Chapter 2 Feynman Path Integral Formulation Springer

Thank you utterly much for downloading **Chapter 2 Feynman Path Integral Formulation Springer** .Maybe you have knowledge that, people have see numerous times for their favorite books in the same way as this Chapter 2 Feynman Path Integral Formulation Springer , but stop up in harmful downloads.

Rather than enjoying a fine book subsequent to a mug of coffee in the afternoon, then again they juggled considering some harmful virus inside their computer. **Chapter 2 Feynman Path Integral Formulation Springer** is nearby in our digital library an online admission to it is set as public as a result you can download it instantly. Our digital library saves in compound countries, allowing you to acquire the most less latency epoch to download any of our books afterward this one. Merely said, the Chapter 2 Feynman Path Integral Formulation Springer is universally compatible similar to any devices to read.

Statistical Approach to Quantum Field Theory - Andreas Wipf 2012-10-28
Over the past few decades the powerful methods of statistical physics and Euclidean quantum field theory have moved closer together, with common tools based on the use of path integrals. The interpretation of Euclidean field theories as particular systems of statistical physics has opened up new avenues for understanding strongly coupled quantum systems or quantum field theories at zero or finite temperatures. Accordingly, the first chapters of this book contain a self-contained introduction to path integrals in Euclidean quantum mechanics and statistical mechanics. The resulting high-dimensional integrals can be estimated with the help of Monte Carlo simulations based on Markov processes. The most commonly used algorithms are presented in detail so as to prepare the reader for the use of high-performance computers as an “experimental” tool for this burgeoning field of theoretical physics. Several chapters are then devoted to an introduction to simple lattice field theories and a variety of spin systems with discrete and continuous spins, where the ubiquitous Ising model serves as an ideal guide for introducing the fascinating area of phase transitions. As an alternative to the lattice formulation of quantum field theories, variants of the flexible renormalization group methods are discussed in detail. Since, according to our present-day knowledge, all fundamental interactions in nature are described by gauge theories, the remaining chapters of the book deal with gauge theories without and with matter. This text is based on course-tested notes for graduate students and, as such, its style is essentially pedagogical, requiring only some basics of mathematics, statistical physics, and quantum field theory. Yet it also contains some more sophisticated concepts which may be useful to researchers in the field. Each chapter ends with a number of problems – guiding the reader to a deeper understanding of some of the material presented in the main text – and, in most cases, also features some listings of short, useful computer programs.
Path Integrals From Pev To Tev: 50 Years After Feynman's Paper - Proceedings Of The Sixth International Conference - Tognetti Valerio 1999-04-01
This book is the first to cover marketing management issues in geographically remote industrial clusters (GRICs). The phenomena of GRICs have increased in importance, especially in the Nordic countries, due to changes in industry structures as well as political ambitions. The practice of marketing and marketing management is not singular to industry clusters in Nordic countries. Remote areas in parts of the United States, South and Central America, and South East Asia exhibit similar tendencies.The problems faced by many entrepreneurial managers managing start-up or even existing enterprises are complex and require an in-depth understanding not only of the problems themselves, but also of the contextual framework in which these problems need to be solved. This book contains original cases that cover issues like cluster formation, information gathering, marketing strategies and operations, and information-technology. Examples come from industries like textile & furniture, automobile, agro-machinery, food, wine, software, and management consulting.
Quantum Physics - James Glimm 2012-12-06
Describes fifteen years' work which has led to the construc- tion of solutions to non-linear relativistic local field e- quations in 2 and 3 space-time dimensions. Gives proof of the existence theorem in 2 dimensions and describes many properties of the solutions.
Gauge Theories of the Strong, Weak, and Electromagnetic Interactions - Chris Quigg 2013-09-23
A thoroughly revised edition of a landmark textbook on gauge theories and their applications to particle physics This completely revised and updated graduate-level textbook is an ideal introduction to gauge theories and their applications to high-energy particle physics, and takes an in-depth look at two new laws of nature—quantum chromodynamics and the electroweak theory. From quantum electrodynamics through unified theories of the interactions among leptons and quarks, Chris Quigg examines the logic and structure behind gauge theories and the experimental underpinnings of today's theories. Quigg emphasizes how we know what we know, and in the era of the Large Hadron Collider, his insightful survey of the standard model and the next great questions for particle physics makes for compelling reading. The brand-new edition shows how the electroweak theory developed in conversation with experiment. Featuring a wide-ranging treatment of electroweak symmetry breaking, the physics of the Higgs boson, and the importance of the 1-TeV scale, the book moves beyond established knowledge and investigates the path toward unified theories of strong, weak, and electromagnetic interactions. Explicit calculations and diverse exercises allow readers to derive the consequences of these theories. Extensive annotated bibliographies accompany each chapter, amplify points of conceptual or technical interest, introduce further applications, and lead readers to the research literature. Students and seasoned practitioners will profit from the text's current insights, and specialists wishing to understand gauge theories will find the book an ideal reference for self-study. Brand-new edition of a landmark text introducing gauge theories Consistent attention to how we know what we know Explicit calculations develop concepts and engage with experiment Interesting and diverse problems sharpen skills and ideas Extensive annotated bibliographies
Mathematical Reviews - 2000

Mathematical Theory of Feynman Path Integrals - Sergio Albeverio 2008-05-06
The 2nd edition of LNM 523 is based on the two first authors' mathematical approach of this theory presented in its 1st edition in 1976. An entire new chapter on the current forefront of research has been added. Except for this new chapter and the correction of a few misprints, the basic material and presentation of the first edition has been maintained. At the end of each chapter the reader will also find notes with further bibliographical information.
Uncommon Measure - Natalie Hodges 2022-03-22
NATIONAL BOOK AWARD LONGLIST NEW YORK TIMES EDITORS’ CHOICE A virtuosic debut from a gifted violinist searching for a new mode of artistic becoming How does time shape consciousness and consciousness, time? Do we live in time, or does time live in us? And how does music, with its patterns of rhythm and harmony, inform our experience of time? Uncommon Measure explores these questions from the perspective of a young Korean American who dedicated herself to perfecting her art until performance anxiety forced her to give up the dream of becoming a concert solo violinist. Anchoring her story in illuminating research in neuroscience and quantum physics, Hodges traces her own passage through difficult family dynamics, prejudice, and enormous personal expectations to come to terms with the meaning of a life reimagined—one still shaped by classical music but moving toward the freedom of improvisation.
Handbooks in Operations Research and Management Science: Financial Engineering - John R.

Birge 2007-11-16
The remarkable growth of financial markets over the past decades has been accompanied by an equally remarkable explosion in financial engineering, the interdisciplinary field focusing on applications of mathematical and statistical modeling and computational technology to problems in the financial services industry. The goals of financial engineering research are to develop empirically realistic stochastic models describing dynamics of financial risk variables, such as asset prices, foreign exchange rates, and interest rates, and to develop analytical, computational and statistical methods and tools to implement the models and employ them to design and evaluate financial products and processes to manage risk and to meet financial goals. This handbook describes the latest developments in this rapidly evolving field in the areas of modeling and pricing financial derivatives, building models of interest rates and credit risk, pricing and hedging in incomplete markets, risk management, and portfolio optimization. Leading researchers in each of these areas provide their perspective on the state of the art in terms of analysis, computation, and practical relevance. The authors describe essential results to date, fundamental methods and tools, as well as new views of the existing literature, opportunities, and challenges for future research.
Quantum versus Chaos - K. Nakamura 2006-04-11
Quantum and chaos, key concepts in contemporary science, are incompatible by nature. This volume presents an investigation into quantum transport in mesoscopic or nanoscale systems which are classically chaotic and shows the success and failure of quantal, semiclassical, and random matrix theories in dealing with questions emerging from the mesoscopic cosmos. These traditional theories are critically analysed, and this leads to a new direction. To reconcile quantum with chaos and to restore genuine temporal chaos in quantum systems, a time-discrete variant of quantum dynamics is proposed. Audience:This book will be of interest to graduate students and researchers in physics, chemistry and mathematics, whose work involves fundamental questions of quantum mechanics in chaotic systems.
Quantum Mechanics: Fundamentals - Kurt Gottfried 2013-12-01
Quantum mechanics was already an old and solidly established subject when the first edition of this book appeared in 1966. The context in which a graduate text on quantum mechanics is studied today has changed a good deal, however. In 1966, most entering physics graduate students had a quite limited exposure to quan tum mechanics in the form of wave mechanics. Today the standard undergraduate curriculum contains a large dose of elementary quantum mechanics, and often intro duces the abstract formalism due to Dirac. Back then, the study of the foundations by theorists and experimenters was close to dormant, and very few courses spent any time whatever on this topic. At that very time, however, John Bell's famous theorem broke the ice, and there has been a great flowering ever since, especially in the laboratory thanks to the development of quantum optics, and more recently because of the interest in quantum computing. And back then, the Feynman path integral was seen by most as a very imaginative but rather useless formulation of quantum mechanics, whereas it now plays a large role in statistical physics and quantum field theory, especially in computational work. For these and other reasons, this book is not just a revision of the 1966 edition. It has been rewritten throughout, is differently organized, and goes into greater depth on many topics that were in the old edition.
The Schrödinger Equation - F.A. Berezin 2012-12-06
This volume deals with those topics of mathematical physics, associated with the study of the Schrödinger equation, which are considered to be the most important. Chapter 1 presents the basic concepts of quantum mechanics. Chapter 2 provides an introduction to the spectral theory of the one-dimensional Schrödinger equation. Chapter 3 opens with a discussion of the spectral theory of the multi-dimensional Schrödinger equation, which is a far more complex case and requires careful consideration of aspects which are trivial in the one-dimensional case. Chapter 4 presents the scattering theory for the multi-dimensional non-relativistic Schrödinger equation, and the final chapter is devoted to quantization and Feynman path integrals. These five main chapters are followed by three supplements, which present material drawn on in the various chapters. The first two supplements deal with general questions concerning the spectral theory of operators in Hilbert space, and necessary information relating to Sobolev spaces and elliptic equations. Supplement 3, which essentially stands alone, introduces the concept of the supermanifold which leads to a more natural treatment of quantization. Although written primarily for mathematicians who wish to gain a better awareness of the physical aspects of quantum mechanics and related topics, it will also be useful for mathematical physicists who wish to become better acquainted with the mathematical formalism of quantum mechanics. Much of the material included here has been based on lectures given by the authors at Moscow State University, and this volume can also be recommended as a supplementary graduate level introduction to the spectral theory of differential operators with both discrete and continuous spectra. This English edition is a revised, expanded version of the original Soviet publication.
Heat Kernels and Analysis on Manifolds, Graphs, and Metric Spaces - Pascal Auscher 2003
This volume contains the expanded lecture notes of courses taught at the Emile Borel Centre of the Henri Poincare Institute (Paris). In the book, leading experts introduce recent research in their fields. The unifying theme is the study of heat kernels in various situations using related geometric and analytic tools. Topics include analysis of complex-coefficient elliptic operators, diffusions on fractals and on infinite-dimensional groups, heat kernel and isoperimetry on Riemannian manifolds, heat kernels and infinite dimensional analysis, diffusions and Sobolev-type spaces on metric spaces, quasi-regular mappings and p-Laplace operators, heat kernel and spherical inversion on $SL 2(C)$, random walks and spectral geometry on crystal lattices, isoperimetric and isocapacitary inequalities, and generating function techniques for random walks on graphs. This volume is suitable for graduate students and research mathematicians interested in random processes and analysis on manifolds.
Euler Through Time - V. S. Varadarajan 2006
Euler is one of the greatest and most prolific mathematicians of all time. He wrote the first accessible books on calculus, created the theory of circular functions, and discovered new areas of research such as elliptic integrals, the calculus of variations, graph theory, divergent series, and so on. It took hundreds of years for his successors to develop in full the theories he began, and some of his themes are still at the center of today's mathematics. It is of great interesttherefore to examine his work and its relation to current mathematics. This book attempts to do that. In number theory the discoveries he made empirically would require for their eventual understanding such sophisticated developments as the reciprocity laws and class field theory. His pioneering work onelliptic integrals is the precursor of the modern theory of abelian functions and abelian integrals. His evaluation of zeta and multizeta values is not only a fantastic and exciting story but very relevant to us, because they are at the confluence of much research in algebraic geometry and number theory today (Chapters 2 and 3 of the book). Anticipating his successors by more than a century, Euler created a theory of summation of series that do not converge in the traditional manner. Chapter 5of the book treats the progression of ideas regarding divergent series from Euler to many parts of modern analysis and quantum physics. The last chapter contains a brief treatment of Euler products. Euler discovered the product formula over the primes for the zeta function as well as for a smallnumber of what are now called Dirichlet L-functions. Here the book goes into the development of the theory of such Euler products and the role they play in number theory, thus offering the reader a glimpse of current developments (the Langlands program).
Annual Reports on Computational Chemistry - David A. Dixon 2020-09-24
Annual Reports in Computational Chemistry, Volume 16, provides timely and critical reviews of important topics in computational chemistry. Topics covered in this series include quantum chemistry, molecular mechanics, force fields, chemical education, and applications in academic and industrial settings. Focusing on the most recent literature and advances in the field, each article covers a specific topic of importance to computational chemists. Includes timely discussions on quantum chemistry and molecular mechanics Covers force fields, chemical education, and more Presents the latest in chemical education and applications in both academic and industrial settings
Quantum Gravitation - Herbert W. Hamber 2008-10-20
"Quantum Gravitation" approaches the subject from the point of view of Feynman path integrals, which provide a manifestly covariant approach in which fundamental quantum aspects of the theory such as radiative corrections and the renormalization group can be systematically and consistently addressed. It is shown that the path integral method is suitable for both perturbative as well as non-perturbative studies, and is already known to offer a framework for the theoretical investigation of non-Abelian gauge theories,

the basis for three of the four known fundamental forces in nature. The book thus provides a coherent outline of the present status of the theory gravity based on Feynman's formulation, with an emphasis on quantitative results. Topics are organized in such a way that the correspondence to similar methods and results in modern gauge theories becomes apparent. Covariant perturbation theory are developed using the full machinery of Feynman rules, gauge fixing, background methods and ghosts. The renormalization group for gravity and the existence of non-trivial ultraviolet fixed points are investigated, stressing a close correspondence with well understood statistical field theory models. The final chapter addresses contemporary issues in quantum cosmology such as scale dependent gravitational constants and quantum effects in the early universe.

Basic Quantum Mechanics - Kyriakos Tamvakis 2019-08-23

This textbook on quantum mechanics has been designed for use in two-semester undergraduate courses. It describes the basic concepts of quantum mechanics, explains the use of the mathematical formalism and provides illustrative examples of both concepts and methods. Although the aim is to enable students to master the use of quantum mechanics as a tool, the author also discusses the meaning of quantum concepts. To this end the book contains a variety of relevant examples, worked out in considerable detail, as well as a substantial number of pertinent problems and exercises. The latter will be extremely helpful, if not essential, for gaining a deep understanding and command of the subject. This book is based on the author's thirty years experience of teaching the subject.

Path Integrals, Hyperbolic Spaces and Selberg Trace Formulae - Christian Grosche 2013

In this second edition, a comprehensive review is given for path integration in two- and three-dimensional (homogeneous) spaces of constant and non-constant curvature, including an enumeration of all the corresponding coordinate systems which allow separation of variables in the Hamiltonian and in the path integral. The corresponding path integral solutions are presented as a tabulation. Proposals concerning interbasis expansions for spheroidal coordinate systems are also given. In particular, the cases of non-constant curvature Darboux spaces are new in this edition. The volume also contains results on the numerical study of the properties of several integrable billiard systems in compact domains (i.e. rectangles, parallelepipeds, circles and spheres) in two- and three-dimensional flat and hyperbolic spaces. In particular, the discussions of integrable billiards in circles and spheres (flat and hyperbolic spaces) and in three dimensions are new in comparison to the first edition. In addition, an overview is presented on some recent achievements in the theory of the Selberg trace formula on Riemann surfaces, its super generalization, their use in mathematical physics and string theory, and some further results derived from the Selberg (super-) trace formula.

Path Integrals and Quantum Processes - Mark S. Swanson 2014-02-19

Graduate-level, systematic presentation of path integral approach to calculating transition elements, partition functions, and source functionals. Covers Grassmann variables, field and gauge field theory, perturbation theory, and nonperturbative results. 1992 edition.

Quantum Geometry - Margaret Prugovecki 2013-03-14

This monograph presents a review and analysis of the main mathematical, physical and epistomological difficulties encountered at the foundational level by all the conventional formulations of relativistic quantum theories, ranging from relativistic quantum mechanics and quantum field theory in Minkowski space, to the various canonical and covariant approaches to quantum gravity. It is, however, primarily devoted to the systematic presentation of a quantum framework meant to deal effectively with these difficulties by reconsidering the foundations of these subjects, analyzing their epistemic nature, and then developing mathematical tools which are specifically designed for the elimination of all the basic inconsistencies. A carefully documented historical survey is included, and additional extensive notes containing quotations from original sources are incorporated at the end of each chapter, so that the reader will be brought up-to-date with the very latest developments in quantum field theory in curved spacetime, quantum gravity and quantum cosmology. The survey further provides a backdrop against which the new foundational and mathematical ideas of the present approach to these subjects can be brought out in sharper relief.

Symplectic Geometry - Dietmar Salamon 1993

This volume is based on lectures given at a workshop and conference on symplectic geometry at the University of Warwick in August 1990.

Springer Tracts in Modern Physics - 1998

Quantum Mechanics - Walter Greiner 2012-12-06

Supplementing "Quantum Mechanics. An Introduction" and "Quantum Mechanics. Symmetries", this book covers an important additional course on quantum mechanics, including an introduction to quantum statistics, the structure of atoms and molecules, and the Schrödinger wave equation. 72 fully worked examples and problems consolidate the material.

New Trends in Kramers' Reaction Rate Theory - P. Talkner 2012-12-06

The escape from metastable states via noise-assisted hopping and/or tunneling is pivotal to many scientific disciplines. It impacts on such diverse physical, chemical and biological processes as diffusion in solids, chemical reactions, nucleation phenomena and transfer of matter and information in biological systems. This volume surveys recent developments in the rate theory of both equilibrium and nonequilibrium processes. The understanding of the classical and quantum-mechanical concepts of this theory is deepened and extended in order to cope with various problems which, in particular, arise in complex systems. A wide range of applications are discussed such as correlated hops in periodic potentials, fluctuating barriers, transitions to limit cycles, discrete time dynamics, random walks on selfsimilar structures, and nonexponential decay in disordered systems is covered and profoundly discussed. For research workers and graduate students in chemistry, physics and biology with an interest in reaction rate theory.

Wave Packet Analysis of Feynman Path Integrals - Fabio Nicola 2022-07-28

The purpose of this monograph is to offer an accessible and essentially self-contained presentation of some mathematical aspects of the Feynman path integral in non-relativistic quantum mechanics. In spite of the primary role in the advancement of modern theoretical physics and the wide range of applications, path integrals are still a source of challenging problem for mathematicians. From this viewpoint, path integrals can be roughly described in terms of approximation formulas for an operator (usually the propagator of a Schrödinger-type evolution equation) involving a suitably designed sequence of operators. In keeping with the spirit of harmonic analysis, the guiding theme of the book is to illustrate how the powerful techniques of time-frequency analysis - based on the decomposition of functions and operators in terms of the so-called Gabor wave packets – can be successfully applied to mathematical path integrals, leading to remarkable results and paving the way to a fruitful interaction. This monograph intends to build a bridge between the communities of people working in time-frequency analysis and mathematical/theoretical physics, and to provide an exposition of the present novel approach along with its basic toolkit. Having in mind a researcher or a Ph.D. student as reader, we collected in Part I the necessary background, in the most suitable form for our purposes, following a smooth pedagogical pattern. Then Part II covers the analysis of path integrals, reflecting the topics addressed in the research activity of the authors in the last years.

Mathematical Theory of Feynman Path Integrals - Sergio A. Albeverio 2006-11-14

Feynman path integrals integrals, suggested heuristically by Feynman in the 40s, have become the basis of much of contemporary physics, from non relativistic quantum mechanics to quantum fields, including gauge fields, gravitation, cosmology. Recently ideas based on Feynman path integrals have also played an important role in areas of mathematics like low dimensional topology and differential geometry, algebraic geometry, infinite dimensional analysis and geometry, and number theory. The 2nd edition of LNM 523 is based on the two first authors' mathematical approach of this theory presented in its 1st edition in 1976. To take care of the many developments which have occurred since then, an entire new chapter about the current forefront of research has been added. Except for this new chapter, the basic material and presentation of the first edition was mantained, a few misprints have been corrected. At the end of each chapter the reader will also find notes with further bibliographical information.

Stochastic Processes, Physics And Geometry Ii - Proceedings Of The Iii International Conference - Albeverio Sergio 1995-02-17

In the last few years there has been an explosion of activity in the field of the dynamics of fractal surfaces, which, through the convergence of important new results from computer simulations, analytical theories

and experiments, has led to significant advances in our understanding of nonequilibrium surface growth phenomena. This interest in surface growth phenomena has been motivated largely by the fact that a wide variety of natural and industrial processes lead to the formation of rough surfaces and interfaces. This book presents these developments in a single volume by bringing together the works containing the most important results in the field.The material is divided into chapters consisting of reprints related to a single major topic. Each chapter has a general introduction to a particular aspect of growing fractal surfaces. These introductory parts are included in order to provide a scientific background to the papers reproduced in the main part of the chapters. They are written in a pedagogical style and contain only the most essential information. The contents of the reprints are made more accessible to the reader as they are preceded by a short description of what the editors find to be the most significant results in the paper.

Time in Quantum Mechanics - Gonzalo Muga 2007-12-07

The treatment of time in quantum mechanics is still an important and challenging open question in the foundation of the quantum theory. This multi-authored book, written as an introductory guide for newcomers to the subject, as well as a useful source of information for the expert, covers many of the open questions. The book describes the problems, and the attempts and achievements in defining, formalizing and measuring different time quantities in quantum theory.

Nonperturbative Methods In Quantum Field Theory - Proceedings Of The Workshop - Andreas W Schreiber 1999-01-15

This book contains the proceedings of the Workshop on Nonperturbative Methods in Quantum Field Theory, held in Adelaide, Australia, in February 1998. Lattice gauge theory and calculations based on the use of Schwinger-Dyson equations feature prominently, with further contributions in the areas of variational and functional techniques, strong interaction phenomenology and chiral perturbation theory. QCD in the infrared regime as well as QCD at finite temperatures and densities is the subject matter of a number of papers, while other authors explore chiral symmetry breaking in QCD as well as in other field theories.

Schwinger's Quantum Action Principle - Kimball A. Milton 2015-06-12

Starting from the earlier notions of stationary action principles, these tutorial notes shows how Schwinger’s Quantum Action Principle descended from Dirac’s formulation, which independently led Feynman to his path-integral formulation of quantum mechanics. Part I brings out in more detail the connection between the two formulations, and applications are discussed. Then, the Keldysh-Schwinger time-cycle method of extracting matrix elements is described. Part II will discuss the variational formulation of quantum electrodynamics and the development of source theory.

On Klauder's Path - G□rard G. Emch 1994

This volume contains contributions by friends, colleagues and associates of John R Klauder on the occasion of his 60th birthday.Klauder's scientific work embraces vast territories from quantum theories to general relativity, optics and chaotic dynamics. A recurrent theme in his research is the role played by coherent states, in particular, in connection with path integral formulations of quantization. Perhaps at a less lofty level, this concept has had at least two spectacular applications: as a powerful investigative tool in quantum optics and as a precursor to wavelets. In a different vein, Klauder also attacked specific, non-renormalizable but exactly soluble, hard-core models in field theory, where he uncovered what has since been called the Klauder phenomenon.The contributors to this volume represent the special brand of mathematicians and physicists John Klauder helped define throughout his seminal career in the industrial and academic worlds.

Open Quantum Systems and Feynman Integrals - P. Exner 2012-12-06

Every part of physics offers examples of non-stability phenomena, but probably nowhere are they so plentiful and worthy of study as in the realm of quantum theory. The present volume is devoted to this problem: we shall be concerned with open quantum systems, i.e. those that cannot be regarded as isolated from the rest of the physical universe. It is a natural framework in which non-stationary processes can be investigated. There are two main approaches to the treatment of open systems in quantum theory. In both the system under consideration is viewed as part of a larger system, assumed to be isolated in a reasonable approximation. They are differentiated mainly by the way in which the state Hilbert space of the open system is related to that of the isolated system - either by orthogonal sum or by tensor product. Though often applicable simultaneously to the same physical situation, these approaches are complementary in a sense and are adapted to different purposes. Here we shall be concerned with the first approach, which is suitable primarily for a description of decay processes, absorption, etc. The second approach is used mostly for the treatment of various relaxation phenomena. It is comparably better examined at present; in particular, the reader may consult a monograph by E. B. Davies.

Fourier Transform Spectroscopy in the Soft X-ray Regime - Scott Christopher Locklin 2004

On Klauder's Path: A Field Trip - G G Emch 1994-04-27

This volume contains contributions by friends, colleagues and associates of John R Klauder on the occasion of his 60th birthday. Klauder's scientific work embraces vast territories from quantum theories to general relativity, optics and chaotic dynamics. A recurrent theme in his research is the role played by coherent states, in particular, in connection with path integral formulations of quantization. Perhaps at a less lofty level, this concept has had at least two spectacular applications: as a powerful investigative tool in quantum optics and as a precursor to wavelets. In a different vein, Klauder also attacked specific, non-renormalizable but exactly soluble, hard-core models in field theory, where he uncovered what has since been called the Klauder phenomenon. The contributors to this volume represent the special brand of mathematicians and physicists John Klauder helped define throughout his seminal career in the industrial and academic worlds. Contents:Preface (J R Klauder)A Remark on a Connection of Return to Equilibrium and Multiple Ground States in Some Perturbed XY–Model (H Araki)Covariance Sub-Algebras Connected with Symmetry Groups of C∗öAlgebras (H J Borchers)Coherent-State Path-Integrals and Their Relations to Wavelets (B De Facio)Brownian Motion and Its Conditional Descendants (P Garbaczweski)Path Integrals and Network Quantum Numbers (R Gilmore and M Jeffery)Reckoning of the Besselian Path Integral (A Inomata)On Q-Analogs of Coherent States (M A Lohe & L C Biedenharn)Coherent States and Squeezed States, Supercoherent States and Supersqueezed States (M M Nieto)How to Generate Thermal Photons — On the Computer (M R Schroeder)A Local Quantum Theory Without Positive Energy Representations (R F Streater)Quantum Noise and Thermal Noise (H Umezawa)and other papers Readership: Physicists and mathematicians. keywords:

Rigorous Time Slicing Approach to Feynman Path Integrals - Daisuke Fujiwara 2017-06-24

This book proves that Feynman's original definition of the path integral actually converges to the fundamental solution of the Schrödinger equation at least in the short term if the potential is differentiable sufficiently many times and its derivatives of order equal to or higher than two are bounded. The semi-classical asymptotic formula up to the second term of the fundamental solution is also proved by a method different from that of Birkhoff. A bound of the remainder term is also proved.The Feynman path integral is a method of quantization using the Lagrangian function, whereas Schrödinger's quantization uses the Hamiltonian function. These two methods are believed to be equivalent. But equivalence is not fully proved mathematically, because, compared with Schrödinger's method, there is still much to be done concerning rigorous mathematical treatment of Feynman's method. Feynman himself defined a path integral as the limit of a sequence of integrals over finite-dimensional spaces which is obtained by dividing the time interval into small pieces. This method is called the time slicing approximation method or the time slicing method.This book consists of two parts. Part I is the main part. The time slicing method is performed step by step in detail in Part I. The time interval is divided into small pieces. Corresponding to each division a finite-dimensional integral is constructed following Feynman's famous paper. This finite-dimensional integral is not absolutely convergent. Owing to the assumption of the potential, it is an oscillatory integral. The oscillatory integral techniques developed in the theory of partial differential equations are applied to it. It turns out that the finite-dimensional integral gives a finite definite value. The stationary phase method is applied to it. Basic properties of oscillatory integrals and the stationary phase method are explained in the book in detail.Those finite-dimensional integrals form a sequence of approximation of the Feynman path integral when the division goes finer and finer. A careful discussion is required to prove the convergence of the approximate sequence as the length of each of the small subintervals tends to 0. For that purpose the book uses the stationary phase method of oscillatory integrals over a space of large dimension, of which the detailed proof is given in Part II of the book. By virtue of this method, the approximate sequence converges to the limit. This proves that the Feynman path integral converges. It turns out that the convergence occurs

in a very strong topology. The fact that the limit is the fundamental solution of the Schrödinger equation is proved also by the stationary phase method. The semi-classical asymptotic formula naturally follows from the above discussion.A prerequisite for readers of this book is standard knowledge of functional analysis. Mathematical techniques required here are explained and proved from scratch in Part II, which occupies a large part of the book, because they are considerably different from techniques usually used in treating the Schrödinger equation.

Condensed Matter Field Theory - Alexander Altland 2010-03-11

Modern experimental developments in condensed matter and ultracold atom physics present formidable challenges to theorists. This book provides a pedagogical introduction to quantum field theory in many-particle physics, emphasizing the applicability of the formalism to concrete problems. This second edition contains two new chapters developing path integral approaches to classical and quantum nonequilibrium phenomena. Other chapters cover a range of topics, from the introduction of many-body techniques and functional integration, to renormalization group methods, the theory of response functions, and topology. Conceptual aspects and formal methodology are emphasized, but the discussion focuses on practical experimental applications drawn largely from condensed matter physics and neighboring fields. Extended and challenging problems with fully worked solutions provide a bridge between formal manipulations and research-oriented thinking. Aimed at elevating graduate students to a level where they can engage in independent research, this book complements graduate level courses on many-particle theory.

Quantum Transport in Semiconductors - David K. Ferry 2013-06-29

The majority of the chapters in this volume represent a series of lectures. that were given at a workshop on quantum transport in ultrasmall electron devices, held at San Miniato, Italy, in March 1987. These have, of course, been extended and updated during the period that has elapsed since the workshop was held, and have been supplemented with additional chapters devoted to the tunneling process in semiconductor quantum-well structures. The aim of this work is to review and present the current understanding in nonequilibrium quantum transport appropriate to semiconductors. Gen erally, the field of interest can be categorized as that appropriate to inhomogeneous transport in strong applied fields. These fields are most likely to be strongly varying in both space and time. Most of the literature on quantum transport in semiconductors (or in metallic systems, for that matter) is restricted to the equilibrium approach, in which spectral densities are maintained as semiclassical energy conserving delta functions, or perhaps incorporating some form of collision broadening through a Lorentzian shape, and the distribution functions are kept in the equilibrium Fermi-Dirac form. The most familiar field of nonequilibrium transport, at least for the semiconductor world, is that of hot carriers in semiconductors.

Non-Equilibrium Thermodynamics in Multiphase Flows - Roberto Mauri 2012-11-08

Non-equilibrium thermodynamics is a general framework that allows the macroscopic description of irreversible processes. This book introduces non-equilibrium thermodynamics and its applications to the rheology of multiphase flows. The subject is relevant to graduate students in chemical and mechanical engineering, physics and material science. This book is divided into two parts. The first part presents the theory of non-equilibrium thermodynamics, reviewing its essential features and showing, when possible, some applications. The second part of this book deals with how the general theory can be applied to model multiphase flows and, in particular, how to determine their constitutive relations. Each chapter contains problems at the end, the solutions of which are given at the end of the book. No prior knowledge of statistical mechanics is required; the necessary prerequisites are elements of transport phenomena and on thermodynamics. “The style of the book is mathematical, but nonetheless it remains very readable and anchored in the physical world rather than becoming too abstract. Though it is up-to-date and includes recent important developments, there is a lot of classical material in the book, albeit presented with unprecedented clarity and coherence. The first six chapters are actually a very good introduction to the theory underlying many phenomena in soft matter physics, beyond the focus on flow and transport of the later chapters of the book.” Prof Richard A.L. Jones FRS, Pro-Vice-Chancellor for Research and Innovation, University of Sheffield

Path Integral Quantization and Stochastic Quantization - Michio Masujima 2008-11-21

In this book, we discuss the path integral quantization and the stochastic quantization of classical mechanics and classical field theory. Forthe description ofthe classical theory, we have two methods, one based on the Lagrangian formalism and the other based on the Hamiltonian formal ism. The Hamiltonian formalism is derived from the Lagrangian·formalism. In the standard formalism ofquantum mechanics, we usually make use ofthe Hamiltonian formalism. This fact originates from the following circumstance which dates back to the birth of quantum mechanics. The first formalism ofquantum mechanics is Schrodinger's wave mechan ics. In this approach, we regard the Hamilton-Jacobi equation of analytical mechanics as the Eikonal equation of "geometrical mechanics". Based on the optical analogy, we obtain the Schrodinger equation as a result ofthe inverse of the Eikonal approximation to the Hamilton-Jacobi equation, and thus we arrive at "wave mechanics". The second formalism ofquantum mechanics is Heisenberg's "matrix me chanics". In this approach, we arrive at the Heisenberg equation of motion from consideration of the consistency of the Ritz combination principle, the Bohr quantization condition and the Fourier analysis of a physical quantity. These two formalisms make up the Hamiltonian.formalism of quantum me chanics.

Principles of Quantum Mechanics - R. Shankar 2012-12-06

R. Shankar has introduced major additions and updated key presentations in this second edition of Principles of Quantum Mechanics. New features of this innovative text include an entirely rewritten mathematical introduction, a discussion of Time-reversal invariance, and extensive coverage of a variety of path integrals and their applications. Additional highlights include: - Clear, accessible treatment of underlying mathematics - A review of Newtonian, Lagrangian, and Hamiltonian mechanics - Student understanding of quantum theory is enhanced by separate treatment of mathematical theorems and physical postulates - Unsurpassed coverage of path integrals and their relevance in contemporary physics The requisite text for advanced undergraduate- and graduate-level students, Principles of Quantum Mechanics, Second Edition is fully referenced and is supported by many exercises and solutions. The book’s self-contained chapters also make it suitable for independent study as well as for courses in applied disciplines.

Functional Integration and Quantum Physics - 1979-11-16

It is fairly well known that one of Hilbert’s famous list of problems is that of developing an axiomatic theory of mathematical probability theory (this problem could be said to have been solved by Khintchine, Kolmogorov, and Levy), and also among the list is the “axiomatization of physics. What is not so well known is that these are two parts of one and the same problem, namely, the sixth, and that the axiomatics of probability are discussed in the context of the foundations of statistical mechanics. Although Hilbert could not have known it when he formulated his problems, probability theory is also central to the foundations of quantum theory. In this book, I wish to describe a very different interface between probability and mathematical physics, namely, the use of certain notions of integration in function spaces as technical tools in quantum physics. Although Nelson has proposed some connection between these notions and foundational questions, we shall deal solely with their use to answer a variety of questions in conventional quantum theory.