic Microwave Background radiation over the whole sky. The Advanced Topic sections present subjects with more detailed mathematical approaches to give greater depth to discussions. Student problems with hints for solving them and numerical answers are embedded in the chapters to facilitate the reader’s understanding and learning. Cosmology is now part of the core in many degree programs. This current, clear and concise introductory text is relevant to a wide range of astronomy programs worldwide and is

essential reading for undergraduates and Masters students, as well as anyone starting research in cosmology. The accompanying website for this text, http://booksupport.wiley.com, provides additional material designed to enhance your learning, as well as errata within the text.

Comprehending and Decoding the Cosmos Jun 14 2024 There are many mysteries involving cosmic phenomena. Jerome Drexler used 14 of these and his analytical concept of dark matter (DM) relationism to discover a promising candidate for dark matter, the source of ultra-high energy cosmic rays, and theories for star formation, starburst galaxies, and the emergence of DM halos. To test the validity of his discoveries, Drexler used another 11 unexplained cosmic phenomena discovered by astronomers primarily during 2005. Utilizing his same promising dark matter candidate, Drexler was able to explain in a plausible manner all 11 of these recently discovered cosmic mysteries. Drexler's research has led not only to an identification of dark matter and to plausible explanations for the 25 cosmic phenomena, but also to a deeper understanding of many aspects of the cosmos, leading to a partial decoding of the cosmos.

An Introduction To Cosmology And Particle Physics Jan 17 2022 The book discusses, based on a series of lectures given by the authors at the Universidad Autonoma of Madrid discusses the relation between cosmology and particle physics at a pedagogical level. The topics covered contain much valuable introductory materials. Very useful as a text for graduate students in this field.

The Cosmology of People, and the Time Travel Solution Jul 23 2022 The book introduces a new interpretation of life and its connections, of mind and its unique occupation of three-dimensional space, as the background to a new kind of social experiment.

Particle and Astroparticle Physics Feb 10 2024 This book presents more than 200 problems, with detailed guided solutions, spanning key areas of particle physics and astrophysics. The selected

examples enable students to gain a deeper understanding of these fields and also offer valuable support in the preparation for written examinations. The book is an ideal companion to Introduction to Particle and Astroparticle Physics: Multimessenger Astronomy and its Particle Physics Foundations, written by Alessandro De Angelis and Mário Pimenta and published in its second edition in Springer's Undergraduate Lecture Notes in Physics series in 2018. It can, however, also be used independently. The present book is organized into 11 chapters that match exactly those in the companion textbook, and each of the exercises is given a title to facilitate identification of the subject within that book. Some new exercises have been added because they are considered helpful on the basis of the experience gained by teachers while using the textbook. Beyond students on relevant courses, exercises and solutions in particle and astroparticle physics are of value for physics teachers and to all who seek aid to self-training.

Brief Solutions to the Big Problems in Physics, Astrophysics and Cosmology Mar 11 2024 People have always wanted answers to the big questions. Where did we come from? How did the universe begin? What is the meaning and design behind it all? Is there anyone out there? The creation accounts of the past now seem less relevant and credible. They have been replaced by a variety of what can only be called superstitions, ranging from New Age to Star Trek. But real science can be far stranger than science fiction, and much more satisfying. I am a scientist. And a scientist with a deep fascination with physics, cosmology, the universe and the future of humanity. I was brought up by my parents to have an unwavering curiosity and, like my father, to research and try to answer the many questions that science asks us. I have spent my life travelling across the universe, inside my mind. Through theoretical physics, I have sought to answer some of the great questions. At one point, I thought I would see the end of physics as we know it, but now I think the wonder of discovery will continue long after I am gone. We are close to some

of these answers, but we are not there yet. The problem is, most people believe that real science is too difficult and complicated for them to understand. But I don't think this is the case. To do research on the fundamental laws that govern the universe would require a commitment of time that most people don't have; the world would soon grind to a halt if we all tried to do theoretical physics. But most people can understand and appreciate the basic ideas if they are presented in a clear way with equations, which I believe is possible and which is something I have enjoyed trying to do throughout my life. I want to add my voice to those who demand why we must ask the big questions immediate action on the key challenges for our global community. I hope that going forward, even when I am no longer here, people with power can show creativity, courage and leadership. Let them rise to the challenges and act now.
Primordial Cosmology Jan 09 2024 This book provides an extensive survey of all the physics necessary to understand the current developments in the field of fundamental cosmology, as well as an overview of the observational data and methods. It will help students to get into research by providing definitions and main techniques and ideas discussed today. The book is divided into three parts. Part 1 summarises the fundamentals in theoretical physics needed in cosmology (general relativity, field theory, particle physics). Part 2 describes the standard model of cosmology and includes cosmological solutions of Einstein equations, the hot big bang model, cosmological perturbation theory, cosmic microwave background anisotropies, lensing and evidence for dark matter, and inflation. Part 3 describes extensions of this model and opens up current research in the field: scalar-tensor theories, supersymmetry, the cosmological constant problem and acceleration of the universe, topology of the universe, grand unification and baryogenesis, topological defects and phase transitions, string inspired cosmology including branes and the latest developments. The book provides details of all derivations and leads the student up to the level of

research articles.

Classical Solutions in Quantum Field Theory Oct 26 2022 Classical solutions play an important role in quantum field theory, high-energy physics and cosmology. Real-time soliton solutions give rise to particles, such as magnetic monopoles, and extended structures, such as domain walls and cosmic strings, that have implications for early universe cosmology. Imaginary-time Euclidean instantons are responsible for important nonperturbative effects, while Euclidean bounce solutions govern transitions between metastable states. Written for advanced graduate students and researchers in elementary particle physics, cosmology and related fields, this book brings the reader up to the level of current research in the field. The first half of the book discusses the most important classes of solitons: kinks, vortices and magnetic monopoles. The cosmological and observational constraints on these are covered, as are more formal aspects, including BPS solitons and their connection with supersymmetry. The second half is devoted to Euclidean solutions, with particular emphasis on Yang–Mills instantons and on bounce solutions.

String Theory: From Gauge Interactions to Cosmology Mar 07 2021 String Theory is our current best candidate for the unification of all fundamental forces, including gravity, in a consistent quantum framework. In this collection of lectures delivered at the Cargèse Summer School "String Theory: from Gauge Interactions to Cosmology", world leading experts provide an up-to-date survey of the latest developments in this topic, including the gauge/gravity correspondence, superstring cosmology and cosmic strings, topological string theory and matrix models, physics beyond the standard model and the landscape of vacua of string theory, conformal field theory and critical phenomena in statistical mechanics. Many more topics are also discussed in shorter contributions by School participants. Written with an emphasis on pedagogy, this volume will be a invaluable resource to students and

experts alike.

Exact Solutions of Einstein's Field Equations Jan 29 2023 A completely revised and updated edition of this classic text, covering important new methods and many recently discovered solutions. This edition contains new chapters on generation methods and their application, classification of metrics by invariants, and treatments of homothetic motions and methods from dynamical systems theory. It also includes colliding waves, inhomogeneous cosmological solutions, and spacetimes containing special subspaces.

Cosmological Crossroads Dec 08 2023 History and Overview -- Is Nature Generic? -- Evolution of Ideas in Modern Cosmology -- Mathematical Cosmology -- Constraints and Evolution in Cosmology -- Cosmological Singularities -- Exact Cosmological Solutions -- to Cosmological Dynamical Systems -- Astrophysical and Observational Cosmology -- The Quest for the Cosmological Parameters -- Modern Cosmological Observations -- Cosmological Perturbations -- Dark Matter: A Particle Theorist's Viewpoint -- Particle and String Cosmology -- An Introduction to Particle Physics -- Quantum Cosmology -- Inflationary Cosmology -- String Cosmology -- Brane Cosmology.

Dimensionless Solution for the Cosmological Constant Aug 04 2023 In this paper in an elegant way will be present that the gravitational fine-structure constant is a simple analogy between atomic physics and cosmology. We will find the expression that connects the gravitational fine-structure constant with the four coupling constants. Perhaps the gravitational fine-structure constant is the coupling constant for the fifth force. Also will be presented the simple unification of atomic physics and cosmology. We will find the formulas for the cosmological constant and we will propose a possible solution for the cosmological parameters. Perhaps the shape of the universe is Poincaré dodecahedral space. This article will be followed by the energy wave theory and the fractal space-time theory.

The Cosmological Singularity Apr 07 2021 This book mathematically derives the theory underlying the Belinski-Khalatnikov-Lifshitz conjecture on the general solution of the Einstein equations with a cosmological singularity.

Brief Solutions to the Big Problems in Physics, Astrophysics and Cosmology Second Edition Feb 03 2021 In 1900, the British physicist Lord Kelvin declared "There is nothing new to discover in physics. All that remains is to more accurately measure its quantities" today, hardly anyone would dare say that our knowledge of the universe and everything in it is almost complete. There are still some deficiencies in the standard model of physics, such as the origin of mass, the strong CP problem, neutrino oscillations, matter-antimatter asymmetry and the nature of dark matter and dark energy. Another problem lies within the mathematical framework of the standard model itself. Some of the major problems in physics are theoretical, meaning that existing theories seem incapable of explaining a certain observed phenomena or experimental result. The others are experimental meaning that there is difficulty in creating an experiment to test a proposed theory. In what follows, there is given a discussion of what are arguably the most unsolved problems in physics, astrophysics and cosmology. And this book sets to solve them living none untouched. The form of the discussion is not negative: formulating a problem succinctly is essential to a solution. Perhaps the most remarkable aspect of what follows is that many of the problems are interrelated, so the solution of one or a few opens the prospect of widespread advancement. An excerpt from Lee Smolin's book "the trouble with physics" explains in detail what this book is all about as given below in Lee's original words. To be fair we've made two experimental discoveries in the past few decades, that neutrinos have mass and that the universe is dominated by a mysterious dark energy that seems to be accelerating its expansion. But we have no idea why neutrinos (or any other particles) have mass or what explains their mass values. As for dark

energy, its not explained in terms of any existing theory. Its discovery cannot then be counted as a success, for it suggests that there is some major fact we are all missing. And except for dark energy, no new particle has been discovered, no new force found, no new phenomenon encountered that was not known and understood twenty-five years ago. Don't get me wrong. For the past 25years we have certainly been very busy. There has been enormous progress in applying established theories to diverse subjects; the properties of materials, the molecular physics underlying biology, the dynamics of vast clusters of stars. But when it comes to extending our knowledge of the laws of nature we have made no real head way. Many beautiful ideas have been explored, and there have been remarkable particle aaccelerator experiments and cosmological observations, but these have mainly served to confirm exisiting theory. There have been few leaps forward, and none as definitive or important as those of the previous 200years. When something like this happens in sports or business, it's called hitting the wall. What are the major unsolved problems in physics? And what can we do to solve them? These are the central questions of my book

From Nebula to Nebula Sep 12 2021

Introduction to General Relativity and the Cosmological Constant Problem Aug 24 2022 This book is an introductory text in General Relativity, while also focusing some solutions to the cosmological constant problem, which consists in an amazing 100 orders of magnitude discrepancy between the value of this constant in the present Universe, and its estimated value in the very early epoch. The author suggests that the constant is in fact, a time-varying function of the age of the Universe. The book offers a wealth of cosmological models, treats up to date findings, like the verification of the Lense-Thirring effect in the year 2004, and the recently published research by Cooperstock and Tieu (2005) suggesting that "dark" matter is not a necessary concept in order to explain the rotational velocities of stars around galaxies' nuclei. This

is a mathematical cosmology textbook that may lead undergraduates, and graduate students to one of the frontiers of research, while keeping the prerequisites to a minimum, because most of the theory in the book requires only prior knowledge of Calculus and a University Physics course.

The Philosophy of Cosmology Nov 26 2022 This book addresses foundational questions raised by observational and theoretical progress in modern cosmology. As the foundational volume of an emerging academic discipline, experts from relevant fields lay out the fundamental problems of contemporary cosmology and explore the routes toward finding possible solutions, for a broad academic audience.

Special Relativity May 01 2023 Writing a new book on the classic subject of Special Relativity, on which numerous important physicists have contributed and many books have already been written, can be like adding another epicycle to the Ptolemaic cosmology. Furthermore, it is our belief that if a book has no new elements, but simply repeats what is written in the existing literature, perhaps with a different style, then this is not enough to justify its publication. However, after having spent a number of years, both in class and research with relativity, I have come to the conclusion that there exists a place for a new book. Since it appears that somewhere along the way, mathem- ics may have obscured and prevailed to the degree that we tend to teach relativity (and I believe, theoretical physics) simply using “heavier” mathematics without the inspiration and the mastery of the classic physicists of the last century. Moreover current trends encourage the application of techniques in producing quick results and not tedious conceptual approaches resulting in long-lasting reasoning. On the other hand, physics cannot be done a ? la carte stripped from philosophy, or, to put it in a simple but dramatic context A building is not an accumulation of stones! As a result of the above, a major aim in the writing of this book has been the distinction between the

mathematics of Minkowski space and the physics of r- ativity.
Scalar Field Cosmology Jun 02 2023 This monograph discusses cosmological inflation and provides exact and slow roll solutions. It also reviews new and advanced approaches of exact solutions construction with canonical scalar fields, including application of generating functions methods, the superpotential and many others. This book presents the reduction of the Friedmann equation to the Abel equation, which is a very useful tool in cosmology. It offers new solutions and discusses its properties.Additionally, it touches upon the role of phantom scalar field cosmology and analyzes phantonical models. It describes brane cosmology with scalar fields, providing exact solutions construction using the superpotential method as well as Darboux transformations.This book provides detailed calculations throughout.
Cosmological Solutions in General Relativity Apr 19 2022 The aim of this dissertation is twofold. The early chapters consist of an expository review of the historical development of relativistic cosmology since Einstein suggested the general theory of relativity in 1916. One chapter is devoted to developing the corresponding Newtonian theory and it is seen that many results are analogous with the relativistic case. In the latter part of the thesis some new solutions of the cosmological field equations are suggested; one of these solutions is shown to characterize an empty rotating universe in which test particles (nebulae) of negligible mass recede from the axis of rotation. Hence this model combines features of the de Sitter and Godel type universes.
Laboratory Exercises in Astronomy Feb 15 2022 The book contains solutions to individual exercises included to the "Laboratory Exercises In Astronomy", by Dr. Adrian Kaminski. This book depicts also methods that can be used to elaborate respective exercises. Students are guided through various topics, like constellations, measures in Astronomy, coordinate systems, cosmic objects, characteristics of stars and galaxies, elements of cosmology

and others. It's designed for College and High School students as well as first years of University students, where Astronomy is discussed on the introductory and intermediate level. It can be also used by individuals who are interested in practical aspects of Astronomy. The book is available on the following websites and stands for one unit with the first one. http: //www.bookfinder4u.com/search_title/Laboratory_Exercises_in_Astronom or/and http: //www.bookfinder4u.com/IsbnSearch.aspx?isbn=1490734511&mode=direc or/and at every seller, like: Bookdepository Abebooks Barnes&Noble BookQuest Textbooks.com Amazon and others on the same site.

Introduction to Cosmology Aug 12 2021

Exact Solutions and Scalar Fields in Gravity Dec 28 2022 Divided into four parts, this book covers recent developments in topics pertaining to gravity theories, including discussions on the presence of scalar fields. Part One is devoted to exact solutions in general relativity, and is mainly concerned with the results of rotating null dust beams and fluids. Also included is a panoramic vision of new research directions in this area, which would require revising certain theorems and their possible extensions within gravity theories, new aspects concerning the Ernst potentials, double Kerr spacetimes, and rotating configurations. In particular, there is a detailed discussion of totally symmetric and totally geodesic spaces, in which a method for generating (2+1)-dimensional solutions from (3+1)-dimensional solutions is given. Part Two deals with alternative theories of gravity, all of which include scalar fields and gauge fields. Here, quantum and cosmological effects, which arise from both gravity theories in four and higher dimensions and from metric-affine theories, are investigated. Part Three is devoted to cosmological and inflationary scenarios. Local effects, such as the influence of scalar fields in protogalactic interactions, numerical studies of the collapse of molecular cores, as well as the inverse inflationary problem and

the blue eigenvalue spectrum of it, are considered. Moreover, the role of scalar fields as dark matter and quantum cosmology in the Bergman-Wagoner and Gowdy theories, together with the relation of the conformal symmetry and deflationary gas universe, are likewise presented. The last part of the book includes some mixed topics which are still in the experimental stage. Among them are the foundation of the Maxwell theory, a discussion on electromagnetic Thirring problems, a note on the staticity of black holes with non-minimally coupled scalar fields, and a study of the Lorentz force free charged fluids in general relativity. Thus, this book is the most up-to-date, comprehensive collection of papers on the subject of exact solutions and scalar fields in gravity and is a valuable tool for researchers in the area.

Cosmology Mar 31 2023 If you have a question about Cosmology this is the book with the answers. Cosmology: Questions and Answers takes some of the best questions and answers asked on the physics.stackexchange.com website. You can use this book to look up commonly asked questions, browse questions on a particular topic, compare answers to common topics, check out the original source and much more. This book has been designed to be very easy to use, with many internal references set up that makes browsing in many different ways possible. Topics covered include: Space Expansion, Universe, Big Bang, General Relativity, CMB, Astrophysics, Spacetime, Cosmological Inflation, Galaxies, Dark Matter, Dark Energy, Astronomy, Black Holes, Time, Energy Conservation, Gravity and many more.

Introduction To General Relativity And Cosmology Sep 05 2023 Introduction to General Relativity and Cosmology gives undergraduate students an overview of the fundamental ideas behind the geometric theory of gravitation and spacetime. Through pointers on how to modify and generalise Einstein's theory to enhance understanding, it provides a link between standard textbook content and current research in the field.Chapters present complicated

material practically and concisely, initially dealing with the mathematical foundations of the theory of relativity, in particular differential geometry. This is followed by a discussion of the Einstein field equations and their various properties. Also given is analysis of the important Schwarzschild solutions, followed by application of general relativity to cosmology. Questions with fully worked answers are provided at the end of each chapter to aid comprehension and guide learning. This pared down textbook is specifically designed for new students looking for a workable, simple presentation of some of the key theories in modern physics and mathematics.

Four Possible Ways to Model Rotating Universe Jun 09 2021 It is known that most existing cosmology models do not include rotation, with few exceptions such as rotating Bianchi and rotating Godel metrics. Therefore in this paper we aim to discuss four possible ways to model rotating universe, including Nurgaliev's Ermakov-type equation. It is our hope that the new proposed method can be verified with observations, in order to open new possibilities of more realistic nonlinear cosmology models.

Cosmology and Particle Astrophysics Feb 27 2023 Beginning with basic facts about the observable universe, this book reviews the complete range of topics that make up a degree course in cosmology and particle astrophysics. The book is self-contained - no specialised knowledge is required on the part of the reader, apart from undergraduate math and physics. This paperback edition targets students of physics, astrophysics and cosmology from advanced undergraduate to early graduate level.

Introduction to Cosmology May 13 2024 A substantial update of this award-winning and highly regarded cosmology textbook, for advanced undergraduates in physics and astronomy.

Exact Solutions of Einstein's Field Equations Mar 19 2022 A paperback edition of a classic text, this book contains six new chapters, covering generation methods and their application,

colliding waves, classification of metrics by invariants and treatments of homothetic motions. This book is an important resource for graduates and researchers in relativity, theoretical physics, astrophysics and mathematics.

Black Holes, Cosmology And Extra Dimensions Oct 14 2021 Assuming foundational knowledge of special and general relativity, this book guides the reader on issues surrounding black holes, wormholes, cosmology, and extra dimensions. Its first part is devoted to local strong field configurations (black holes and wormholes) in general relativity and the most relevant of alternative theories: scalar-tensor, f(R) and multidimensional theories. The second part is on cosmology, including inflation and a unified description of the whole evolution of the universe. The third part concerns multidimensional theories of gravity and contains a number of original results obtained by the authors. Expository work is conducted for a mechanism of symmetries and fundamental constants formation, while the original approach to nonlinear multidimensional gravity that is able to construct a unique perspective describing different phenomena is highlighted.Much of the content is new in book publications, because it was previously found only in journal publications, e.g. regarding regular black holes, various scalar field solutions, wormholes and their stability, and multidimensional gravity.

Our Universe-Infinite and Eternal Nov 07 2023 The field equations of Einstein's General Relativity are solved for an infinite universe with uniform density. One of the three solutions, the Infinite Universe of Einstein and Newton, fits all the data for the Hubble diagram better than the Big Bang. Next, using general relativity and the physics that evolved from Newton, the force of gravity between two massive point particles is found. Utilizing this force and the Infinite Universe of Einstein and Newton model, the net force of gravity on a point particle in arbitrary motion, due the uniform mass distribution of the universe, is calculated by

integration. This net force of gravity is found to be equal to the Force of Inertia. These calculations explain Newton's First Law, Newton's Second Law, and the equivalence of inertial and gravitational mass. The middle of the book deals with the development of quantum mechanics. Here it is shown that hidden within the classical mechanics of particles there is the phase of a wave, associated with a particle, that moves at the speed of a de Broglie wave. The form of the phase of the wave is developed. Making use of the form of the phase, the Hamilton-Jacobi equation for a particle is setup to be solved using an integrating factor. The resulting equation is manipulated directly into the form of the Schrodinger equation. This development requires that the particle Hamilton-Jacobi equation has a solution whenever the Schrodinger equation has a solution and vice versa. The classical wave function is then shown to have exactly the same mathematical properties as the quantum mechanical wave function, including the fact that the absolute value squared of the classical wave function has the mathematical properties of a probability density. However, the interpretation that this is a probability density for the particle is shown not to hold. Lastly, the missing matter problem is resolved by showing that the dynamics and the mass of a spiral galaxy are better and more naturally explained by using ordinary physics with ordinary interacting matter than they are by postulating and using exotic weakly interacting dark matter.

Cosmological Physics Jul 11 2021 This textbook provides advanced undergraduate and graduate students with a complete introduction to modern cosmology. It successfully bridges the gap between undergraduate and advanced graduate texts by discussing topics of current research, starting from first principles. Throughout this authoritative volume, emphasis is given to the simplest, most intuitive explanation for key equations used by researchers. The first third of the book carefully develops the necessary background in general relativity and quantum fields. The rest of the book then

provides self-contained accounts of all the key topics in contemporary cosmology, including inflation, topological defects, gravitational lensing, galaxy formation, large-scale structure and the distance scale. To aid understanding, the book is well illustrated with helpful figures and includes outline solutions to nearly 100 problems. All necessary astronomical jargon is clearly explained, ensuring the book is self-contained for any student with undergraduate physics.

Modern Cosmology Dec 16 2021 An advanced text for senior undergraduates, graduate students and physical scientists in fields outside cosmology. This is a self-contained book focusing on the linear theory of the evolution of density perturbations in the universe, and the anisotropiesin the cosmic microwave background.

Lecture Notes in Cosmology Jul 03 2023 Cosmology has become a very active research field in the last decades thanks to the impressing improvement of our observational techniques which have led to landmark discoveries such as the accelerated expansion of the universe, and have put physicists in front of new mysteries to unveil, such as the quest after the nature of dark matter and dark energy. These notes offer an approach to cosmology, covering fundamental topics in the field: the expansion of the universe, the thermal history, the evolution of small cosmological perturbations and the anisotropies in the cosmic microwave background radiation. Some extra topics are presented in the penultimate chapter and some standard results of physics and mathematics are available in the last chapter in order to provide a self-contained treatment. These notes offer an in-depth account of the above-mentioned topics and are aimed to graduate students who want to build an expertise in cosmology.

Developments in Mathematical and Experimental Physics May 09 2021 The first part is devoted to the topic of quantum gravity and string theories, mainly concerned with recent authoritative results in the study of discretizations in classical and quantum general

relativity, non-commutative theories of gravity, (2+1)-dimensional supergravity, and Berezin description of Kaehler quotients. The field to particle transition problem is also considered. The second part deals with cosmology and black holes. Here, cosmological, inflationary, and braneworld scenarios are investigated. Moreover, some scalar field models for the dark matter content of the universe as well as new models of protostellar collapse and fragmentation are presented. This part includes also a study of de Sitter/Anti-de Sitter phase transition for black holes, an understanding of hairy black holes and an improvement of the no-hair theorem proof for the Proca field. The third part is devoted to exact solutions, in particular classical and quantum cosmological solutions in scalar-tensor theories. Additionally, a discussion about conformally flat axisymmetric spacetimes and some considerations on accelerated expansion in scalar-tensor theories are presented. Experimental and some mixed topics are included in the final part. Among them is an experimental foundation of nonlocality and superluminal signal velocity in photonic tunneling, a proposal for testing the weak equivalence principle for charged particles in space. Moreover, a possible new type of skewon field linked to Maxwell theory is also presented, and an authoritative discussion at the interface of quantum and gravitational realms.

Solutions to the Unsolved Physics Problems Sep 24 2022 People have always wanted answers to the big questions. Where did we come from? How did the universe begin? What is the meaning and design behind it all? Is there anyone out there? The creation accounts of the past now seem less relevant and credible. They have been replaced by a variety of what can only be called superstitions, ranging from New Age to Star Trek. But real science can be far stranger than science fiction, and much more satisfying. I am a scientist. And a scientist with a deep fascination with physics, cosmology, the universe and the future of humanity. I was brought up by my parents to have an unwavering curiosity and, like my

father, to research and try to answer the many questions that science asks us. I have spent my life travelling across the universe, inside my mind. Through theoretical physics, I have sought to answer some of the great questions. At one point, I thought I would see the end of physics as we know it, but now I think the wonder of discovery will continue long after I am gone. We are close to some of these answers, but we are not there yet. The problem is, most people believe that real science is too difficult and complicated for them to understand. But I don't think this is the case. To do research on the fundamental laws that govern the universe would require a commitment of time that most people don't have; the world would soon grind to a halt if we all tried to do theoretical physics. But most people can understand and appreciate the basic ideas if they are presented in a clear way with equations, which I believe is possible and which is something I have enjoyed trying to do throughout my life. I want to add my voice to those who demand why we must ask the big questions immediate action on the key challenges for our global community. I hope that going forward, even when I am no longer here, people with power can show creativity, courage and leadership. Let them rise to the challenges and act now.

EINSTEIN´S UNIVERSE WITHOUT BIG BANG Apr 12 2024 Einstein was right. The Big Bang never happend! www.einsteins-universe.com/en/ On the basis of the spiritual ideas of a Belgian priest and an Indian Brahmin, so-called “modern cosmology” has been peddling unadulterated mysticism for decades now. This mysticism has found worldwide distribution especially through a plethora of television documentaries, despite the fact that their pseudoscientific content has been proven to lie completely outside the laws of physics. In this way, people have been led to believe that 95 percent of our universe consists of mystical dark energy and dark matter and only 5 percent of the universe is accessible to us empirically. But what lies behind the scandalous and lamentable failure of an entire branch of astrophysical science and who has an

interest in promoting this mysticism? The author of the book reveals clearly, how the scandalous failure of a whole branch of science came about and explains the actual dynamics of the universe using the reputable physical findings of Isaac Newton, Max Planck, Albert Einstein, and Karl Schwarzschild. Almost everything about the universe that you believe to be true is demonstrably false. A mixture of mysticism and science-fiction! After 100 years, Einstein´s idea of a static universe has turned out to be true after all. There was definitely no Big Bang, nor are there so-called "black holes" in which space, mass and time collapse to a point, but rather relativistic black spheres. These black spheres are the solution of Hawking´s paradox. Further information: www.einsteins-universe.com/en/
Relativity and Cosmology May 21 2022

Theoretical and Experimental Approaches to Dark Energy and the Cosmological Constant Problem Jun 21 2022 This thesis represents a unique mix of theoretical work discussing the Lorentz theory of gravity and experimental work searching for supersymmetry with the Compact Muon Solenoid experiment at the Large Hadron Collider. It begins by reviewing a set of widely-discussed theoretical solutions to the cosmological constant problem, including a natural solution provided by the recently developed Lorentz gauge theory of gravity. The Schwartzschild metric, de Sitter space, and quantum versions of the theory are also discussed. The thesis then looks to supersymmetry for an alternative solution. The idea behind supersymmetry is reviewed and an experimental search for supersymmetry is presented. A major contribution was to estimate one of the most significant backgrounds in this search, which arises from top-antitop quark pair production or W boson production in association with multiple jets where the W boson decays into the hadronically-decaying tau leptons and neutrinos. This background was estimated through a novel method involving kinematically analogous events but including a well-measured muon. This search significantly extends

limits on supersymmetric partners of gluons from previous searches. **Dynamical Systems and Cosmology** Nov 14 2021 Dynamical systems theory is especially well-suited for determining the possible asymptotic states (at both early and late times) of cosmological models, particularly when the governing equations are a finite system of autonomous ordinary differential equations. In this book we discuss cosmological models as dynamical systems, with particular emphasis on applications in the early Universe. We point out the important role of self-similar models. We review the asymptotic properties of spatially homogeneous perfect fluid models in general relativity. We then discuss results concerning scalar field models with an exponential potential (both with and without barotropic matter). Finally, we discuss the dynamical properties of cosmological models derived from the string effective action. This book is a valuable source for all graduate students and professional astronomers who are interested in modern developments in cosmology.