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KEY=II - LUCIANA AUBREY

Lectures On Computation

Perseus Books Covering the theory of computation, information and communications, the physical aspects of computation, and the physical limits of computers, this text is based on the notes taken by one of its editors, Tony Hey, on a lecture course on computation given b

Introduction to Elementary Particle Physics

Cambridge University Press The second edition of this successful textbook is fully updated to include the discovery of the Higgs boson and other recent developments, providing undergraduate students with complete coverage of the basic elements of the standard model of particle physics for the first time. Physics is emphasised over mathematical rigour, making the material accessible to students with no previous knowledge of elementary particles. Important experiments and the theory linked to them are highlighted, helping students appreciate how key ideas were developed. The chapter on neutrino physics has been completely revised, and the final chapter summarises the limits of the standard model and introduces students to what lies beyond. Over 250 problems, including sixty that are new to this edition, encourage students to apply the theory themselves. Partial solutions to selected problems appear in the book, with full solutions and slides of all figures available at www.cambridge.org/9781107050402.

College Physics

Breton Publishing Company

A First Introduction to Quantum Physics

Springer In this undergraduate textbook, the author develops the quantum theory from first principles based on very simple experiments: a photon travelling through beam splitters to detectors, an electron moving through a Stern-Gerlach machine, and an atom emitting radiation. From the physical description of these experiments follows a natural mathematical description in terms of matrices and complex numbers. The first part of the book examines how experimental facts force us to let go of some deeply held preconceptions and develops this idea into a mathematical description of states, probabilities, observables, and time evolution using physical applications. The second part of the book explores more advanced topics, including the concept of entanglement, the process of decoherence, and extension of the quantum theory to the situation of a particle in a one-dimensional box. Here, the text makes contact with more traditional treatments of quantum mechanics. The remaining chapters delve deeply into the idea of uncertainty relations and explore what the quantum theory says about the nature of reality. The book is an ideal and accessible introduction to quantum physics, with modern examples and helpful end-of-chapter exercises.

Handbook of Photosynthesis

CRC Press Since the publication of the previous editions of the Handbook of Photosynthesis, many new ideas on photosynthesis have emerged in the past decade that have drawn the attention of experts and researchers on the subject as well as interest from individuals in other disciplines. Updated to include 37 original chapters and making extensive revisions to the chapters that have been retained, 90% of the material in this edition is entirely new. With contributions from over 100 authors from around the globe, this book covers the most recent important research findings. It details all photosynthetic factors and processes under normal and stressful conditions, explores the relationship between photosynthesis and other plant physiological processes, and relates photosynthesis to plant production and crop yields. The third edition also presents an extensive new section on the molecular aspects of photosynthesis, focusing on photosystems, photosynthetic enzymes, and genes. New chapters on photosynthesis in lower and monocellular plants as well as in higher plants are included in this section. The book also addresses growing concerns about excessive levels and high accumulation rates of carbon dioxide due to industrialization. It considers plant species with the most efficient photosynthetic pathways that can help improve the balance of oxygen and carbon dioxide in the atmosphere. Completely overhauled from its bestselling predecessors, the Handbook of Photosynthesis, Third Edition provides a nearly entirely new source on the subject that is both comprehensive and timely. It continues to fill the need for an authoritative and exhaustive resource by assembling a global team of experts to provide thorough coverage of the subject while focusing on finding solutions to relevant contemporary issues related to the field.

Introduction to Particle and Astroparticle Physics

Multimessenger Astronomy and its Particle Physics Foundations

Springer This book introduces particle physics, astrophysics and cosmology. Starting from an experimental perspective, it provides a unified view of these fields that reflects the very rapid advances being made. This new edition has a number of improvements and has been updated to describe the recent discovery of gravitational waves and astrophysical neutrinos, which started the new era of multimessenger astrophysics; it also includes new results on the Higgs particle. Astroparticle and particle physics share a common problem: we still don't have a description of the main ingredients of the Universe from the point of view of its energy budget. Addressing these fascinating issues, and offering a balanced introduction to particle and astroparticle physics that requires only a basic understanding of quantum and classical physics, this book is a valuable resource, particularly for advanced undergraduate students and for those embarking on graduate courses. It includes exercises that offer readers practical insights. It can be used equally well as a self-study book, a reference and a textbook.

Introduction to Nuclear Reactor Physics

CRC Press INTRODUCTION TO NUCLEAR REACTOR PHYSICS is the most comprehensive, modern and readable textbook for this course/module. It explains reactors, fuel cycles, radioisotopes, radioactive materials, design, and operation. Chain reaction and fission reactor concepts are presented, plus advanced coverage including neutron diffusion theory. The diffusion equation, Fisk's Law, and steady state/time-dependent reactor behavior. Numerical and analytical solutions are also covered. The text has full color illustrations throughout, and a wide range of student learning features.

Introduction to Optical and Optoelectronic Properties of Nanostructures

Cambridge University Press A rigorous guide providing a unified, multidisciplinary treatment of the fundamentals of optical and optoelectronic nanostructures.

Introduction to the Physics of Massive and Mixed Neutrinos

Springer Science & Business Media For many years neutrino was considered a massless particle. The theory of a two-componentneutrino,whichplayedacrucialroleinthecreationofthetheoryof theweakinteraction,isbasedontheassumptionthattheneutrinomassisequalto zero. We now know that neutrinos have nonzero, small masses. In numerous exp- iments with solar, atmospheric, reactor and accelerator neutrinos a new p- nomenon, neutrino oscillations, was observed. Neutrino oscillations (periodic transitionsbetweendifferent?avorneutrinos? ,? ,?)arepossibleonlyifneutrino e ? ? mass-squareddifferencesaredifferentfromzeroandsmalland?avorneutrinosare "mixed". The discovery of neutrino oscillations opened a new era in neutrino physics: an era of investigation of neutrino masses, mixing, magnetic moments and other neutrino properties. After the establishment of the Standard Model of the el- troweak interaction at the end of the seventies, the discovery of neutrino masses was the most important discovery in particle physics. Small neutrino masses cannot be explained by the standard Higgs mechanism of mass generation. For their explanation a new mechanism is needed. Thus, small neutrino masses is the ?rst signature in particle physics of a new beyond the Standard Model physics. It took many years of heroic efforts by many physicists to discover n- trino oscillations. After the ?rst period of investigation of neutrino oscillations, manychallengingproblemsremainedunsolved.Oneofthemostimportantisthe problem of the nature of neutrinos with de?nite masses. Are they Dirac n- trinos possessing a conserved lepton number which distinguish neutrinos and antineutrinos or Majorana neutrinos with identical neutrinos and antineutrinos? Many experiments of the next generation and new neutrino facilities are now under preparation and investigation. There is no doubt that exciting results are ahead.

A Short Course on Topological Insulators

Band Structure and Edge States in One and Two Dimensions

Springer This course-based primer provides newcomers to the field with a concise introduction to some of the core topics in the emerging field of topological insulators. The aim is to provide a basic understanding of edge states, bulk topological invariants, and of the bulk--boundary correspondence with as simple mathematical tools as possible. The present approach uses noninteracting lattice

models of topological insulators, building gradually on these to arrive from the simplest one-dimensional case (the Su-Schrieffer-Heeger model for polyacetylene) to two-dimensional time-reversal invariant topological insulators (the Bernevig-Hughes-Zhang model for HgTe). In each case the discussion of simple toy models is followed by the formulation of the general arguments regarding topological insulators. The only prerequisite for the reader is a working knowledge in quantum mechanics, the relevant solid state physics background is provided as part of this self-contained text, which is complemented by end-of-chapter problems.

Introduction to the Physics of Silicene and other 2D Materials

Springer This concise book offers an essential introduction and reference guide for the many newcomers to the field of physics of elemental 2D materials. Silicene and related materials are currently among the most actively studied materials, especially following the first experimental synthesis on substrates in 2012. Accordingly, this primer introduces and reviews the most crucial developments regarding silicene from both theoretical and experimental perspectives. At the same time the reader is guided through the extensive body of relevant foundational literature. The text starts with a brief history of silicene, followed by a comparison of the bonding nature in silicon versus carbon atoms. Here, a simple but robust framework is established to help the reader follow the concepts presented throughout the book. The book then presents the atomic and electronic structure of free-standing silicene, followed by an account of the experimental realization of silicene on substrates. This topic is subsequently developed further to discuss various reconstructions that silicene acquires due to interactions with the substrate and how such effects are mirrored in the electronic properties. Next the book examines the dumbbell structure that is the key to understanding the growth mechanism and atomic structure of multilayer silicene. Last but not least, it addresses similar effects in other elemental 2D materials from group IV (germanene, stanane), group V (phosphorene) and group III (borophene), as well as transition metal dichalcogenides and other compositions, so as to provide a general comparative overview of their electronic properties.

Physics

Introduction to Electromagnetic Theory

KHANNA PUBLISHING HOUSE Physics: Introduction to Electromagnetic Theory has been written for the first-year students of B. Tech Engineering Degree Courses of all Indian Universities following the guideline and syllabus as recommended by AICTE. The book, written in a very simple and lucid way, will be very much helpful to reinforce understanding of different aspects to meet the engineering student's needs. Writing a text-cum manual of this category poses several challenges providing enough content without sacrificing the essentials, highlighting the key features, presenting in a novel format and building informative assessment. This book on engineering physics will prepare students to apply the knowledge of Electromagnetic Theory to tackle 21st century and onward engineering challenges and address the related questions. Some salient features of the book: · Expose basic science to the engineering students to the fundamentals of physics and to enable them to get an insight of the subject · To develop knowledge on critical questions solved and supplementary problems covering all types of medium and advanced level problems in a very logical and systematic manner · Some essential information for the users under the heading "Know more" for clarifying some basic information as well as comprehensive synopsis of formulae for a quick revision of the basic principles · Constructive manner of presentation so that an Engineering degree students can prepare to work in different sectors or in national laboratories at the very forefront of technology

Introduction to Nonlinear Dynamics for Physicists

World Scientific This series of lectures aims to address three main questions that anyone interested in the study of nonlinear dynamics should ask and ponder over. What is nonlinear dynamics and how does it differ from linear dynamics which permeates all familiar textbooks? Why should the physicist study nonlinear systems and leave the comfortable territory of linearity? How can one progress in the study of nonlinear systems both in the analysis of these systems and in learning about new systems from observing their experimental behavior? While it is impossible to answer these questions in the finest detail, this series of lectures nonetheless successfully points the way for the interested reader. Other useful problems have also been incorporated as a study guide. By presenting both substantial qualitative information about phenomena in nonlinear systems and at the same time sufficient quantitative material, the author hopes that readers would learn how to progress on their own in the study of such similar material hereon. Contents:IntroductionNonlinear Oscillator without DissipationEquilibrium States of a Nonlinear Oscillator with DissipationOscillations in Systems with Nonlinear Dissipation-GeneratorsThe Van der Pol GeneratorThe Poincaré MapSlow and Fast Motions in Systems with One Degree of FreedomForced Nonlinear Oscillators: Linear and Nonlinear ResonancesForced Generator: SynchronizationCompetition of ModesPoincaré Indices and Bifurcations of Equilibrium StatesResonance Interactions between OscillatorsSolitonsSteady Propagation of Shock WavesFormation of Shock WavesSolitons. Shock Waves. Wave Interaction. The Spectral ApproachWeak Turbulence. Random Phase ApproximationRegular Patterns in Dissipative MediaDeterministic Chaos. Qualitative DescriptionDescription of a Circuit with Chaos. Chaos in MapsBifurcations of Periodic Motions. Period DoublingControlled Nonlinear Oscillator. IntermittencyScenarios of the Onset of Chaos. Chaos through Quasi-PeriodicityCharacteristics of Chaos. Experimental Observation of ChaosMultidimensional Chaos. Discrete Ginzburg-Landau ModelProblems to Accompany the Lectures Readership: Physicists. keywords: "These lecture notes briefly introduce the reader to new ideas, so would be a useful addition to a library or a source of ideas for lectures or projects; a good student may also find this text useful as a quick introduction to many new ideas." Contemporary Physics "Introduction to Nonlinear Dynamics for Physicists … is a compact and fairly terse high-level set of 24 lectures." New Scientist

An Introduction to High-Pressure Science and Technology

CRC Press An Introduction to High-Pressure Science and Technology provides you with an understanding of the connections between the different areas involved in the multidisciplinary science of high pressure. The book reflects the deep interdisciplinary nature of the field and its close relationship with industrial applications.Thirty-nine specialists in high

Advanced Concepts in Particle and Field Theory

Cambridge University Press Uniting the usually distinct areas of particle physics and quantum field theory, gravity and general relativity, this expansive and comprehensive textbook of fundamental and theoretical physics describes the quest to consolidate the basic building blocks of nature, by journeying through contemporary discoveries in the field, and analysing elementary particles and their interactions. Designed for advanced undergraduates and graduate students and abounding in worked examples and detailed derivations, as well as including historical anecdotes and philosophical and methodological perspectives, this textbook provides students with a unified understanding of all matter at the fundamental level. Topics range from gauge principles, particle decay and scattering cross-sections, the Higgs mechanism and mass generation, to spacetime geometries and supersymmetry. By combining historically separate areas of study and presenting them in a logically consistent manner, students will appreciate the underlying similarities and conceptual connections to be made in these fields.

Transport Phenomena in Micro- and Nanoscale Functional Materials and Devices

William Andrew Transport Phenomena in Micro- and Nanoscale Functional Materials and Devices offers a pragmatic view on transport phenomena for micro- and nanoscale materials and devices, both as a research tool and as a means to implant new functions in materials. Chapters emphasize transport properties (TP) as a research tool at the micro/nano level and give an experimental view on underlying techniques. The relevance of TP is highlighted through the interplay between a micro/nanocarrier's characteristics and media characteristics: long/short-range order and disorder excitations, couplings, and in energy conversions. Later sections contain case studies on the role of transport properties in functional nanomaterials. This includes transport in thin films and nanostructures, from nanogranular films, to graphene and 2D semiconductors and spintronics, and from read heads, MRAMs and sensors, to nano-oscillators and energy conversion, from figures of merit, micro-coolers and micro-heaters, to spincaloritronics. Presents a pragmatic description of electrical transport phenomena in micro- and nanoscale materials and devices from an experimental viewpoint Provides an in-depth overview of the experimental techniques available to measure transport phenomena in micro- and nanoscale materials Features case studies to illustrate how each technique works Highlights emerging areas of interest in micro- and nanomaterial transport phenomena, including spintronics

Real Spinorial Groups

A Short Mathematical Introduction

Springer This book explores the Lipschitz spinorial groups (versor, pinor, spinor and rotor groups) of a real non-degenerate orthogonal geometry (or orthogonal geometry, for short) and how they relate to the group of isometries of that geometry. After a concise mathematical introduction, it offers an axiomatic presentation of the geometric algebra of an orthogonal geometry. Once it has established the language of geometric algebra (linear grading of the algebra; geometric, exterior and interior products; involutions), it defines the spinorial groups, demonstrates their relation to the isometry groups, and illustrates their suppleness (geometric covariance) with a variety of examples. Lastly, the book provides pointers to major applications, an extensive bibliography and an alphabetic index. Combining the characteristics of a self-contained research monograph and a state-of-the-art survey, this book is a valuable foundation reference resource on applications for both undergraduate and graduate students.

Fundamentals of Physics, Volume 2

Wiley Global Education Renowned for its interactive focus on conceptual understanding, its superlative problem-solving instruction, and emphasis on reasoning skills, the Fundamentals of Physics: Volume 2, 12th Edition, is an industry-leading resource in physics teaching. With expansive, insightful, and accessible treatments of a wide variety of subjects, including photons, matter waves, diffraction, and relativity, the book is an invaluable reference for physics educators and students. In the second volume of this two-volume set, the authors discuss subjects including Coulomb???s Law, Gauss??? Law, and Maxwell???s Equations.

The Feynman Lectures on Physics

Quantum Mechanics

A Most Incomprehensible Thing

Notes Towards a Very Gentle Introduction to the Mathematics of Relativity

Incomprehensible Books A straightforward, enjoyable guide to the mathematics of Einstein's relativity To really understand Einstein's theory of relativity – one of the cornerstones of modern physics – you have to get to grips with the underlying mathematics. This self-study guide is aimed at the general reader who is motivated to tackle that not insignificant challenge. With a user-friendly style, clear step-by-step mathematical derivations, many fully solved problems and numerous diagrams, this book provides a comprehensive introduction to a fascinating but complex subject. For those with minimal mathematical background, the first chapter gives a crash course in foundation mathematics. The reader is then taken gently by the hand and guided through a wide range of fundamental topics, including Newtonian mechanics; the Lorentz transformations; tensor calculus; the Einstein field equations; the Schwarzschild solution (which gives a good approximation of the spacetime of our Solar System); simple black holes, relativistic cosmology and gravitational waves. Special relativity helps explain a huge range of non-gravitational physical phenomena and has some strangely counter-intuitive consequences. These include time dilation, length contraction, the relativity of simultaneity, mass-energy equivalence and an absolute speed limit. General relativity, the leading theory of gravity, is at the heart of our understanding of cosmology and black holes. "I must observe that the theory of relativity resembles a building consisting of two separate stories, the special theory and the general theory. The special theory, on which the general theory rests, applies to all physical phenomena with the exception of gravitation; the general theory provides the law of gravitation and its relations to the other forces of nature." – Albert Einstein, 1919 Understand even the basics of Einstein's amazing theory and the world will never seem the same again. Contents: Preface Introduction 1 Foundation mathematics 2 Newtonian mechanics 3 Special relativity 4 Introducing the manifold 5 Scalars, vectors, one-forms and tensors 6 More on curvature 7 General relativity 8 The Newtonian limit 9 The Schwarzschild metric 10 Schwarzschild black holes 11 Cosmology 12 Gravitational waves Appendix: The Riemann curvature tensor Bibliography Acknowledgements January 2019. This third edition has been revised to make the material even more accessible to the enthusiastic general reader who seeks to understand the mathematics of relativity.

Introduction to Soft-Collinear Effective Theory

Springer Among resummation techniques for perturbative QCD in the context of collider and flavor physics, soft-collinear effective theory (SCET) has emerged as both a powerful and versatile tool, having been applied to a large variety of processes, from B-meson decays to jet production at the LHC. This book provides a concise, pedagogical introduction to this technique. It discusses the expansion of Feynman diagrams around the high-energy limit, followed by the explicit construction of the effective Lagrangian - first for a scalar theory, then for QCD. The underlying concepts are illustrated with the quark vector form factor at large momentum transfer, and the formalism is applied to compute soft-gluon resummation and to perform transverse-momentum resummation for the Drell-Yan process utilizing renormalization group evolution in SCET. Finally, the infrared structure of n-point gauge-theory amplitudes is analyzed by relating them to effective-theory operators. This text is suitable for graduate students and non-specialist researchers alike as it requires only basic knowledge of perturbative QCD.

Philosophy of Science

Between the Natural Sciences, the Social Sciences, and the Humanities

Springer This broad and insightful book presents current scholarship in important subfields of philosophy of science and addresses an interdisciplinary and multidisciplinary readership. It groups carefully selected contributions into the four fields of I) philosophy of physics, II) philosophy of life sciences, III) philosophy of social sciences and values in science, and IV) philosophy of mathematics and formal modeling. Readers will discover research papers by Paul Hoyningen-Huene, Keizo Matsubara, Kian Salimkhani, Andrea Reichenberger, Anne Sophie Meincke, Javier Suárez, Roger Deulofeu, Ludger Jansen, Peter Hucklenbroich, Martin Carrier, Elizaveta Kostrova, Lara Huber, Jens Harbecke, Antonio Piccolomini d'Aragona and Axel Gelfert. This collection fosters dialogue between philosophers of science working in different subfields, and brings readers the finest and latest work across the breadth of the field, illustrating that contemporary philosophy of science has successfully broadened its scope of reflection. It will interest and inspire a wide audience of philosophers as well as scholars of the natural sciences, social sciences and the humanities. The volume shares selected contributions from the prestigious second triennial conference of the German Society for Philosophy of Science/ Gesellschaft für Wissenschaftsphilosophie (GWP.2016, March 8, 2016 – March 11, 2016).

Introduction to Quantum Algorithms via Linear Algebra, second edition

MIT Press Quantum computing explained in terms of elementary linear algebra, emphasizing computation and algorithms and requiring no background in physics. This introduction to quantum algorithms is concise but comprehensive, covering many key algorithms. It is mathematically rigorous but requires minimal background and assumes no knowledge of quantum theory or quantum mechanics. The book explains quantum computation in terms of elementary linear algebra; it assumes the reader will have some familiarity with vectors, matrices, and their basic properties, but offers a review of the relevant material from linear algebra. By emphasizing computation and algorithms rather than physics, it makes quantum algorithms accessible to students and researchers in computer science who have not taken courses in quantum physics or delved into fine details of quantum effects, apparatus, circuits, or theory.

An Introduction to Planetary Nebulae

Morgan & Claypool Publishers In this book we will look at what planetary nebulae are, where they come from and where they go. We will discuss what mechanisms cause these beautiful markers of stellar demise as well as what causes them to form their variety of shapes. How we measure various aspects of planetary nebulae such as what they are made of will also be explored. Though we will give some aspects of planetary nebulae mathematical treatment, the main points should be accessible to people with only a limited background in mathematics. A short glossary of some of the more arcane astronomical terms is at the end of the book to help in understanding. Included at the end of each chapter is an extensive bibliography to the peer reviewed research on these objects and I would encourage the reader interested in an even deeper understanding to read these articles.

Image Modeling of the Human Eye

Artech House Written by pioneers in the field, this groundbreaking resource gives you full details on state-of-the-art 2D and 3D eye imaging and modeling techniques that are paving the way to breakthrough clinical applications in eye health. It's the first book to explore in depth a new generation of computational methods that combine image processing, simulation, and statistical discrimination tools in efforts to improve early detection of cataracts, diabetic retinopathy, glaucoma, iridocyclitis, corneal haze, maculopathy, and other visual impairments and conditions. Supported by 250 illustrations, this comprehensive volume presents the essentials of the human eye, eye imaging systems, and imaging optics. You discover latest advances in computer-based detection and identification of various eye conditions, including issues involving automatic retinal image registration, computer-based optic disc localization, and contour detection using ellipse fitting and wavelet transform. The book explains various infra-red and bio-heat analysis methods, including 2D and 3D ocular surface temperature profiles produced by FEM simulation of the eye structure. This unique volume examines corneal surface temperature with contact lens wear, boundary element modeling of heat transfer in the eye, and the role of aqueous humor hydrodynamics in human eye heat transfer. Moreover, you find chapters that explore age factors, temperature measurement during silicone hydrogel lens wear, and IR imaging.

Adapting to a Changing World

Challenges and Opportunities in Undergraduate Physics Education

National Academies Press Adapting to a Changing World was commissioned by the National Science Foundation to examine the present status of undergraduate physics education, including the state of physics education research, and, most importantly, to develop a series of recommendations for improving physics education that draws from the knowledge we have about learning and effective teaching. Our committee has endeavored to do so, with great interest and more than a little passion. The Committee on Undergraduate Physics Education Research and Implementation was established in 2010 by the Board on Physics and Astronomy of the National Research Council. This report summarizes the committee's response to its statement of task, which requires the committee to produce a report that identifies the goals and challenges facing undergraduate physics education and identifies how best practices for undergraduate physics education can be implemented on a widespread and sustained basis, assess the status of physics education research (PER) and discuss how PER can assist in accomplishing the goal of improving undergraduate physics education best practices and education policy.

An Introduction to Two-Dimensional Quantum Field Theory with (0,2) Supersymmetry

Springer This book introduces two-dimensional supersymmetric field theories with emphasis on both linear and non-linear sigma models. Complex differential geometry, in connection with supersymmetry, has played a key role in most developments of the last thirty years in quantum field theory and string theory. Both structures introduce a great deal of rigidity compared to the more general categories of non-supersymmetric theories and real differential geometry, allowing for many general conceptual results and detailed quantitative predictions. Two-dimensional (0,2) supersymmetric quantum field theories provide a natural arena for the fruitful interplay between geometry and quantum field theory. These theories play an important role in string theory and provide generalizations, still to be explored fully, of rich structures such as mirror symmetry. They also have applications to non-perturbative four-dimensional physics, for instance as descriptions of surface defects or low energy dynamics of solitonic strings in four-dimensional supersymmetric theories. The purpose of these lecture notes is to acquaint the reader with these fascinating theories, assuming a background in conformal theory, quantum field theory and differential geometry at the beginning graduate level. In order to investigate the profound relations between structures from complex geometry and field theory the text begins with a thorough examination of the basic structures of (0,2) quantum field theory and conformal field theory. Next, a simple class of Lagrangian theories, the (0,2) Landau-Ginzburg models, are discussed,

together with the resulting renormalization group flows, dynamics, and symmetries. After a thorough introduction and examination of (0,2) non-linear sigma models, the text introduces linear sigma models that, in particular, provide a unified treatment of non-linear sigma models and Landau-Ginzburg theories. Many exercises, along with discussions of relevant mathematical notions and important open problems in the field, are included in the text.

A Mathematical Introduction to Conformal Field Theory

Springer The first part of this book gives a self-contained and mathematically rigorous exposition of classical conformal symmetry in n dimensions and its quantization in two dimensions. The second part surveys some more advanced topics of conformal field theory.

Statistical Approach to Quantum Field Theory

An Introduction

Springer Nature

The Two Cultures

Cambridge University Press The importance of science and technology and future of education and research are just some of the subjects discussed here.

Introduction to General Relativity

Solutions to Problems

World Scientific Publishing Company It is important for every physicist today to have a working knowledge of Einstein's theory of general relativity. Introduction to General Relativity published in 2007 was aimed at first-year graduate students, or advanced undergraduates, in physics. Only a basic understanding of classical lagrangian mechanics is assumed; beyond that, the reader should find the material to be self-contained. The mechanics problem of a point mass constrained to move without friction on a two-dimensional surface of arbitrary shape serves as a paradigm for the development of the mathematics and physics of general relativity. Special relativity is reviewed. The basic principles of general relativity are then presented, and the most important applications are discussed. The final special topics section takes the reader up to a few areas of current research. An extensive set of accessible problems enhances and extends the coverage. As a learning and teaching tool, this current book provides solutions to those problems. This text and solutions manual are meant to provide an introduction to the subject. It is hoped that these books will allow the reader to approach the more advanced texts and monographs, as well as the continual influx of fascinating new experimental results, with a deeper understanding and sense of appreciation.

Particles and Fields

World Scientific The Jorge André Swieca Summer School is a traditional school in Latin America well known for the high level of its courses and lecturers. This book contains lectures on forefront areas of high energy physics, such as collider physics, neutrino phenomenology, noncommutative field theory, string theory and branes. Contents:Noncommutative Field Theories and (Super) String Field Theories (I Ya Aref'eva et al.)Introduction to Superstring Theory (N Berkovits)Selected Topics in Integrable Models (A Das)Monte Carlo Simulation: A Road from Theoretical Models to Experimental Observables (R Z Funchal)Renormalization in Noncommutative Field Theory (M Gomes)What is behind the Tricks of Data Analysis in High Energy Physics (P Gouffon)The Physics of Hadron Colliders (D Green)Lectures on Noncommutative Theories (S Minwalla)Introduction to Perturbative QCD (P Nason)High Energy Cosmic Rays (R C Shellard)Brane Solutions in Supergravity (K S Stelle)Introductory Lectures on D-Branes (I V Vancea)Physics at Hadron Colliders (J Womersley) Readership: Graduate students and researchers in high energy physics. Keywords:

Introduction to Random Matrices

Theory and Practice

Springer Modern developments of Random Matrix Theory as well as pedagogical approaches to the standard core of the discipline are surprisingly hard to find in a well-organized, readable and user-friendly fashion. This slim and agile book, written in a pedagogical and hands-on style, without sacrificing formal rigor fills this gap. It brings Ph.D. students in Physics, as well as more senior practitioners, through the standard tools and results on random matrices, with an eye on most recent developments that are not usually covered in introductory texts. The focus is mainly on random matrices with real spectrum.The main guiding threads throughout the book are the Gaussian Ensembles. In particular, Wigner's semicircle law is derived multiple times to illustrate several techniques (e.g., Coulomb gas approach, replica theory).Most chapters are accompanied by Matlab codes (stored in an online repository) to guide readers through the numerical check of most analytical results.

Hadronic Matter

PediaPress

Yet Another Introduction to Dark Matter

The Particle Physics Approach

Springer Dark matter is a frequently discussed topic in contemporary particle physics. Written strictly in the language of particle physics and quantum field theory, these course-based lecture notes focus on a set of standard calculations that students need in order to understand weakly interacting dark matter candidates. After introducing some general features of these dark matter agents and their main competitors, the Higgs portal scalar and supersymmetric neutralinos are introduced as our default models. In turn, this serves as a basis for exploring four experimental aspects: the dark matter relic density extracted from the cosmic microwave background; indirect detection including the Fermi galactic center excess; direct detection; and collider searches. Alternative approaches, like an effective theory of dark matter and simplified models, naturally follow from the discussions of these four experimental directions.

Free Space Optical Systems Engineering

Design and Analysis

John Wiley & Sons Gets you quickly up to speed with the theoretical and practical aspects of free space optical systems engineering design and analysis One of today's fastest growing system design and analysis disciplines is free space optical systems engineering for communications and remote sensing applications. It is concerned with creating a light signal with certain characteristics, how this signal is affected and changed by the medium it traverses, how these effects can be mitigated both pre- and post-detection, and if after detection, it can be differentiated from noise under a certain standard, e.g., receiver operating characteristic. Free space optical systems engineering is a complex process to design against and analyze. While there are several good introductory texts devoted to key aspects of optics—such as lens design, lasers, detectors, fiber and free space, optical communications, and remote sensing—until now, there were none offering comprehensive coverage of the basics needed for optical systems engineering. If you're an upper-division undergraduate, or first-year graduate student, looking to acquire a practical understanding of electro-optical engineering basics, this book is intended for you. Topics and tools are covered that will prepare you for graduate research and engineering in either an academic or commercial environment. If you are an engineer or scientist considering making the move into the opportunity rich field of optics, this all-in-one guide brings you up to speed with everything you need to know to hit the ground running, leveraging your experience and expertise acquired previously in alternate fields. Following an overview of the mathematical fundamentals, this book provides a concise, yet thorough coverage of, among other crucial topics: Maxwell Equations, Geometrical Optics, Fourier Optics, Partial Coherence theory Linear algebra, Basic probability theory, Statistics, Detection and Estimation theory, Replacement Model detection theory, LADAR/LIDAR detection theory, optical communications theory Critical aspects of atmospheric propagation in real environments, including commonly used models for characterizing beam, and spherical and plane wave propagation through free space, turbulent and particulate channels Lasers, blackbodies/graybodies sources and photodetectors (e.g., PIN, ADP, PMT) and their inherent internal noise sources The book provides clear, detailed discussions of the basics for free space optical systems design and analysis, along with a wealth of worked examples and practice problems—found throughout the book and on a companion website. Their intent is to help you test and hone your skill set and assess your comprehension of this important area. Free Space Optical Systems Engineering is an indispensable introduction for students and professionals alike.

Introduction to Conformal Field Theory

With Applications to String Theory

Springer Based on class-tested notes, this text offers an introduction to Conformal Field Theory with a special emphasis on computational techniques of relevance for String Theory. It introduces Conformal Field Theory at a basic level, Kac-Moody algebras, one-loop partition functions, Superconformal Field Theories, Gepner Models and Boundary Conformal Field Theory. Eventually, the concept of orientifold constructions is explained in detail for the example of the bosonic string. In providing many detailed CFT calculations, this book is ideal for students and scientists intending to become acquainted with CFT techniques relevant for string theory but also for students and non-specialists from related fields.

Quantum Chromodynamics on the Lattice

An Introductory Presentation

Springer This introduction to quantum chromodynamics presents the basic concepts and calculations in a clear and didactic style accessible to those new to the field. Readers will find useful methods for obtaining numerical results, including pure gauge theory and quenched spectroscopy.

Introduction to General Relativity

World Scientific A working knowledge of Einstein's theory of general relativity is an essential tool for every physicist today. This self-contained book is an introductory text on the subject aimed at first-year graduate students, or advanced undergraduates, in physics that assumes only a basic understanding of classical Lagrangian mechanics. The mechanics problem of a point mass constrained to move without friction on a two-dimensional surface of arbitrary shape serves as a paradigm for the development of the mathematics and physics of general relativity. After reviewing special relativity, the basic principles of general relativity are presented, and the most important applications are discussed. The final special topics section guides the reader through a few important areas of current research.This book will allow the reader to approach the more advanced texts and monographs, as well as the continual influx of fascinating new experimental results, with a deeper understanding and sense of appreciation.

Probability in Physics

An Introductory Guide

Springer Nature This textbook presents an introduction to the use of probability in physics, treating introductory ideas of both statistical physics and of statistical inference, as well the importance of probability in information theory, quantum mechanics, and stochastic processes, in a unified manner. The book also presents a harmonised view of frequentist and Bayesian approaches to inference, emphasising their complementary value. The aim is to steer a middle course between the "cookbook" style and an overly dry mathematical statistics style. The treatment is driven by real physics examples throughout, but developed with a level of mathematical clarity and rigour appropriate to mid-career physics undergraduates. Exercises and solutions are included.