

Superstring Theory Volume 2 Loop Amplitudes Anomalies And Phenomenology

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Gravity and Strings - Tomás Ortín 2004

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.

Superstring Theory - John Schwarz 2012

Twenty-five years ago, Michael Green, John Schwarz, and Edward Witten wrote two volumes on string theory. Published during a period of rapid progress in this subject, these volumes were highly influential for a generation of students and researchers. Despite the immense progress that has been made in the field since then, the systematic exposition of the foundations of superstring theory presented in these volumes is just as relevant today as when first published. Volume 2 is concerned with the evaluation of one-loop amplitudes, the study of anomalies and phenomenology. It examines the low energy effective field theory analysis of anomalies, the emergence of the gauge groups $E_8 \times E_8$ and $SO(32)$ and the four-dimensional physics that arises by compactification of six extra dimensions. Featuring a new Preface setting the work in context in light of recent advances, this book is invaluable for graduate students and researchers in high energy physics and astrophysics, as well as mathematicians.

Non-Perturbative Field Theory - Yitzhak Frishman 2010-04-08

Providing a new perspective on quantum field theory, this book gives a pedagogical and up-to-date exposition of non-perturbative methods in relativistic quantum field theory and introduces the reader to modern research work in theoretical physics. It describes in detail non-perturbative methods in quantum field theory, and explores two-dimensional and four-dimensional gauge dynamics using those methods. The book concludes with a summary emphasizing the interplay between two- and four-dimensional gauge theories. Aimed at graduate students and researchers, this book covers topics from two-dimensional conformal symmetry, affine Lie algebras, solitons, integrable models, bosonization, and 't Hooft model, to four-dimensional conformal invariance, integrability, large N expansion, Skyrme model, monopoles and instantons. Applications, first to simple field theories and gauge dynamics in two dimensions, and then to gauge theories in four dimensions and quantum chromodynamics (QCD) in particular, are thoroughly described.

Supersymmetry and String Theory - Michael Dine 2007-01-04

The past decade has witnessed dramatic developments in the field of theoretical physics. This book is a comprehensive introduction to these recent developments. It contains a review of the Standard Model, covering non-perturbative topics, and a discussion of grand unified theories and magnetic monopoles. It introduces the basics of supersymmetry and its phenomenology, and includes dynamics, dynamical supersymmetry breaking, and electric-magnetic duality. The book then covers general relativity and the big bang theory, and the basic issues in inflationary cosmologies before discussing the spectra of known string theories and the features of their interactions. The book also includes brief introductions to technicolor, large extra dimensions, and the Randall-Sundrum theory of warped spaces. This will be of great interest to graduates and researchers in the fields of particle theory, string theory,

astrophysics and cosmology. The book contains several problems, and password protected solutions will be available to lecturers at www.cambridge.org/9780521858410.

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.

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.

Classical Covariant Fields - Mark Burgess 2023-01-31

This 2002 book is for graduate students and researchers working on field theory, group theory and dynamical systems.

The Scalar-Tensor Theory of Gravitation - Yasunori Fujii 2003-01-02

The scalar-tensor theory of gravitation is one of the most popular alternatives to Einstein's theory of gravitation. This book provides a clear and concise introduction to the theoretical ideas and developments, exploring scalar fields and placing them in context with a discussion of Brans-Dicke theory. Topics covered include the cosmological constant problem, time variability of coupling constants, higher dimensional space-time, branes and conformal transformations. The authors emphasize the physical applications of the scalar-tensor theory and thus provide a pedagogical overview of the subject, keeping more mathematically detailed sections for the appendices. This book is suitable for graduate courses in cosmology, gravitation and relativity. It will also provide a valuable reference for researchers.

Introduction to Supersymmetry and Supergravity - Peter C. West 1990

To the 1st edition of this monograph (addressed to advanced graduate students and researchers) the author, responding to developments within superstring theory, has added 51/2 chapters dealing with two-dimensional supersymmetry. Authoritative, as lucid as the subject matter allows (yet demanding nonetheless!), attractively produced and priced. (NW) Annotation copyrighted by Book News, Inc., Portland, OR

The Theory of Complex Angular Momenta - V. N. Gribov 2003-12-04

This 2003 book provides a rigorous introduction to the theory of complex angular momenta, based on the methods of field theory. It comprises an English translation of the series of lectures given by V. N. Gribov in 1969, when the physics of high-energy hadron interactions was being created. Besides their historical significance, these lectures contain material which is highly relevant to research today. The basic physical results and the approaches Gribov developed are now being rediscovered in an alternative context: in the microscopic theory of hadrons provided by quantum chromodynamics. The ideas and calculation techniques presented in this book are useful for analysing high-energy hadron scattering phenomena, deep inelastic lepton-hadron scattering, the physics of heavy ion collisions, kinetic phenomena in phase transitions, and will be instrumental in the analysis of electroweak processes at the next-generation particle accelerators, such as LHC and TESLA.

Superstring Theory: Volume 2, Loop Amplitudes, Anomalies and Phenomenology - Michael B Green 1988-07-29

A two-volume systematic exposition of superstring theory and its applications which presents many of the new mathematical tools that theoretical physicists are likely to need in coming years. This volume contains an introduction to superstrings

Strings, Branes and Extra Dimensions - Steven S Gubser 2004-03-23

This book covers some recent advances in string theory and extra

dimensions. Intended mainly for advanced graduate students in theoretical physics, it presents a rare combination of formal and phenomenological topics, based on the annual lectures given at the School of the Theoretical Advanced Study Institute (2001) — a traditional event that brings together graduate students in high energy physics for an intensive course of advanced learning. The lecturers in the School are leaders in their fields. The first lecture, by E D'Hoker and D Freedman, is a systematic introduction to the gauge-gravity correspondence, focusing in particular on correlation functions in the conformal case. The second, by L Dolan, provides an introduction to perturbative string theory, including recent advances on backgrounds involving Ramond-Ramond fluxes. The third, by S Gubser, explains some of the basic facts about special holonomy and its uses in string theory and M-theory. The fourth, by J Hewett, surveys the TeV phenomenology of theories with large extra dimensions. The fifth, by G Kane, presents the case for supersymmetry at the weak scale and some of its likely experimental consequences. The sixth, by A Liddle, surveys recent developments in cosmology, particularly with regard to recent measurements of the CMB and constraints on inflation. The seventh, by B Ovrut, presents the basic features of heterotic M-theory, including constructions that contain the Standard Model. The eighth, by K Rajagopal, explains the recent advances in understanding QCD at low temperatures and high densities in terms of color superconductivity. The ninth, by M Sher, summarizes grand unified theories and baryogenesis, including discussions of supersymmetry breaking and the Standard Model Higgs mechanism. The tenth, by M Spiropulu, describes collider physics, from a survey of current and future machines to examples of data analyses relevant to theories beyond the Standard Model. The eleventh, by M Strassler, is an introduction to supersymmetric gauge theory, focusing on Wilsonian renormalization and analogies between three- and four-dimensional theories. The twelfth, by W Taylor and B Zwiebach, introduces string field theory and discusses recent advances in understanding open string tachyon condensation. The thirteenth, by D Waldram, discusses explicit model building in heterotic M-theory, emphasizing the role of the E8 gauge fields. The written presentation of these lectures is detailed yet straightforward, and they will be of use to both students and experienced researchers in high-energy theoretical physics for years to come. The proceedings have been selected for coverage in:

• Index to Scientific & Technical Proceedings (ISTP CDROM version / ISI Proceedings) • CC Proceedings — Engineering & Physical Sciences Contents: Supersymmetric Gauge Theories and the AdS/CFT Correspondence (E D'Hoker & D Z Freedman) [157 pages] Perturbative String Theory and Ramond-Ramond Flux (L Dolan) [33 pages] Special Holonomy in String Theory and M-Theory (S S Gubser) [37 pages] Phenomenology of Extra Dimensions (J L Hewett) [34 pages] Weak Scale Supersymmetry — A Top-Motivated-Bottom-Up Approach (G L Kane) [61 pages] Recent Developments in Cosmology (A R Liddle) [19 pages] Lectures on Heterotic M-Theory (B A Ovrut) [48 pages] Color Superconductivity (K Rajagopal) [59 pages] Grand Unification, Higgs Bosons, and Baryogenesis (M Sher) [46 pages] Collider Experiment: Strings, Branes and Extra Dimensions (M Spiropulu) [40 pages] An Unorthodox Introduction to Supersymmetric Gauge Theory (M J Strassler) [78 pages] D-Branes, Tachyons, and String Field Theory (W Taylor & B Zwiebach) [88 pages] Introduction to Model Building in Heterotic M-Theory (D Waldram) [87 pages]

Readership: Graduates and researchers in high energy physics, mathematical physics and astrophysics.
Keywords: Strings; Branes; Extra Dimensions; TASI; Particle Physics
[Chemistry](#) - Edward Witten 1996-09

[D-Branes](#) - Clifford V. Johnson 2006-11-02

D-branes represent a key theoretical tool in the understanding of strongly coupled superstring theory and M-theory. They have led to many striking discoveries, including the precise microphysics underlying the thermodynamic behaviour of certain black holes, and remarkable holographic dualities between large-N gauge theories and gravity. This book provides a self-contained introduction to the technology of D-branes, presenting the recent developments and ideas in a pedagogical manner. It is suitable for use as a textbook in graduate courses on modern string theory and theoretical particle physics, and will also be an indispensable reference for seasoned practitioners. The introductory material is developed by first starting with the main features of string theory needed to get rapidly to grips with D-branes, uncovering further aspects while actually working with D-branes. Many advanced applications are covered, with discussions of open problems which could form the basis for other avenues of research.

String Theory - Joseph Polchinski 2007

[Loops, Knots, Gauge Theories](#) - Rodolfo Gambini 2023-01-31

This volume provides a self-contained introduction to applications of loop representations in particle physics and quantum gravity, in order to explore the gauge invariant quantization of Yang-Mills theories and gravity. First published in 1996, this title has been reissued as an Open Access publication on Cambridge Core.

[Geometry, Topology and Physics](#) - Mikio Nakahara 2018-10-03

Differential geometry and topology have become essential tools for many theoretical physicists. In particular, they are indispensable in theoretical studies of condensed matter physics, gravity, and particle physics. *Geometry, Topology and Physics, Second Edition* introduces the ideas and techniques of differential geometry and topology at a level suitable for postgraduate students and researchers in these fields. The second edition of this popular and established text incorporates a number of changes designed to meet the needs of the reader and reflect the development of the subject. The book features a considerably expanded first chapter, reviewing aspects of path integral quantization and gauge theories. Chapter 2 introduces the mathematical concepts of maps, vector spaces, and topology. The following chapters focus on more elaborate concepts in geometry and topology and discuss the application of these concepts to liquid crystals, superfluid helium, general relativity, and bosonic string theory. Later chapters unify geometry and topology, exploring fiber bundles, characteristic classes, and index theorems. New to this second edition is the proof of the index theorem in terms of supersymmetric quantum mechanics. The final two chapters are devoted to the most fascinating applications of geometry and topology in contemporary physics, namely the study of anomalies in gauge field theories and the analysis of Polakov's bosonic string theory from the geometrical point of view. *Geometry, Topology and Physics, Second Edition* is an ideal introduction to differential geometry and topology for postgraduate students and researchers in theoretical and mathematical physics.

Introduction to Classical Integrable Systems - Olivier Babelon 2003-04-17

This book provides a thorough introduction to the theory of classical integrable systems, discussing the various approaches to the subject and explaining their interrelations. The book begins by introducing the central ideas of the theory of integrable systems, based on Lax representations, loop groups and Riemann surfaces. These ideas are then illustrated with detailed studies of model systems. The connection between isomonodromic deformation and integrability is discussed, and integrable field theories are covered in detail. The KP, KdV and Toda hierarchies are explained using the notion of Grassmannian, vertex operators and pseudo-differential operators. A chapter is devoted to the inverse scattering method and three complementary chapters cover the necessary mathematical tools from symplectic geometry, Riemann surfaces and Lie algebras. The book contains many worked examples and is suitable for use as a textbook on graduate courses. It also provides a comprehensive reference for researchers already working in the field.

Rotating Relativistic Stars - John L. Friedman 2013-02-11

The masses of neutron stars are limited by an instability to gravitational collapse and an instability driven by gravitational waves limits their spin. Their oscillations are relevant to x-ray observations of accreting binaries and to gravitational wave observations of neutron stars formed during the coalescence of double neutron-star systems. This volume includes more than forty years of research to provide graduate students and researchers in astrophysics, gravitational physics and astronomy with the first self-contained treatment of the structure, stability and oscillations of rotating neutron stars. This monograph treats the equations of stellar equilibrium; key approximations, including slow rotation and perturbations of spherical and rotating stars; stability theory and its applications, from convective stability to the r-mode instability; and numerical methods for computing equilibrium configurations and the nonlinear evolution of their oscillations. The presentation of fundamental equations, results and applications is accessible to readers who do not need the detailed derivations.

Gravitational Solitons - V. Belinski 2001-07-19

This 2001 book gives a self-contained exposition of the theory of gravitational solitons and provides a comprehensive review of exact soliton solutions to Einstein's equations. The text begins with a detailed discussion of the extension of the Inverse Scattering Method to the theory of gravitation, starting with pure gravity and then extending it to the coupling of gravity with the electromagnetic field. There follows a systematic review of the gravitational soliton solutions based on their symmetries. These solutions include some of the most interesting in gravitational physics such as those describing inhomogeneous cosmological models, cylindrical waves, the collision of exact gravity

waves, and the Schwarzschild and Kerr black holes. A valuable reference for researchers and graduate students in the fields of general relativity, string theory and cosmology, this book will also be of interest to mathematical physicists in general.

Path Integrals and Anomalies in Curved Space - Fiorenzo Bastianelli 2006-07-20

Path integrals provide a powerful method for describing quantum phenomena. This book introduces the quantum mechanics of particles that move in curved space by employing path integrals and then using them to compute anomalies in quantum field theories. The authors start by deriving path integrals for particles moving in curved space and their supersymmetric generalizations. They then discuss the regularization schemes essential to constructing and computing these path integrals. This topic is used to introduce regularization and renormalization in quantum field theories in a wider context. These methods are then applied to discuss and calculate anomalies in quantum field theory. Such anomalies provide enormous constraints in the search for physical theories of elementary particles, quantum gravity and string theories. An advanced text for researchers and graduate students of quantum field theory and string theory, the first part is also a stand-alone introduction to path integrals in quantum mechanics.

Methods of Contemporary Gauge Theory - Yuri Makeenko 2002-08-15

This 2002 book introduces the quantum theory of gauge fields. Emphasis is placed on four non-perturbative methods: path integrals, lattice gauge theories, the $1/N$ expansion, and reduced matrix models, all of which have important contemporary applications. Written as a textbook, it assumes a knowledge of quantum mechanics and elements of perturbation theory, while many relevant concepts are pedagogically introduced at a basic level in the first half of the book. The second half comprehensively covers large- N Yang-Mills theory. The book uses an approach to gauge theories based on path-dependent phase factors known as the Wilson loops, and contains problems with detailed solutions to aid understanding. Suitable for advanced graduate courses in quantum field theory, the book will also be of interest to researchers in high energy theory and condensed matter physics as a survey of recent developments in gauge theory.

Gravitational N-Body Simulations - Sverre J. Aarseth 2003-10-23

This book discusses in detail all the relevant numerical methods for the classical N -body problem. It demonstrates how to develop clear and elegant algorithms for models of gravitational systems, and explains the fundamental mathematical tools needed to describe the dynamics of a large number of mutually attractive particles. Particular attention is given to the techniques needed to model astrophysical phenomena such as close encounters and the dynamics of black hole binaries. The author reviews relevant work in the field and covers applications to the problems of planetary formation and star cluster dynamics, both of Pleiades type and globular clusters. Self-contained and pedagogical, this book is suitable for graduate students and researchers in theoretical physics, astronomy and cosmology.

String Field Theory - Harold Erbin 2021-03-26

This textbook provides an introduction to string field theory (SFT). String theory is usually formulated in the worldsheet formalism, which describes a single string (first-quantization). While this approach is intuitive and could be pushed far due to the exceptional properties of two-dimensional theories, it becomes cumbersome for some questions or even fails at a more fundamental level. These motivations have led to the development of SFT, a description of string theory using the field theory formalism (second-quantization). As a field theory, SFT provides a rigorous and constructive formulation of string theory. The main focus of the book is the construction of the closed bosonic SFT. The accent is put on providing the reader with the foundations, conceptual understanding and intuition of what SFT is. After reading this book, the reader is able to study the applications from the literature. The book is organized in two parts. The first part reviews the notions of the worldsheet theory that are necessary to build SFT (worldsheet path integral, CFT and BRST quantization). The second part starts by introducing general concepts of SFT from the BRST quantization. Then, it introduces off-shell string amplitudes before providing a Feynman diagrams interpretation from which the building blocks of SFT are extracted. After constructing the closed SFT, the author outlines the proofs of several important properties such as background independence, unitarity and crossing symmetry. Finally, the generalization to the superstring is also discussed.

Topological Solitons - Nicholas Manton 2004-06-10

Topological solitons occur in many nonlinear classical field theories. They are stable, particle-like objects, with finite mass and a smooth structure. Examples are monopoles and Skyrmons, Ginzburg-Landau vortices and

sigma-model lumps, and Yang-Mills instantons. This book is a comprehensive survey of static topological solitons and their dynamical interactions. Particular emphasis is placed on the solitons which satisfy first-order Bogomolny equations. For these, the soliton dynamics can be investigated by finding the geodesics on the moduli space of static multi-soliton solutions. Remarkable scattering processes can be understood this way. The book starts with an introduction to classical field theory, and a survey of several mathematical techniques useful for understanding many types of topological soliton. Subsequent chapters explore key examples of solitons in one, two, three and four dimensions. The final chapter discusses the unstable sphaleron solutions which exist in several field theories.

Quantum Gravity - Carlo Rovelli 2007-11-29

Quantum gravity is perhaps the most important open problem in fundamental physics. It is the problem of merging quantum mechanics and general relativity, the two great conceptual revolutions in the physics of the twentieth century. The loop and spinfoam approach, presented in this 2004 book, is one of the leading research programs in the field. The first part of the book discusses the reformulation of the basis of classical and quantum Hamiltonian physics required by general relativity. The second part covers the basic technical research directions. Appendices include a detailed history of the subject of quantum gravity, hard-to-find mathematical material, and a discussion of some philosophical issues raised by the subject. This fascinating text is ideal for graduate students entering the field, as well as researchers already working in quantum gravity. It will also appeal to philosophers and other scholars interested in the nature of space and time.

String Theory and M-Theory - Katrin Becker 2006-12-07

String theory is one of the most exciting and challenging areas of modern theoretical physics. This book guides the reader from the basics of string theory to recent developments. It introduces the basics of perturbative string theory, world-sheet supersymmetry, space-time supersymmetry, conformal field theory and the heterotic string, before describing modern developments, including D-branes, string dualities and M-theory. It then covers string geometry and flux compactifications, applications to cosmology and particle physics, black holes in string theory and M-theory, and the microscopic origin of black-hole entropy. It concludes with Matrix theory, the AdS/CFT duality and its generalizations. This book is ideal for graduate students and researchers in modern string theory, and will make an excellent textbook for a one-year course on string theory. It contains over 120 exercises with solutions, and over 200 homework problems with solutions available on a password protected website for lecturers at www.cambridge.org/9780521860697.

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.

Classical Solutions in Quantum Field Theory - Erick J. Weinberg 2012-08-16

An overview of classical solutions and their consequences in quantum field theory, high energy physics and cosmology for graduates and researchers.

Gauge/Gravity Duality - Martin Ammon 2015-04-09

The first textbook on this important topic, for graduate students and researchers in particle and condensed matter physics.

Gravitational N-Body Simulations - Sverre J. Aarseth 2003-10-23

This book discusses in detail all the relevant numerical methods for the classical N -body problem. It demonstrates how to develop clear and elegant algorithms for models of gravitational systems, and explains the fundamental mathematical tools needed to describe the dynamics of a large number of mutually attractive particles. Particular attention is given to the techniques needed to model astrophysical phenomena such as close encounters and the dynamics of black hole binaries. The author reviews relevant work in the field and covers applications to the problems of planetary formation and star cluster dynamics, both of Pleiades type and globular clusters. Self-contained and pedagogical, this book is suitable for graduate students and researchers in theoretical physics, astronomy and cosmology.

Inflation and String Theory - Daniel Baumann 2015-04-23

The past two decades have seen transformative advances in cosmology and string theory. Observations of the cosmic microwave background have revealed strong evidence for inflationary expansion in the very early universe, while new insights about compactifications of string theory have led to a deeper understanding of inflation in a framework that unifies quantum mechanics and general relativity. Written by two of the leading researchers in the field, this complete and accessible volume provides a

modern treatment of inflationary cosmology and its connections to string theory and elementary particle theory. After an up-to-date experimental summary, the authors present the foundations of effective field theory, string theory, and string compactifications, setting the stage for a detailed examination of models of inflation in string theory. Three appendices contain background material in geometry and cosmological perturbation theory, making this a self-contained resource for graduate students and researchers in string theory, cosmology, and related fields.

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

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 $E_8 \times E_8$ 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 ISBN10:9061868947 Imprint:Leuven University Press Language: English NUR * 925 Theoretische natuurkunde * Number of pages: v-316 * Width: 16 cm * Height: 24 cm * Elias Kiritsis, Author (all publications from this author/editor with Leuven University Press)

Nonequilibrium Quantum Field Theory - Esteban A. Calzetta 2023-01-31 This 2008 book, reissued as OA, captures the essence of nonequilibrium quantum field theory, graduate students and researchers.

Superstring theory. Vol. 2, Loop amplitudes, anomalies and phenomenology - Michael B. Green 1987

Scattering Amplitudes in Gauge Theory and Gravity - Henriette Elvang 2015-02-05

This book provides a comprehensive, pedagogical introduction to scattering amplitudes in gauge theory and gravity for graduate students.

An Introduction to String Theory and D-brane Dynamics - Richard J. Szabo 2011

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.

Quantum Groups in Two-Dimensional Physics - Cisar Gómez 1996-04-18

A 1996 introduction to integrability and conformal field theory in two dimensions using quantum groups.

Superstring Theory: Volume 2, Loop Amplitudes, Anomalies and Phenomenology - Michael B. Green 2012-07-26

Twenty-five years ago, Michael Green, John Schwarz, and Edward Witten wrote two volumes on string theory. Published during a period of rapid progress in this subject, these volumes were highly influential for a generation of students and researchers. Despite the immense progress that has been made in the field since then, the systematic exposition of the foundations of superstring theory presented in these volumes is just as relevant today as when first published. Volume 2 is concerned with the evaluation of one-loop amplitudes, the study of anomalies and phenomenology. It examines the low energy effective field theory analysis of anomalies, the emergence of the gauge groups $E_8 \times E_8$ and $SO(32)$ and the four-dimensional physics that arises by compactification of six extra dimensions. Featuring a new Preface setting the work in context in light of recent advances, this book is invaluable for graduate students and researchers in high energy physics and astrophysics, as well as mathematicians.