# Quantum Physics A Functional Integral Point Of View

Functional integration is one of the most powerful methods of contempo rary theoretical physics, enabling us to simplify, accelerate, and make clearer the process of the theoretician's analytical work. Interest in this method and the endeavour to master it creatively grows incessantly. This book presents a study of the application of functional integration methods to a wide range of contemporary theoretical physics problems. The concept of a functional integral is introduced as a method of quantizing finite-dimensional mechanical systems, as an alternative to ordinary quantum mechanics. The problems of systems quantization with constraints and the manifolds quantization are presented here for the first time in a monograph. The application of the functional integration methods to systems with an infinite number of degrees of freedom allows one to uniquely introduce and formulate the diagram perturbation theory in quantum field theory and statistical physics. This approach is significantly simpler than the widely accepted method using an operator approach.

This book provides a comprehensive treatment of quantum mechanics from a mathematics perspective and is accessible to mathematicians starting with second-year graduate students. It addition to traditional topics, like classical mechanics, mathematical foundations of quantum mechanics, quantization, and the Schrodinger equation, this book gives a mathematical treatment of systems of identical particles with spin, and it introduces the reader to functional methods in quantum mechanics. This includes the Feynman path integral approach to quantum mechanics, integration in functional spaces, the relation between Feynman and Wiener integrals, Gaussian integration and regularized determinants of differential operators, fermion systems and integration over anticommuting (Grassmann) variables, supersymmetry and localization in loop spaces, and supersymmetric derivation of the Atiyah-Singer formula for the index of the Dirac operator. Prior to this book, mathematicians could find these topics only in physics textbooks and in specialized literature. This book is written in a concise style with careful attention to precise mathematics formulation of methods and results.Numerous problems, from routine to advanced, help the reader to master the subject. In addition to providing a fundamental knowledge of quantum mechanics, this book could also serve as a bridge for studying more advanced topics in quantum physics, among them quantum field theory. Prerequisites include standard first-year graduate courses covering linear and abstract algebra, topology and geometry, and real and complex analysis.

Quantum field theory is hardly comprehensible without path integrals: the goal of this book is to introduce students to this topic within the context of ordinary quantum mechanics and non-relativistic many-body theory, before facing the problems associated with the more involved quantum field theory formalism.

This text takes advantage of recent developments in the theory of path integration and attempts to make a major paradigm shift in how the art of functional integration is practiced. The techniques developed in the work will prove valuable to graduate students and researchers in physics, chemistry, mathematical physics, and applied mathematics who find it necessary to deal with solutions to wave equations, both quantum and beyond. A Modern Approach to Functional Integration offers insight into a number of contemporary research topics, which may lead to improved methods and results that cannot be found elsewhere in the textbook literature. Exercises are included in most chapters, making the book suitable for a one-semester graduate course on functional integration.

Topological restrictions. These are relevant to the understanding of the statistical properties of elementary particles and the entanglement phenomena in polymer physics and biophysics. The Chern-Simons theory of particles with fractional statistics (anyons) is introduced and applied to explain the fractional quantum Hall effect." "The relevance of path integrals to financial markets is discussed, and improvements of the famous Black-Scholes formula for option prices are developed which account for the fact that large market fluctuations occur much more frequently than in Gaussian distributions." --Book Jacket.

This book is a self-contained and concise introduction to the techniques and applications of path integral quantization and functional techniques, aimed at students and practitioners. The first half of the text focuses on quantum mechanics, including a review of the action formulation of classical mechanics and quantum mechanics in the Dirac operator and state formalism, and further examination of the path integral. The second part examines relativistic field theories, reviewing special relativity, as well as derivation of the path integral representation of the vacuum transition element for quantized scalar, spinor, and vector fields from the coherent state representation of the respective field theories. Key Features Concise introduction to the derivation and methods of path integral approaches to quantum mechanics and quantum field theory. Self-contained guide for students and practitioners

Fractional quantum mechanics is a recently emerged and rapidly developing field of quantum physics. This is the first monograph on fundamentals and physical applications of fractional quantum mechanics, written by its founder. The fractional Schrödinger equation and the fractional path integral are new fundamental physical concepts introduced and elaborated in the book. The fractional Schrödinger equation is a manifestation of fractional quantum mechanics. The fractional path integral is a new mathematical tool based on integration over Lévy flights. The fractional path integral method enhances the well-known Feynman path integral framework. Related topics covered in the text include time fractional quantum mechanics, fractional statistical mechanics, fractional classical mechanics and the ?-stable Lévy random process. The book is well-suited for theorists, pure and applied mathematicians, solid-state physicists, chemists, and others working with the Schrödinger equation, the path integral technique and applications of fractional calculus in various research areas. It is useful to skilled researchers as well as to graduate students looking for new ideas and advanced approaches.

Looks at quantum mechanics, covering such topics as perturbation method, statistical mechanics, path integrals, and quantum electrodynamics.

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.

Path Integrals in Physics: Volume I, Stochastic Processes and Quantum Mechanics presents the fundamentals of path integrals, both the Wiener and Feynman type, and their many applications in physics. Accessible to a broad community of theoretical physicists, the book deals with systems possessing a infinite number of degrees in freedom. It discusses the general physical background and concepts of the path integral approach used, followed by a detailed presentation of the most typical and important applications as well as problems with either their solutions or hints how to solve them. It describes in detail various applications, including systems with Grassmann variables. Each chapter is self-contained and can be considered as an independent textbook. The book provides a comprehensive, detailed, and systematic account of the subject suitable for both students and experienced researchers.

Concise textbook intended as a primer on path integral formalism both in classical and quantum field theories, although emphasis is on the latter. It is ideally suited as an intensive one-semester course, delivering the basics needed by readers to follow developments in field theory. Path Integrals in Field Theory paves the way for both more rigorous studies in fundamental mathematical issues as well as for applications in hadron, particle and nuclear physics, thus addressing students in mathematical and theoretical physics alike. Assuming some background in relativistic quantum theory (but none in field theory), it complements the authors monograph Fields, Symmetries, and Quarks (Springer, 1999).

The investigation ofmost problems of quantum physics leads to the solution of the Schrodinger equation with an appropriate interaction Hamiltonian or potential. However, the exact solutions are known for rather a restricted set of potentials, so that the standard eternal problem that faces us is to find the best effective approximation to the exact solution of the Schrodinger equation under consideration. In the most general form, this problem can be formulated as follows. Let a total Hamiltonian H describing a relativistic (quantum field theory) or a nonrelativistic (quantum mechanics) system be given. Our problem is to solve the Schrodinger equation Hlft = Enlftn, n i. e. , to find the energy spectrum {En}

and the proper wave functions {lft } n including the'ground state or vacuum lft = 10). The main idea of any ap o proximation technique is to find a decomposition in such a way that Ha describes our physical system in the "closest to H" manner, and the Schrodinger equation HolJt. (O) = E(O)lJt. (O) n n n can be solved exactly. The interaction Hamiltonian HI is supposed to give small corrections to the zero approximation which can be calculated. In this book, we shall consider the problem of a strong coupling regime in quantum field theory, calculations ofpath or functional integrals over the Gaussian measure and spectral problems in quantum mechanics. Let us con sider these problems briefly.
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.

Suitable for advanced undergraduates and graduate students, this text develops the techniques of path integration and deals with applications, covering a host of illustrative examples. 26 figures. 1981 edition.

After a consideration of basic quantum mechanics, this introduction aims at a side by side treatment of fundamental applications of the Schrödinger equation on the one hand and the applications of the path integral on the other. Different from traditional texts and using a systematic perturbation method, the solution of Schrödinger equations includes also those with anharmonic oscillator potentials, periodic potentials, screened Coulomb potentials and a typical singular potential, as well as the investigation of the large order behavior of the perturbation series. On the path integral side, after introduction of the basic ideas, the expansion around classical configurations in Euclidean time, such as instantons, is considered, and the method is applied in particular to anharmonic oscillator and periodic potentials. Numerous other aspects are treated on the way, thus providing the reader an instructive overview over diverse quantum mechanical phenomena, e.g. many other potentials, Green's functions, comparison with WKB, calculation of lifetimes and sojourn times, derivation of generating functions, the Coulomb problem in various coordinates, etc. All calculations are given in detail, so that the reader can follow every step.

The applications of functional integral methods introduced in this text for solving a range of problems in quantum field theory will prove useful for students and researchers in theoretical physics and quantum field theory.

Quantum field theory has been a great success for physics, but it is difficult for mathematicians to learn because it is mathematically incomplete. Folland, who is a mathematician, has spent considerable time digesting the physical theory and sorting out the mathematical issues in it. Fortunately for mathematicians, Folland is a gifted expositor. The purpose of this book is to present the elements of quantum field theory, with the goal of understanding the behavior of elementary particles rather than building formal mathematical structures, in a form that will be comprehensible to mathematicians. Rigorous definitions and arguments are presented as far as they are available, but the text proceeds on a more informal level when necessary, with due care in identifying the difficulties. The book begins with a review of classical

physics and quantum mechanics, then proceeds through the construction of free quantum fields to the perturbation-theoretic development of interacting field theory and renormalization theory, with emphasis on quantum electrodynamics. The final two chapters present the functional integral approach and the elements of gauge field theory, including the Salam–Weinberg model of electromagnetic and weak interactions.
Traditionally, field theory is taught through canonical quantization with a heavy emphasis on high energy physics. However, the techniques of field theory are applicable as well and are extensively used in various other areas of physics such as consdensed matter, nuclear physics and statistical mechanics. The path integral approach brings out this feature most clearly. In this book, the path integral approach is developed in detail completely within the context of quantum mechanics. Subsequently, it is applied to various areas of physics.
The Advanced Study Institute on "Path Integrals and Their Applications in Quantum, Statistical, and Solid State Physics" was held at the University of Antwerpen (R.U.C.A.), July 17-30, 1977. The Institute was sponsored by NATO. Co-sponsors were: A.C.E.C. (Belgium), Agfa-Gevaert (Belgium), l'Air Li~uide BeIge (Belgium), Be1gonucleaire (Belgium), Bell Telephone Mfg. Co. (Belgium), Boelwerf (Belgium), Generale BankmaatschappiJ (Belgium), I.B.M. (Belgium), Kredietbank (Belgium), National Science Foundation (U.S.A.), Siemens (Belgium). A total of 100 lecturers and partici pants attended the Institute. The development of path (or functional) integrals in relation to problems of stochastic nature dates back to the early 20's. At that time, Wiener succeeded in obtaining the fundamental solution of the diffusion e~uation using Einstein's joint probability of finding a Brownian particle in a succession of space intervals during a corresponding succession of time intervals. Dirac in the early 30's sowed the seeds of the path integral formulation of ~uantum mecha nics. However, the major and decisive step in this direction was taken with Feynman's works in ~uantum and statistical physics, and quantum electrodynamicso The applications now extend to areas such as continuous mechanics, and recently functional integration methods have been employed by Edwards for the study of polymerized matter.
These lecture notes present a concise and introductory, yet as far as possible coherent, view of the main formalizations of quantum mechanics and of quantum field theories, their interrelations and their theoretical foundations. The “standard” formulation of quantum mechanics (involving the Hilbert space of pure states, self-adjoint operators as physical observables, and the probabilistic interpretation given by the Born rule) on one hand, and the path integral and functional integral representations of probabilities amplitudes on the other, are the standard tools used in most applications of quantum theory in physics and chemistry. Yet, other mathematical representations of quantum mechanics sometimes allow better comprehension and justification of quantum theory. This text focuses on two of such representations: the algebraic formulation of quantum mechanics and the “quantum logic” approach. Last but not least, some emphasis will also be put on understanding the relation between quantum physics and special relativity through their common roots - causality, locality and reversibility, as well as on the relation between quantum theory, information theory, correlations and measurements, and quantum gravity. Quantum mechanics is probably the most successful physical theory ever proposed and despite huge experimental and technical progresses in over almost a century, it has never been seriously challenged by experiments. In addition, quantum information science ha s become an important and very active field in recent decades, further enriching the many facets of quantum physics. Yet, there is a strong revival of the discussions about the principles of quantum mechanics and its seemingly paradoxical aspects: sometimes the theory is portrayed as the unchallenged and dominant paradigm of modern physical sciences and technologies while sometimes it is considered a still mysterious and poorly understood theory, waiting for a revolution. This volume, addressing graduate students and seasoned researchers alike, aims to contribute to the reconciliation of these two facets of quantum mechanics.

Functional integration successfully entered physics as path integrals in the 1942 PhD dissertation of Richard P. Feynman, but it made no sense at all as a mathematical definition. Cartier and DeWitt-Morette have created, in this book, a fresh approach to functional integration. The book is self-contained: mathematical ideas are introduced, developed, generalised and applied. In the authors' hands, functional integration is shown to be a robust, user-friendly and multi-purpose tool that can be applied to a great variety of situations, for example: systems of indistinguishable particles; Aharonov–Bohm systems; supersymmetry; non-gaussian integrals. Problems in quantum field theory are also considered. In the final part the authors outline topics that can be profitably pursued using material already presented.
This book provides an ideal introduction to the use of Feynman path integrals in the fields of quantum mechanics and statistical physics. It is written for graduate students and researchers in physics, mathematical physics, applied mathematics as well as chemistry. The material is presented in an accessible manner for readers with little knowledge of quantum mechanics and no prior exposure to path integrals. It begins with elementary concepts and a review of quantum mechanics that gradually builds the framework for the Feynman path integrals and how they are applied to problems in quantum mechanics and statistical physics. Problem sets throughout the book allow readers to test their understanding and reinforce the explanations of the theory in real situations. Features: Comprehensive and rigorous yet, presents an easy-to-understand approach. Applicable to a wide range of disciplines. Accessible to those with little, or basic, mathematical understanding.
Although ideas from quantum physics play an important role in many parts of modern mathematics, there are few books about quantum mechanics aimed at mathematicians. This book introduces the main ideas of quantum mechanics in language familiar to mathematicians. Readers with little prior exposure to physics will enjoy the book's conversational tone as they delve into such topics as the Hilbert space approach to quantum theory; the Schrödinger equation in one space dimension; the Spectral Theorem for bounded and unbounded self-adjoint operators; the Stone–von Neumann Theorem; the Wentzel–Kramers–Brillouin approximation; the role of Lie groups and Lie algebras in quantum mechanics; and the path-integral approach to quantum mechanics. The numerous exercises at the end of each chapter make the book suitable for both graduate courses and independent study. Most of the text is accessible to graduate students in mathematics who have had a first course in real analysis, covering the basics of L2 spaces and Hilbert spaces. The final chapters introduce readers who are familiar with the theory of manifolds to more advanced topics, including geometric quantization.
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.
This is the fifth, expanded edition of the comprehensive textbook published in 1990 on the theory and applications of path integrals. It is the first book to explicitly solve path integrals of a wide variety of nontrivial quantum-mechanical systems, in particular the hydrogen atom. The solutions have been made possible by two major advances. The first is a new euclidean path integral formula which increases the restricted range of applicability of Feynman's time-sliced formula to include singular attractive 1/r- and 1/r2-potentials. The second is a new nonholonomic mapping principle carrying physical laws in flat spacetime to spacetimes with curvature and torsion, which leads to time-sliced path integrals that are manifestly invariant under coordinate transformations. In addition to the time-sliced definition, the author gives a perturbative, coordinate-independent definition of path integrals, which makes them invariant under coordinate transformations. A consistent implementation of this property leads to an extension of the theory of generalized functions by defining uniquely products of distributions. The powerful FeynmanKleinert variational approach is explained and developed systematically into a variational perturbation theory which, in contrast to ordinary perturbation theory, produces convergent results. The convergence is uniform from weak to strong couplings, opening a

way to precise evaluations of analytically unsolvable path integrals in the strong-coupling regime where they describe critical phenomena. Tunneling processes are treated in detail, with applications to the lifetimes of supercurrents, the stability of metastable thermodynamic phases, and thelarge-order behavior of perturbation expansions. A variational treatment extends the range of validity to small barriers. A corresponding extension of the large-order perturbation theory now also applies to small orders. Special attention is devoted to path integrals with topological restrictions needed to understand the statistical properties of elementary particles and the entanglement phenomena in polymer physics and biophysics. The ChernSimons theory of particles with fractional statistics (anyons) is introduced and applied to explain the fractional quantum Hall effect. The relevance of path integrals to financial markets is discussed, and improvements of the famous BlackScholes formula for option prices are developed which account for the fact, recently experienced in the world markets, that large fluctuations occur much more frequently than in Gaussian distributions.

The Feynman integral is considered as an intuitive representation of quantum mechanics showing the complex quantum phenomena in a language comprehensible at a classical level. It suggests that the quantum transition amplitude arises from classical mechanics by an average over various interfering paths. The classical picture suggested by the Feynman integral may be illusory. By most physicists the path integral is usually treated as a convenient formal mathematical tool for a quick derivation of useful approximations in quantum mechanics. Results obtained in the formalism of Feynman integrals receive a mathematical justification by means of other (usually much harder) methods. In such a case the rigour is achieved at the cost of losing the intuitive classical insight. The aim of this book is to formulate a mathematical theory of the Feynman integral literally in the way it was expressed by Feynman, at the cost of complexifying the configuration space. In such a case the Feynman integral can be expressed by a probability measure. The equations of quantum mechanics can be formulated as equations of random classical mechanics on a complex configuration space. The opportunity of computer simulations shows an immediate advantage of such a formulation. A mathematical formulation of the Feynman integral should not be considered solely as an academic question of mathematical rigour in theoretical physics.

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A unique approach to quantum field theory, with emphasis on the principles of renormalization Quantum field theory is frequently approached from the perspective of particle physics. This book adopts a more general point of view and includes applications of condensed matter physics. Written by a highly respected writer and researcher, it first develops traditional concepts, including Feynman graphs, before moving on to key topics such as functional integrals, statistical mechanics, and Wilson's renormalization group. The connection between the latter and conventional perturbative renormalization is explained. Quantum Field Theory is an exceptional textbook for graduate students familiar with advanced quantum mechanics as well as physicists with an interest in theoretical physics. It features: * Coverage of quantum electrodynamics with practical calculations and a discussion of perturbative renormalization * A discussion of the Feynman path integrals and a host of current subjects, including the physical approach to renormalization, spontaneous symmetry breaking and superfluidity, and topological excitations * Nineteen self-contained chapters with exercises, supplemented with graphs and charts

Specifically designed to introduce graduate students to the functional integration method in contemporary physics as painlessly as possible, the book concentrates on the conceptual problems inherent in the path integral formalism. Throughout, the striking interplay between stochastic processes, statistical physics and quantum mechanics comes to the fore, and all the methods of fundamental interest are generously illustrated by important physical examples.

A distinguished physicist and leading researcher describes the theory and selected applications of one of the most important mathematical tools used in the theoretical investigation of collective excitations in statistical physics.

This book is addressed to one problem and to three audiences. The problem is the mathematical structure of modem physics: statistical physics, quantum mechanics, and quantum fields. The unity of mathemati cal structure for problems of diverse origin in physics should be no surprise. For classical physics it is provided, for example, by a common mathematical formalism based on the wave equation and Laplace's equation. The unity transcends mathematical structure and encompasses basic phenomena as well. Thus particle physicists, nuclear physicists, and con densed matter physicists have considered similar scientific problems from complementary points of view. The mathematical structure presented here can be described in various terms: partial differential equations in an infinite number of independent variables, linear operators on infinite dimensional spaces, or probability theory and analysis over function spaces. This mathematical structure of quantization is a generalization of the theory of partial differential equa tions, very much as the latter generalizes the theory of ordinary differential equations. Our central theme is the quantization of a nonlinear partial differential equation and the physics of systems with an infinite number of degrees of freedom. Mathematicians, theoretical physicists, and specialists in mathematical physics are the three audiences to which the book is addressed. Each of the three parts is written with a different scientific perspective.

On June 19th 1999, the European Ministers of Education signed the Bologna Dec laration, with which they agreed that the European university education should be uniformized throughout Europe and based on the two cycle bachelor master’s sys tem. The Institute for Theoretical Physics at Utrecht University quickly responded to this new challenge and created an international master’s programme in Theoret ical Physics which started running in the summer of 2000. At present, the master’s programme is a so called prestige master at Utrecht University, and it aims at train ing motivated students to become sophisticated researchers in theoretical physics. The programme is built on the philosophy that modern theoretical physics is guided by universal principles that can be applied to any sub?eld of physics. As a result, the basis of the master’s programme consists of the obligatory courses Statistical Field Theory and Quantum Field Theory. These focus in particular on the general concepts of quantum ?eld theory, rather than on the wide variety of possible applica tions. These applications are left to optional courses that build upon the ?rm concep tual basis given in the obligatory courses. The subjects of these optional courses in clude, for instance, Strongly Correlated Electrons, Spintronics, Bose Einstein Con densation, The Standard Model, Cosmology, and String Theory.

Providing a systematic introduction to the techniques which are fundamental to quantum field theory, this book pays special attention to the use of these techniques in a wide variety of areas, including ordinary quantum mechanics, quantum mechanics in the second-quantized formulation, relativistic quantum field theory, Euclidean field theory, quant

Quantum field theory provides the theoretical backbone to most modern physics. This book is designed to bring quantum field theory to a wider audience of physicists. It is packed with worked examples, witty diagrams, and applications intended to introduce a new audience to this revolutionary theory.

The main theme of this book is the ``path integral technique'' and its applications to constructive methods of quantum physics. The central topic is probabilistic foundations of the Feynman-Kac formula. Starting with the main examples of

Gaussian processes (the Brownian motion, the oscillatory process, and the Brownian bridge), the author presents four different proofs of the Feynman-Kac formula. Also included is a simple exposition of stochastic Ito calculus and its applications, in particular to the Hamiltonian of a particle in a magnetic field (the Feynman-Kac-Ito formula). Among other topics discussed are the probabilistic approach to the bound of the number of ground states of correlation inequalities (the Birman-Schwinger principle, Lieb's formula, etc.), the calculation of asymptotics for functional integrals of Laplace type (the theory of Donsker-Varadhan) and applications, scattering theory, the theory of crushed ice, and the Wiener sausage. Written with great care and containing many highly illuminating examples, this classic book is highly recommended to anyone interested in applications of functional integration to quantum physics. It can also serve as a textbook for a course in functional integration.

This book explores quantum field theory using the Feynman functional and diagrammatic techniques as foundations to apply Quantum Field Theory to a broad range of topics in physics. This book will be of interest not only to condensed matter physicists but physicists in a range of disciplines as the techniques explored apply to high-energy as well as soft matter physics.

The new edition provided the opportunity of adding a new chapter entitled "Principles and Lessons of Quantum Physics". It was a tempting challenge to try to sharpen the points at issue in the long lasting debate on the Copenhagen Spirit, to assess the significance of various arguments from our present vantage point, seventy years after the advent of quantum theory, where, after ali, some problems appear in a different light. It includes a section on the assumptions leading to the specific mathematical formalism of quantum theory and a section entitled "The evolutionary picture" describing my personal conclusions. Alto gether the discussion suggests that the conventional language is too narrow and that neither the mathematical nor the conceptual structure are built for eter nity. Future theories will demand radical changes though not in the direction of a return to determinism. Essential lessons taught by Bohr will persist. This chapter is essentially self-contained. Some new material has been added in the last chapter. It concerns the char acterization of specific theories within the general frame and recent progress in quantum field theory on curved space-time manifolds. A few pages on renor malization have been added in Chapter II and some effort has been invested in the search for mistakes and unclear passages in the first edition. The central objective of the book, expressed in the title "Local Quantum Physics", is the synthesis between special relativity and quantum theory to gether with a few other principles of general nature.