

String Theory And Fundamental Interactions Gabriele Veneziano And Theoretical Physics Historical And Contemporary Perspectives Lecture Notes In Physics

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Geometry of String Theory Compactifications - Alessandro Tomasiello 2022-01-13

String theory is a leading candidate for the unification of universal forces and matter, and one of its most striking predictions is the existence of small additional dimensions that have escaped detection so far. This book focuses on the geometry of these dimensions, beginning with the basics of the theory, the mathematical properties of spinors, and differential geometry. It further explores advanced techniques at the core of current research, such as G-structures and generalized complex geometry. Many significant classes of solutions to the theory's equations are studied in detail, from special holonomy and Sasaki–Einstein manifolds to their more recent generalizations involving fluxes for form fields. Various explicit examples are discussed, of interest to graduates and researchers. *Strings, Conformal Fields, and Topology* - Michio Kaku 1991

Bibliographie internationale annuelle des mélanges - 2009

Introduction to String Theory - Sergio Cecotti 2023-11-07

Graduate students typically enter into courses on string theory having little to no familiarity with the mathematical background so crucial to the discipline. As such, this book, based on lecture notes, edited and expanded, from the graduate course taught by the author at SISSA and BIMSA, places particular emphasis on said mathematical background. The target audience for the book includes students of both theoretical physics and mathematics. This explains the book's "strange" style: on the one hand, it is highly didactic and explicit, with a host of examples for the physicists, but, in addition, there are also almost 100 separate technical boxes, appendices, and starred sections, in which matters discussed in the main text are put into a broader mathematical perspective, while deeper and more rigorous points of view (particularly those from the modern era) are presented. The boxes also serve to further shore up the reader's understanding of the underlying math. In writing this book, the author's goal was not to achieve any sort of definitive conciseness, opting instead for clarity and "completeness". To this end, several arguments are presented more than once from different viewpoints and in varying contexts.

How Energy Considerations Have Shaped Our Fundamental Modern Theories of Physics - E. B. Manoukian

String Theory in a Nutshell - Elias Kiritsis 2019-04-16

The essential introduction to modern string theory—now fully expanded and revised *String Theory in a Nutshell* is the definitive introduction to modern string theory. Written by one of the world's leading authorities on the subject, this concise and accessible book starts with basic definitions and guides readers from classic topics to the most exciting frontiers of research today. It covers perturbative string theory, the unity of string interactions, black holes and their microscopic entropy, the AdS/CFT correspondence and its applications, matrix model tools for string theory, and more. It also includes 600 exercises and serves as a self-contained guide to the literature. This fully updated edition features an entirely new chapter on flux compactifications in string theory, and the chapter on AdS/CFT has been substantially expanded by adding many applications to diverse topics. In addition, the discussion of conformal field theory has been extensively revised to make it more student-friendly. The essential one-volume reference for students and researchers in theoretical high-energy physics Now fully expanded and revised Provides expanded coverage of AdS/CFT and its applications, namely the holographic renormalization group, holographic theories for Yang-Mills and QCD,

nonequilibrium thermal physics, finite density physics, and entanglement entropy Ideal for mathematicians and physicists specializing in theoretical cosmology, QCD, and novel approaches to condensed matter systems An online illustration package is available to professors String Theory and Grand Unification - 1993

An Introduction to String Theory and D-Brane Dynamics - Richard J Szabo 2011-01-07

This invaluable book provides a quick introduction to the rudiments of perturbative string theory and a detailed introduction to the more current topic of D-brane dynamics. The presentation is very pedagogical, with much of the technical detail streamlined. The rapid but highly coherent introduction to the subject is perhaps what distinguishes this book from other string theory or D-brane books. This second edition includes an additional appendix with solutions to the exercises, thus expanding on some of the technical material and making the book more appealing for use in lecture courses. The material is based on mini-courses in theoretical high energy physics delivered by the author at various summer schools, so its actual level has been appropriately tested. Contents: A Brief History of String Theory Classical String Theory Quantization of the Bosonic String Superstrings Ramond–Ramond Charges and T-Duality D-Branes and Gauge Theory D-Brane Dynamics Ramond–Ramond Couplings of D-Branes Solutions to Exercises Readership: Students and professionals in physics. Keywords: String Theory; D-Branes

String Theory and Fundamental Interactions - Maurizio Gasperini 2007-11-08

This book has been prepared to celebrate the 65th birthday of Gabriele Veneziano and his retirement from CERN in September 2007. This retirement certainly will not mark the end of his extraordinary scientific career (in particular, he will remain on the permanent staff of the Collège de France in Paris), but we believe that this important step deserves a special celebration, and an appropriate recognition of his monumental contribution to physics. Our initial idea of preparing a volume of Selected papers of Professor Gabriele Veneziano, possibly with some added commentary, was dismissed when we realized that this format of book, very popular in former times, has become redundant today because of the full "digitalization" of all important physical journals, and their availability online in the electronic archives. We have thus preferred an alternative (and unconventional, but probably more effective) form of celebrating Gabriele's birthday: a collection of new papers written by his main collaborators and friends on the various aspects of theoretical physics that have been the object of his research work, during his long and fruitful career.

Naturalness, String Landscape and Multiverse - Arthur Hebecker 2021

This book presents a string-theoretic approach to new ideas in particle physics, also known as Physics Beyond the Standard Model, and to cosmology. The concept of Naturalness and its apparent violation by the low electroweak scale and the small cosmological constant is emphasized. It is shown that string theory, through its multitude of solutions, known as the landscape, offers a partial resolution to these naturalness problems as well as suggesting more speculative possibilities like that of a multiverse. The book is based on a one-semester course, as such, it has a pedagogical approach, is self-contained and includes many exercises with solutions. Notably, the basics of string theory are introduced as part of the lectures. These notes are aimed at graduate students with a solid background in quantum field theory, as well as at young researchers from

theoretical particle physics to mathematical physics. This text also benefits students who are in the process of studying string theory at a deeper level. In this case, the volume serves as additional reading beyond a formal string theory course.

Classical and Quantum Statistical Physics - Carlo Heissenberg 2022-01-20

Provides a detailed introduction to classical and quantum statistical physics, including modern applications within current research.

Lectures on String Theory - Dieter Lüst 1989-11-08

This book provides a self-contained introduction to string theory, at present one of the most exciting and fastest-growing areas in theoretical high-energy physics. Pedagogical in character, it introduces modern techniques and concepts, such as conformal and superconformal field theory, Kac-Moody algebras, etc., stressing their relevance and application to string theory rather than the formal aspects. The reader is led from a basic discussion of the classical bosonic string to the construction of four-dimensional heterotic string models, an area of current research. The so-called covariant lattice construction is discussed in detail. Being conceptually very simple, the book serves to exemplify the relevant features of other methods of arriving at four-dimensional string theories. It is also shown how one derives a low-energy field theory from string theory, thereby making contact with conventional point-particle physics.

Quantum Field Theory I - Edouard B. Manoukian 2016-12-01

This textbook covers a broad spectrum of developments in QFT, emphasizing those aspects that are now well consolidated and for which satisfactory theoretical descriptions have been provided. The book is unique in that it offers a new approach to the subject and explores many topics merely touched upon, if covered at all, in standard reference works. A detailed and largely non-technical introductory chapter traces the development of QFT from its inception in 1926. The elegant functional differential approach put forward by Schwinger, referred to as the quantum dynamical (action) principle, and its underlying theory are used systematically in order to generate the so-called vacuum-to-vacuum transition amplitude of both abelian and non-abelian gauge theories, in addition to Feynman's well-known functional integral approach, referred to as the path-integral approach. Given the wealth of information also to be found in the abelian case, equal importance is put on both abelian and non-abelian gauge theories. Particular emphasis is placed on the concept of a quantum field and its particle content to provide an appropriate description of physical processes at high energies, where relativity becomes indispensable. Moreover, quantum mechanics implies that a wave function renormalization arises in the QFT field independent of any perturbation theory - a point not sufficiently emphasized in the literature. The book provides an overview of all the fields encountered in present high-energy physics, together with the details of the underlying derivations. Further, it presents "deep inelastic" experiments as a fundamental application of quantum chromodynamics. Though the author makes a point of deriving points in detail, the book still requires good background knowledge of quantum mechanics, including the Dirac Theory, as well as elements of the Klein-Gordon equation. The present volume sets the language, the notation and provides additional background for reading Quantum Field Theory II - Introduction to Quantum Gravity, Supersymmetry and String Theory, by the same author. Students in this field might benefit from first reading the book Quantum Theory: A Wide Spectrum (Springer, 2006), by the same author.

The Universe Before the Big Bang - Maurizio Gasperini 2008-10-08

Terms such as "expanding Universe", "big bang", and "initial singularity", are nowadays part of our common language. The idea that the Universe we observe today originated from an enormous explosion (big bang) is now well known and widely accepted, at all levels, in modern popular culture. But what happens to the Universe before the big bang? And would it make any sense at all to ask such a question? In fact, recent progress in theoretical physics, and in particular in String Theory, suggests answers to the above questions, providing us with mathematical tools able in principle to reconstruct the history of the Universe even for times before the big bang. In the emerging cosmological scenario the Universe, at the epoch of the big bang, instead of being a "new born baby" was actually a rather "aged" creature in the middle of its possibly infinitely enduring evolution. The aim of this book is to convey this picture in non-technical language accessible also to non-specialists. The author, himself a leading cosmologist, draws attention to ongoing and future observations that might reveal relics of an era before the big bang.

Superstring Theory - Michael B. Green 2012-07-26

The twenty-fifth anniversary edition featuring a new Preface, invaluable

for graduate students and researchers in high energy physics and astrophysics.

The Birth of String Theory - Andrea Cappelletti 2012-04-12

Explores the early stages of the development of string theory; essential reading for physicists, historians and philosophers of science.

Advances in String Theory - Eric R. Sharpe 2008

"Over the past decade string theory has had an increasing impact on many areas of physics: high energy and hadronic physics, gravitation and cosmology, mathematical physics and even condensed matter physics. The impact has been through many major conceptual and methodological developments in quantum field theory in the past fifteen years. In addition, string theory has exerted a dramatic influence on developments in contemporary mathematics, including Gromov-Witten theory, mirror symmetry in complex and symplectic geometry, and important ramifications in enumerative geometry." "This volume is derived from a conference of younger leading practitioners around the common theme: "What is string theory?" The talks covered major current topics, both mathematical and physical, related to string theory. Graduate students and research mathematicians interested in string theory in mathematics and physics will be interested in this workshop."--BOOK JACKET.

Strings, Conformal Fields, and M-Theory - Michio Kaku 2012-12-06

Building on the foundations laid in his Introduction to Superstrings and M Theory, Professor Kaku discusses such topics as the classification of conformal string theories, knot theory, the Yang-Baxter relation, quantum groups, and the insights into 11-dimensional strings recently obtained from M-theory. New chapters discuss such topics as Seiberg-Witten theory, M theory and duality, and D-branes. Throughout, the author conveys the vitality of the current research and places readers at its forefront. Several chapters reviewing the fundamentals of string theory, making the presentation of the material self-contained while keeping overlap with the earlier book to a minimum.

A Mathematical Introduction to String Theory - Sergio Albeverio 1997-07-17

This book deals with the mathematical aspects of string theory.

Introduction to String Field Theory - Warren Siegel 1988

This volume covers the most up-to-date findings on string field theory. It is presented in a new approach as a result of insights gained from the theory. This includes the use of a universal method for treating free field theories, which allows the derivation of a single, simple, free, local, Poincare-invariant, gauge-invariant action that can be applied directly to any fields.

String Theory and Particle Physics - Luis E. Ibáñez 2012-02-09

String theory is one of the most active branches of theoretical physics and has the potential to provide a unified description of all known particles and interactions. This book is a systematic introduction to the subject, focused on the detailed description of how string theory is connected to the real world of particle physics. Aimed at graduate students and researchers working in high energy physics, it provides explicit models of physics beyond the Standard Model. No prior knowledge of string theory is required as all necessary material is provided in the introductory chapters. The book provides particle phenomenologists with the information needed to understand string theory model building and describes in detail several alternative approaches to model building, such as heterotic string compactifications, intersecting D-brane models, D-branes at singularities and F-theory.

Non-critical String Theory - Stanislav Klimenko 2007

The relativistic string theory was born in 1960s. The stimulus was an observation that the dual model of hadronic interactions proposed by Veneziano is adequate not to the quantum theory of usual (null-dimensional) particles but to the theory of one-dimensional relativistic objects -- the strings. It has been immediately found that a self-consistent quantum theory of (bosonic) relativistic strings can be constructed in frames of standard quantisation scheme only in a space-time of dimension 26. Inclusion of fermions has decreased this critical dimension to 10. However, it is evident from the experiment, that elementary particles and their constituents 'live' in the space-time of dimension 4. The attempt to show that extra 6 dimensions are compactified on the scale of Planck's length, in the spirit of old ideas by Kaluza-Klein, just created further complications. This book differs from traditional presentations of the classical and quantum theory of relativistic strings by two aspects. First, it proposes and consistently implements an idea of mathematical modelling and computer visualisation of topologically non-trivial solutions of the classical equations of motion of relativistic strings. Second, on this basis it successfully implements a quantisation scheme, originating from the papers by G P Pron'ko, which uses a different set of

dynamical variables, canonically equivalent to the variables of standard scheme, in frames of Hamiltonian formalism and Dirac's quantisation procedure.

Introduction to Superstrings - Michio Kaku 1988

This comprehensive tutorial introduces the development of, and current trends in, superstring theory, a significant and still controversial attempt to unify general relativity and quantum field theory. Intended for graduate students with a year of quantum mechanics and familiarity with relativistic methods, the book makes these exciting developments available to physicists, mathematicians, and others for the first time in one volume. Stressing current areas of research activity, *Introduction to Superstrings* addresses all relevant topics including string field theory, multi-loops and Teichmüller spaces, conformal field theory, and four-dimensional superstrings. Professor Kaku is currently leading seminars in superstring theory at the Graduate Center of the City University of New York.

Introduction to Superstring Theory - Elias Kiritsis 1998-01

String Theory, now almost 30 years of age, was partly forgotten but came back to the forefront of theoretical particle physics in 1984. In this book, based on lectures by the author at the K.U.Leuven and at the University of Padova, Elias Kiritsis takes the reader through the developments of the last 15 years: conformal field theory, the various superstrings and their spectra, compactifications, and the effective description of low energy degrees of freedom. It ends by showing a glimpse of the most recent developments, dualities of strings and higher dimensional objects, that influence both traditional field theory and present day mathematics.

Readership: Theoretical physicists, and mathematicians with an interest in modern string theory. 1. Introduction 2. Historical perspective 3. Classical string theory 3.1. The point particle 3.2. Relativistic strings 3.3. Oscillator expansions 4. Quantization of the bosonic string 4.1. Covariant canonical quantization 4.2. Light-cone quantization 4.3. Spectrum of the bosonic string 4.4. Path integral quantization 4.5. Topologically non-trivial world-sheets 4.6. BRST primer 4.7. BRST in string theory and the physical spectrum 4.8. Interactions and loop amplitudes 5. Conformal field theory 5.1. Conformal transformations 5.2. Conformally invariant field theory 5.3. Radial quantization 5.4. Example: the free boson 5.5. The central charge 5.6. The free fermion 5.7. Mode expansions 5.8. The Hilbert space 5.9. Representations of the conformal algebra 5.10. Affine algebras 5.11. Free fermions and $O(N)$ affine symmetry 5.12. $N=1$ superconformal symmetry 5.13. $N=2$ superconformal symmetry 5.14. $N=4$ superconformal symmetry 5.15. The CFT of ghosts 6. CFT on the torus 6.1. Compact scalars 6.2. Enhanced symmetry and the string Higgs effect 6.3. T-duality 6.4. Free fermions on the torus 6.5. Bosonization 6.6. Orbifolds 6.7. CFT on higher-genus Riemann surfaces 7. Scattering amplitudes and vertex operators of bosonic strings 8. Strings in background fields and low-energy effective actions 9. Superstrings and supersymmetry 9.1. Closed (type-II) superstrings 9.2. Massless R-R states 9.3. Type-I superstrings 9.4. Heterotic superstrings 9.5. Superstring vertex operators 9.6. Supersymmetric effective actions 10. Anomalies 11. Compactification and supersymmetry breaking 11.1. Toroidal compactifications 11.2. Compactification on non-trivial manifolds 11.3. World-sheet versus spacetime supersymmetry 11.4. Heterotic orbifold compactifications with $N=2$ supersymmetry 11.5. Spontaneous supersymmetry breaking 11.6. Heterotic $N=1$ theories and chirality in four dimensions 11.7. Orbifold compactifications of the type-II string 12. Loop corrections to effective couplings in string theory 12.1. Calculation of gauge thresholds 12.2. On-shell infrared regularization 12.3. Gravitational thresholds 12.4. Anomalous $U(1)$'s 12.5. $N=1,2$ examples of thresholds corrections 12.6. $N=2$ universality of thresholds 12.7. Unification 13. Non-perturbative string dualities: a foreword 13.1. Antisymmetric tensors and p-branes 13.2. BPS states and bounds 13.3. Heterotic/type-I duality in ten dimensions 13.4. Type-IIA versus M-theory 13.5. M-theory and the $E8 \times E8$ heterotic string 13.6. Self-duality of the type-IIB string 13.7. D-branes are the type-II R-R charged states 13.8. D-brane actions 13.9. Heterotic/type-II duality in six and four dimensions 14. Outlook Appendices A. Theta functions B. Toroidal lattice sums C. Toroidal Kaluza-Klein reduction D. $N=1,2,4$, $D=4$ supergravity coupled to matter E. BPS Multiplets and helicity supertrace formulae F. Modular forms G. Helicity string partition functions H. Electric-Magnetic duality in $D=4$ References

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String Theory and Fundamental Interactions - Maurizio Gasperini 2016-04-01

Opening with an overview of the pioneering work of Prof. Gabriele Veneziano on string theory and nonperturbative QCD, this volume examines the impact of this and similar early work. The book honors Prof. Veneziano on his retirement from CERN.

String Theory Methods for Condensed Matter Physics - Horatiu Nastase 2017-09-21

The discovery of a duality between Anti-de Sitter spaces (AdS) and Conformal Field Theories (CFT) has led to major advances in our understanding of quantum field theory and quantum gravity. String theory methods and AdS/CFT correspondence maps provide new ways to think about difficult condensed matter problems. String theory methods based on the AdS/CFT correspondence allow us to transform problems so they have weak interactions and can be solved more easily. They can also help map problems to different descriptions, for instance mapping the description of a fluid using the Navier-Stokes equations to the description of an event horizon of a black hole using Einstein's equations. This textbook covers the applications of string theory methods and the mathematics of AdS/CFT to areas of condensed matter physics. Bridging the gap between string theory and condensed matter, this is a valuable textbook for students and researchers in both fields.

A Primer on String Theory - Volker Schomerus 2017-07-06

A concise introduction to string theory explaining central concepts, mathematical tools and recent developments in the field of physics. Covering fundamental concepts including how strings interact with each other, this book is perfect for students with no prior knowledge as well as scholars from other disciplines.

A Short Introduction to String Theory - Thomas Mohaupt 2022-04-07

A concise and pedagogical introduction to string theory for graduate students featuring examples and homework problems.

String Theory Research Progress - Ferenc N. Balogh 2008

String theory is a model of fundamental physics whose building blocks are one-dimensional extended objects called strings, rather than the zero-dimensional point particles that form the basis for the standard model of particle physics. The phrase is often used as shorthand for Superstring theory, as well as related theories such as M-theory. By replacing the point-like particles with strings, an apparently consistent quantum theory of gravity emerges. Moreover, it may be possible to 'unify' the known natural forces (gravitational, electromagnetic, weak nuclear and strong nuclear) by describing them with the same set of equations. Studies of string theory have revealed that it predicts higher-dimensional objects called branes. String theory strongly suggests the existence of ten or eleven (in M-theory) space-time dimensions, as opposed to the usual four (three spatial and one temporal) used in relativity theory.

Introduction to the Relativistic String Theory - Boris Mikhaïlovich Barbashov 1990

This book presents a systematic and detailed account of the classical and quantum theory of the relativistic string and some of its modifications. Main attention is paid to the first-quantized string theory with possible applications to the string models of hadrons as well as to the superstring approach to unifications of all the fundamental interactions in the elementary particle physics and to the 'cosmic' strings. Some new aspects are provided such as the consideration of the string in an external electromagnetic field and in the space-time of constant curvature (the de Sitter universe), the relativistic string loaded by point-like masses and the Cartan method for describing the classical string dynamics. The relativistic membranes and p-branes are also considered briefly. The book is sufficiently self-contained and can be considered as an introduction to this new and fast developing branch of the elementary particle physics.

Ettore Majorana: Unpublished Research Notes on Theoretical Physics - Salvatore Esposito 2008-10-10

Without listing his works, all of which are highly notable both for the originality of the methods utilized as well as for the importance of the results achieved, we limit ourselves to the following:

In modern nuclear theories, the contribution made by this researcher to the introduction of the forces called 'Majorana forces' is universally recognized as the one, among the most fundamental, that permits us to theoretically comprehend the reasons for nuclear stability. The work of Majorana today serves as a basis for the most important research in this field. In atomic physics, the merit of having resolved some of the most intricate questions on the structure of spectra through simple and elegant considerations of symmetry is due to Majorana. Lastly, he devised a brilliant method that permits us to treat the positive and negative electron in a symmetrical way, finally eliminating the necessity to rely on the extremely artificial and unsatisfactory hypothesis of an infinitely large electrical charge distributed in space, a question that had been tackled in

vain by many other scholars [4].

String Theory and Its Applications - Michael Dine 2011-11-22

The book is based on lectures given at the TASI summer school of 2010. It aims to provide advanced graduate students, postdoctorates and senior researchers with a survey of important topics in particle physics and string theory, with special emphasis on applications of methods from string theory and quantum gravity in condensed matter physics and QCD (especially heavy ion physics). Contents: Overview: Introduction to Gauge/Gravity Duality (J Polchinski) TASI Lectures on Holographic Space-Time, SUSY, and Gravitational Effective Field Theory (T Banks) LHC Physics: Fundamentals of LHC Experiments (J Nielsen) Theoretical Particle Physics at Hadron Colliders: An Introduction (M J Strassler) String Model Building, Landscape and Phenomenology: TASI Lectures: Particle Physics from Perturbative and Non-perturbative Effects in D-Braneworlds (M Cvetič and J Halverson) Supergravity and String Vacua in Various Dimensions (W Taylor) TASI Lectures on Complex Structures (F Denef) Supersymmetry from the Top Down (M Dine) AdS/CFT Applications: The Landscape of the Hubbard Model (S Sachdev) Holography for Strongly Coupled Media (D T Son) Collisions in Anti-de Sitter Space, Conformal Symmetry, and Holographic Superconductors (S S Gubser) Emergence of Supersymmetry, Gauge Theory and String Theory in Condensed Matter Systems (S-S Lee) Lectures on Holographic Non-Fermi Liquids and Quantum Phase Transitions (N Iqbal, H Liu and M Mezei) The Fluid/Gravity Correspondence (S Minwalla, V E Hubeny and M Rangamani) Readership: Graduate students, beginning post-docs and advanced researchers. Keywords: String Theory; condensed Matter Physics; Heavy Ion Physics; AdS-CFT Correspondence

Principles of String Theory - Lars Brink 1988-01-31

The almost irresistible beauty of string theory has seduced many theoretical physicists in recent years. Even hardened men have been swept away by what they can already see and by the promise of even more. It would appear fair to say that it is not yet clear what form the theory will finally take and in what precise way it will relate to the physical world. However, it would seem equally fair to state that, most likely, strings are here to stay and will play a profound and central role in our conception of the universe. There is therefore a pressing need to provide both practicing physicists and advanced students with ways to master quickly, but soundly, the basic principles of the theory. The present volume is a step in that direction. It contains a lucid presentation of the basic principles of string theory in forms which may survive future developments. The book is an outgrowth of lectures given by Lars Brink and Marc Henneaux at the Centro de Estudios Científicos de Santiago. The lectures covered in a self-contained manner different but complementary aspects of the foundations of string theory.

Progress in String Theory Research - Fred P. Davis 2015-12

At the first look, the String Theory seems just an interesting and non-trivial application of the quantum mechanics and the special relativity to vibrating strings. By itself, the quantisation of relativistic strings does not call the attention of the particle physicist as a significant paradigm shift. However, when the string quantisation is performed by applying the standard rules of the perturbative Quantum Field Theory, one discovers that the strings in certain states have the same physical properties as the gravity in the flat space-time. Chapter one of this book reviews the construction of the thermal bosonic string and D-brane in the framework of the Thermo Field Dynamics (TFD). It briefly recalls the well-known light-cone quantisation of the bosonic string in the conformal gauge in flat space-time, and gives a bird's eye view of the fundamental concepts of the TFD. Chapter two examines a visual model inspired by string theory, on the system of interacting anyons. Chapter three investigate the late-time dynamic of the universe in a 7-dimensional cosmology in the presence of higher-order curvature terms arising from the heterotic string effective action. Chapter four discusses life resulting from strings, water, and DNA united by mission. The final chapter provides new viewpoints of light quantum research on lightstring.

Strings, Branes and Dualities - L. Baulieu 2012-12-06

As recent developments have shown, supersymmetric quantum field theory and string theory are intimately related, with advances in one area often shedding light on the other. The organising ideas of most of these advances are the notion of duality and the physics of higher dimensional objects or p-branes. The topics covered in the present volume include duality in field theory, in particular in supersymmetric field theory and supergravity, and in string theory. The Seiberg-Witten theory and its recent developments are also covered in detail. A large fraction of the

volume is devoted to the current state of the art in M-theory, in particular its underlying superalgebra as well as its connection with superstring and $N = 2$ strings. The physics of D-branes and its essential role in the beautiful computation of the black hole entropy is also carefully covered. Finally, the last two sets of lectures are devoted to the exciting matrix approach to non-perturbative string theory.

Gravity and Strings - Tomás Ortín 2004-03-25

One appealing feature of string theory is that it provides a theory of quantum gravity. Gravity and Strings is a self-contained, pedagogical exposition of this theory, its foundations and its basic results. In Part I, the foundations are traced back to the very early special-relativistic field theories of gravity, showing how such theories lead to general relativity. Gauge theories of gravity are then discussed and used to introduce supergravity theories. In Part II, some of the most interesting solutions of general relativity and its generalizations are studied. The final Part presents and studies string theory from the effective action point of view, using the results found earlier in the book as background. This 2004 book will be useful as a reference book for graduate students and researchers, as well as a complementary textbook for courses on gravity, supergravity and string theory.

String Theory, Quantum Gravity, and the Unification of the Fundamental Interactions - Massimo Bianchi 1993

100 Years of Fundamental Theoretical Physics in the Palm of Your Hand - E. B. Manoukian 2020-10-20

This book aims to integrate, in a pedagogical and technical manner, with detailed derivations, all essential principles of fundamental theoretical physics as developed over the past 100 years. It covers: Quantum physics and Stability Problems in the Quantum World, Minkowski Spacetime Physics Particle Classifications and Underlying Symmetries, Symmetry Violations, Quantum Field Theory of Particle Interactions, Higgs Field Physics, Supersymmetry: A Theory with Mathematical Beauty Superstrings, Gravity and Supergravity, General Relativity Predictions, including Frame Dragging, Intricacies of Black Hole Physics, Perturbative and Non-perturbative Quantum Gravity Intricacies of Modern Cosmology, including Inflation and Power Spectrum If you are in the process of learning, or are lecturing on, any of the subjects above, then this is your book - irrespective of your specialty. With over-specialization and no time to master all the fields given above, students, and perhaps many physicists, may find it difficult to keep up with all the exciting developments going on, and are even less familiar with their underlying technicalities: e.g. they might have heard that the Universe is 13.8 billion years old, but have no idea on how this number is actually computed. This unique book will be of great value to graduate students, instructors and researchers interested in the intricacies and derivations of the many aspects of modern fundamental theoretical physics. And, although a graduate level book, some chapters may also be suitable for advanced undergraduates in their final year.

Conformal Invariance and String Theory - Petre Dita 2012-12-02

Conformal Invariance and String Theory is an account of the series of lectures held in Summer School regarding Conformal Invariance and String Theory in September 1987. The purpose of the lectures is to present the important problems and results in these two areas of theoretical physics. The text is divided into two major parts. Part I deals with implications of conformal invariance in studying two-dimensional systems. Part II meanwhile presents lectures regarding the advances in string theory and other related topics. Also included in the text is a part dedicated to the topic of determinants. This topic is discussed in two parts; the first focuses on the determinants in the finite dimensional case, while the second talks about Fredholm determinants. The book is a helpful source of reference to students and researchers in the field of physics, specifically quantum and theoretical.

Basic Concepts of String Theory - Ralph Blumenhagen 2012-10-04

The purpose of this book is to thoroughly prepare the reader for research in string theory at an intermediate level. As such it is not a compendium of results but intended as textbook in the sense that most of the material is organized in a pedagogical and self-contained fashion. Beyond the basics, a number of more advanced topics are introduced, such as conformal field theory, superstrings and string dualities - the text does not cover applications to black hole physics and cosmology, nor strings theory at finite temperatures. End-of-chapter references have been added to guide the reader wishing to pursue further studies or to start research in well-defined topics covered by this book.