Quantum Mechanics 2 Vols

HESTER TYRESE

The Foundations of Quantum Mechanics
Oxford University Press
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.

Quantum Mechanics, Volume 1
Bentham Science Publishers
This unique textbook presents a novel, axiomatic pedagogical path from classical to quantum physics. Readers are introduced to the description of classical mechanics, which rests on Euler’s and Helmholtz’s rather than Newton’s or Hamilton’s representations. Special attention is given to the common attributes rather than to the differences between classical and quantum mechanics. Readers will also learn about Schrödinger’s forgotten demands on quantization, his equation, Einstein’s idea of ‘quantization as selection problem’. The Schrödinger equation is derived without any assumptions about the nature of quantum systems, such as interference and superposition, or the existence of a quantum of action, h. The use of the classical expressions for the potential and kinetic energies within quantum physics is justified. Key features: · Presents extensive reference to original texts. · Includes many details that do not enter contemporary representations of classical mechanics, although these details are essential for understanding quantum physics. · Contains a simple level of mathematics which is seldom higher than that of the common (Riemannian) integral. · Brings information about important scientists · Carefully introduces basic equations, notations and quantities in simple steps This book addresses the needs of physics students, teachers and historians with its simple easy to understand presentation and comprehensive approach to both classical and quantum mechanics..

Quantum Mechanics Clarendon Press
A complete overview of quantum

mechanics, covering essential concepts and results, theoretical foundations, and applications. This undergraduate textbook offers a comprehensive overview of quantum mechanics, beginning with essential concepts and results, proceeding through the theoretical foundations that provide the field's conceptual framework, and concluding with the tools and applications students will need for advanced studies and for research. Drawn from lectures created for MIT undergraduates and for the popular MITx online course, "Mastering Quantum Mechanics," the text presents the material in a modern and approachable manner while still including the traditional topics necessary for a well-rounded understanding of the subject. As the book progresses, the treatment gradually increases in difficulty, matching students' increasingly sophisticated understanding of the material. • Part 1 covers states and probability amplitudes, the Schrödinger equation, energy eigenstates of particles in potentials, the hydrogen atom, and spin one-half particles • Part 2 covers mathematical tools, the pictures of quantum mechanics and the axioms of quantum mechanics, entanglement and tensor products, angular momentum, and identical particles. • Part 3 introduces tools and techniques that help students master the theoretical concepts with a focus on approximation methods. • 236 exercises and 286 end-of-chapter problems • 248 figures

The Structure and Interpretation of Quantum Mechanics Courier Corporation

We read in order to know we are not alone, I once heard, and perhaps it could also be suggested that we write in order not to be alone, to endorse, to promote continuity. The idea for this book took about 10 years to materialize, and it is the author's hope that its content will constitute the beginning of further explorations beyond current horizons. More speci cally, this book appeals to the reader to engage upon and persevere with a journey, moving through the less well explored territories in the evolution of the very early universe, and pushing towards new landscapes. P- haps, during or after consulting this book, this attitude and this willingness will be embraced by someone, somewhere, and this person will go on to enrich our quantum cosmological description of the early universe, by means of a clearer supersymm- ric perspective. It is to these creative and inquisitive 'young minds' that the book is addressed. The reader will not therefore nd in this book all the answers to all the problems regarding a supersymmetric and quantum description of the early universe, and this remark is substantiated in the book by a list of unresolved and challenging problems, itself incomplete.

Structural Aspects of Quantum Field Theory and Noncommutative Geometry Springer Science & Business Media

Graduate-level text offers unified treatment of mathematics applicable to many branches of physics. Theory of vector spaces, analytic function theory, theory of integral equations, group theory, and more. Many problems. Bibliography.

The Feynman Lectures on Physics, Vol. III MIT Press

Crucial to most research in physics, as well as leading to the development of inventions such as the transistor and the laser, quantum mechanics approaches its centenary with an impressive record. However, the field has also long been the subject of ongoing debates about the foundations and interpretation of the theory, referred to as the quantum controversy. This Oxford Handbook offers a historical overview of the contrasts which have been at the heart of quantum physics for the last 100 years. Drawing on the wide-ranging expertise of several contributors working across physics, history, and philosophy, the handbook outlines the main theories and interpretations of quantum physics. It goes on to tackle the key controversies surrounding the field, touching on issues such as determinism, realism, locality, classicality, information, measurements, mathematical foundations, and the links between quantum theory and gravity. This engaging introduction is an essential guide for all those interested in the history of scientific controversies and history of quantum physics. It also provides a fascinating examination of the potential of quantum physics to influence new discoveries and advances in fields such quantum information and computing.

Mathematics of Classical and Quantum Physics Time in Quantum Mechanics

In this second volume on the Foundations of Quantum Mechanics we shall show how it is possible, using the methodology presented in Volume I, to deduce some of the most important applications of quantum mechanics. These deductions are concerned with the structures of the microsystems rather than the technical details of the construction of preparation and registration devices. Accordingly. the only new axioms (relative to Volume I) which are introduced are concerned with the relationship between ensemble operators W, effect operators F, and certain construction principles of the preparation and registration devices. The applications described here are concerned with the measurement of atomic and molecular structure and of collision experiments. An additional and essential step towards a theoretical description of the preparation and registration procedures is carried out in Chapter XVII. Here we demonstrate how microscopic collision processes (that is, processes which can be described by quantum mechanics) can be used to obtain novel preparation and registration procedures if we take for granted the knowledge of only a few macroscopic preparation and registration procedures. By clever use of collision processes we are often able to obtain very precise results for the operators Wand F which describe the total procedures from a very imprecise knowledge of the macroscopic parts of the preparation and regis tration processes. In this regard experimental physicists have done brilliant work. In this sense Chapter XVII represents a general theoretical foundation for the procedures used by experimental physicists.

Constructing Quantum Mechanics Springer

Subjects include formalism and its interpretation, analysis of simple systems, symmetries and invariance, methods of approximation, elements of relativistic quantum mechanics, much more. "Strongly recommended." -- "American Journal of Physics."

Quantum Mechanics Vols 1-2 American Mathematical Soc.

The highly positive affirmation and wide reception that this book continues to receive from professors and students ahke is the occasion for this 7th edition. Once again we have included a number of valuable suggestions for improvements, which we address as appropriate. In addition, we refer to a number of developments in atomic physics. Of these new developments in regard to exotic atoms, we mention antihydrogen in par ticular, because fundamental experiments in matter and antimatter can be expected in the future. Furthermore, we have inserted a chapter on the behaviour of atoms in strong elec trical fields. Experiments with corresponding lasers could only recently be realized. We thank our Jenaer colleague, R. Sauerbrey, for his contribution of this chapter. We have also included a new chapter on the behaviour of the hydrogen atom in strong magnetic fields. The results are of profound interest for two very different fields of physics: on the one hand, according to classical physics, one expects chaotic behaviour from Rydberg atoms in magnetic fields

that can be created in the laborato ry; thus, an association can be drawn to aspects of chaos theory and the problems of quantum chaos. On the other hand, the very strong fields necessary for low quantum numbers are realized in the cosmos, in particular with white dwarfs and neutron stars.

Mastering Quantum Mechanics Springer Science & Business Media

In The Foundations of Quantum Mechanics - Historical Analysis and Open Questions, leading Italian researchers involved in different aspects of the foundations and history of quantum mechanics are brought together in an interdisciplinary debate. The book therefore presents an invaluable overview of the state of Italian work in the field at this moment, and of the open problems that still exist in the foundations of the theory. Audience: Physicists, logicians, mathematicians and epistemologists whose research concerns the historical analysis of quantum mechanics.

The Oxford Handbook of the History of Quantum Interpretations Perseus Books

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.

Volume 1: The Scaffold: 1900-1923 Elsevier

This new edition of the unrivalled textbook introduces the fundamental concepts of quantum mechanics such as waves, particles and probability before explaining the postulates of quantum mechanics in detail. In the proven didactic manner, the textbook then covers the classical scope of introductory quantum mechanics, namely simple two-level systems, the one-dimensional harmonic oscillator, the quantized angular momentum and particles in a central potential. The entire book has been revised to take into account new developments in quantum mechanics curricula. The textbook retains its typical style also in the new edition: it explains the fundamental concepts in chapters which are elaborated in accompanying complements that provide more detailed discussions, examples and applications. * The quantum mechanics classic in a new edition: written by 1997 Nobel laureate Claude Cohen-Tannoudji and his colleagues Bernard Diu and Franck Laloë * As easily comprehensible as possible: all steps of the physical background and its mathematical representation are spelled out explicitly * Comprehensive: in addition to the fundamentals themselves, the book contains more than 350 worked examples plus exercises Claude Cohen-Tannoudji was a researcher at the Kastler-Brossel laboratory of the Ecole Normale Supérieure in Paris where he also studied and received his PhD in 1962. In 1973 he became Professor of atomic and molecular physics at the Collège des France. His main research interests were optical pumping, quantum optics and atom-photon interactions. In 1997, Claude Cohen-Tannoudji, together with Steven Chu and William D. Phillips, was awarded the Nobel Prize in Physics for his research on laser cooling and trapping of neutral atoms. Bernard Diu was Professor at the Denis Diderot University (Paris VII). He was engaged in research at the Laboratory of Theoretical Physics and High Energy where his focus was on strong interactions physics and statistical mechanics. Franck Laloë was a researcher at the Kastler-Brossel laboratory of the Ecole Normale Supérieure in Paris. His first assignment was with the University of Paris VI before he was appointed to the CNRS, the French National Research Center. His research was focused on optical pumping, statistical mechanics of quantum gases, musical acoustics and the foundations of quantum mechanics.

Logic and Probability in Quantum Mechanics Springer Science & Business Media

"Nobel Laureate Steven Weinberg combines his exceptional physical insight with his gift for clear exposition to provide a concise introduction to modern quantum mechanics. Ideally suited to a one-year graduate course, this textbook is also a useful reference for researchers. Readers are introduced to the subject through a review of the history of quantum mechanics and an account of classic solutions of the Schrèodinger equation, before quantum mechanics is developed in a modern Hilbert space approach. The textbook covers many topics not often found in other books on the subject, including alternatives to the Copenhagen interpretation, Bloch waves and band structure, the Wigner-Eckart theorem, magic numbers, isospin symmetry, the Dirac theory of constrained canonical systems, general scattering theory, the optical theorem, the 'in-in' formalism, the Berry phase, Landau levels, entanglement and quantum computing. Problems are included at the ends of chapters, with solutions available for instructors at www.cambridge.org/9781107028722"--

The Historical Development of Quantum Theory World Scientific

Written in an informal yet substantive style that is a joy to read, this book provides a uniquely engaging, in-depth introduction to the concepts of quantum physics and their practical implementation, and is filled with clear, thorough explanations that help readers develop insight into physical ideas and master techniques of problem-solving using quantum mechanics. Fully explores the concepts and strategies of quantum mechanics, showing the connections among the physical concepts that govern the atomic and sub-atomic domain of matter, and examining how these concepts manifest themselves in the mathematical machinery of quantum mechanics. Focuses on the explanations and motivations of the postulates that underlie the machinery of quantum mechanics, and applies simple, single-particle systems in one dimension. Illuminates discussions of ideas and techniques with a multitude of examples that show not just the answers but also the reasoning behind them, and adds dimension to the subject with historical, biographical and philosophical references throughout. Designed for a wide range of readers interested in various branches of physics and engineering physics.

A Shorter Course of Theoretical Physics: Mechanics and electrodynamics Springer Science & Business Media

After introducing the empiricist point of view in philosophy of science, and the concepts and methods of the semantic approach to scientific theories, Professor van Fraassen discusses quantum theory in three stages. He first examines the

question of whether and how empirical phenomena require a non-classical theory, and what sort of theory they require. He then discusses the mathematical foundations of quantum theory with special reference to developments in the modelling of interaction, composite systems, and measurement. Finally, the author broaches the main questions of interpretation. After offering a critique of earlier interpretations, he develops a new one - the modal interpretation - which attempts to stay close to the original Copenhagen ideas without implying a radical incompleteness in quantum theory. He gives special attention to the character of composite, many-body systems and especially to the peculiar character of assemblies of identical particles in quantum statistics.

Lectures On Computation Cambridge University Press

Constructing Quantum Mechanics is the first of two volumes on the genesis of quantum mechanics. This volume traces the early contributions by Planck, Einstein, and Bohr, all showing the need for drastic changes to the physics of their day. It examines the efforts by Sommerfeld and others to develop a new theory, now known as the old quantum theory. After some striking successes, this theory ran into serious difficulties and ended up serving as the scaffold on which the arch of modern quantum mechanics was built. This volume breaks new ground, both in its treatment of the work of Sommerfeld and his associates, and by offering new perspectives on classic papers by Planck, Einstein, Bohr, and others. Paying close attention to both primary and secondary sources, Constructing Quantum Mechanics provides an in-depth analysis of the heroic struggle to come to terms with the wealth of mostly spectroscopic data that eventually gave us modern quantum mechanics.

Quantum Mechanics Addison-Wesley

First Published in 2018. Routledge is an imprint of Taylor & Francis, an Informa company.

Quantum Mechanics, Vol 2 John Wiley & Sons

This important work provides an account of the philosophical foundations of quantum theory that should become a classic text for scientists and nonscientists alike. Hughes offers the first detailed and accessible analysis of the Hilbert-space models used in quantum theory and explains why they are so successful. He goes on to show how the very suitability of Hilbert spaces for modeling the quantum world gives rise to deep problems of interpretation, and makes suggestions about how they can be overcome.

Foundations of Quantum Mechanics Routledge

New edition features improved typography, figures and tables, expanded indexes, and 885 new corrections.

Quantum Mechanics Wiley-VCH

This book is devoted to the subject of quantum field theory. It is divided into two volumes. The first can serve as a textbook on the main techniques and results of quantum field theory, while the second treats more recent developments, in particular the subject of quantum groups and noncommutative geometry, and their interrelation. The first volume is directed at graduate students who want to learn the basic facts about quantum field theory. It begins with a gentle introduction to classical field theory, including the standard model of particle physics, general relativity, and also supergravity. The transition to quantized fields is performed with path integral techniques, by means of which the one-loop renormalization of a self-interacting scalar quantum field, of quantum electrodynamics, and the asymptotic freedom of quantum chromodynamics is treated. In the last part of the first volume, the application of path integral methods to systems of quantum statistical mechanics is covered. The book ends with a rather detailed investigation of the fractional quantum Hall effect, and gives a stringent derivation of Laughlin's trial ground state wave function as an exact ground state. The second volume covers more advanced themes. In particular Connes' noncommutative geometry is dealt with in some considerable detail; the presentation attempts to acquaint the physics community with the substantial achievements that have been reached by means of this approach towards the understanding of the elusive Higgs particle. The book also covers the subject of quantum groups and its application to the fractional quantum Hall effect, as it is for this paradigmatic physical system that noncommutative geometry and quantum groups can be brought together. Errata(s) Errata (78 KB) Contents:Volume 1:Classical Relativistic Field Theory: Kinematical AspectsClassical Relativistic Field Theory: Dynamical AspectsRelativistic Quantum Field Theory: Operator MethodsNonrelativistic Quantum Mechanics: Functional Integral MethodsRelativistic Quantum Field Theory: Functional Integral MethodsQuantum Field Theory at Nonzero TemperatureVolume 2:Symmetries and Canonical FormalismGauge Symmetries and Constrained SystemsWeyl QuantizationAnomalies in Quantum Field TheoryNoncommutative GeometryQuantum GroupsNoncommutative Geometry and Quantum Groups Readership: Graduate students and professionals in theoretical and mathematical physics. Keywords:Quantum Field Theory;Quantum Groups;Noncommutative Geometry;Path Integral Techniques;Quantum Electrodynamics;Quantum ChromodynamicsReviews: “This self-contained, comprehensive first volume presents a fundamental and careful introduction to quantum field theory. It will be welcomed by students as well as researchers, since it gives an overview of the origin and development of the basic ideas of modern particle physics, quantum statistical mechanics and the mathematics behind. The book provides a rich collection of modern research topics and references to important recent published work.” Zentralblatt MATH “The publication of this authoritative and comprehensively referenced two-volume set, written in somewhat condensed but eminently lucid style and explaining the principal underlying concepts and most important results of QFT, is particularly timely and useful. I am pleased to recommend most heartily this important reference source to students and physicists and to those concerned with the philosophy of science.” George B. Kauffman Professor Emeritus of Chemistry California State University, Fresno

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