Quantum Mechanics For Scientists And Engineers

From Basics to Real-World Applications for Materials Scientists, Applied Physicists, and Devices Engineers
Quantum Physics for Scientists and Technologists
Fundamental Principles and Applications for Biologists, Chemists, Computer Scientists, and Nanotechnologists
A Simplified Approach
Quantum Mechanics II
Quantum Legacies
Physics for Scientists and Engineers
Quantum Mechanics for Applied Physics and Engineering
Fundamentals of Quantum Physics
Vol. 3 Modern Physics, Quantum Mechanics, Relativity, & the Structure of Matter
Quantum Mechanics
With Applications to Chemistry
An Introduction to Quantum Physics
Textbook for Students of Science and Engineering
What Is Real?
Problem Solving in Quantum Mechanics
Applied Quantum Mechanics
Textbook for Students of Science and Engineering
A Second Course in Quantum Theory
Lectures on Quantum Mechanics
Quantum Mechanics for Scientists and Engineers
The Strange World of Quantum Mechanics
Quantum Mechanics
Introduction to Quantum Mechanics
Weimar Culture and Quantum Mechanics
Mastering Quantum Mechanics
How to Understand Quantum Mechanics
Fundamental Principles and Applications for Biologists, Chemists, Computer Scientists, and Nanotechnologists
Quantum Mechanics with Applications to Nanotechnology and Information Science
Fundamentals of Quantum Physics
How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival
For Engineering, Materials Science, and Applied Physics
Quantum Mechanics for Scientists and Engineers
From Data to Quanta
A Concise Introduction to Quantum Mechanics
Einstein's Unfinished Revolution
The Search for What Lies Beyond the Quantum
Quantum Mechanics
Introduction to Quantum Mechanics
Fundamentals of Quantum Mechanics

OBRIEN DEANNA

From Basics to Real-World Applications for Materials Scientists, Applied Physicists, and Devices Engineers Morgan & Claypool Publishers
Preliminaries. From laboratory to theory ; from classical experiments to quantum theory -- Bohr's vision in practice : the old quantum theory. Spectral lines, quantum states, and a master model of the atom ; The correspondence principle as an intermediary hypothesis ; Reception ; The scientific moderator -- Toward Quantum mechanics. Quantum corpuscles, quantum waves, and the experiments ; The uncertainty principle as an intermediary hypothesis ; Metaphysical principles and heuristic rules ; New formalisms and Bohr's atom -- Complementarity established and applied -- Aftermath. Bohr and the "Copenhagen orthodoxy" ; Bohr's response to the Einstein-Podolsky-Rosen argument ; The mature Bohr and the rise of slick theory and theoreticians.
Quantum Physics for Scientists and Technologists Cambridge University Press
During the academic years 1972-1973 and 1973-1974, an intensive sem inar on the foundations of quantum mechanics met at Stanford on a regular basis. The extensive exploration of ideas in the seminar led to the org~ization of a double issue of Synthese concerned with the foundations of quantum mechanics, especially with the role of logic and probability in quantum meChanics. About half of the articles in the volume grew out of this seminar. The remaining articles have been so licited explicitly from individuals who are actively working in the foun dations of quantum mechanics. Seventeen of the twenty-one articles appeared in Volume 29 of Syn these. Four additional articles and a bibliography on -the history and philosophy of quantum mechanics have been added to the present volume. In particular, the articles by Bub, Demopoulos, and Lande, as well as the second article by Zanotti and myself, appear for the first time in the present volume. In preparing the articles for publication I am much indebted to Mrs. Lillian O'Toole, Mrs. Dianne Kanerva, and Mrs. Marguerite Shaw, for their extensive assistance.
Fundamental Principles and Applications for Biologists, Chemists, Computer Scientists, and Nanotechnologists CRC 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

A Simplified Approach Academic Press

For upper-level undergraduates and graduate students: an introduction to the fundamentals of quantum mechanics, emphasizing aspects essential to an understanding of solid-state theory. Numerous problems (and selected answers), projects, exercises.

Quantum Mechanics II Springer Science & Business Media

Why does one theory "succeed" while another, possibly clearer interpretation, fails? By exploring two observationally equivalent yet conceptually incompatible views of quantum mechanics, James T. Cushing shows how historical contingency can be crucial to determining a theory's construction and its position among competing views. Since the late 1920s, the theory formulated by Niels Bohr and his colleagues at Copenhagen has been the dominant interpretation of quantum mechanics. Yet an alternative interpretation, rooted in the work of Louis de Broglie in the early 1920s and reformulated and extended by David Bohm in the 1950s, equally well explains the observational data. Through a detailed historical and sociological study of the physicists who developed different theories of quantum mechanics, the debates within and between opposing camps, and the receptions given to each theory, Cushing shows that despite the preeminence of the Copenhagen view, the Bohm interpretation cannot be ignored. Cushing contends that the Copenhagen interpretation became widely accepted not because it is a better explanation of subatomic phenomena than is Bohm's, but because it happened to appear first. Focusing on the philosophical, social, and cultural forces that shaped one of the most important developments in modern physics, this provocative book examines the role that timing can play in the establishment of theory and explanation.

Quantum Legacies Cambridge University Press

How to Understand Quantum Mechanics presents an accessible introduction to understanding quantum mechanics in a natural and intuitive way, which was advocated by Erwin Schroedinger and Albert Einstein. A theoretical physicist reveals dozens of easy tricks that avoid long calculations, makes complicated things simple, and bypasses the worthless anguish of famous scientists who died in angst. The author's approach is light-hearted, and the book is written to be read without equations, however all relevant equations still appear with explanations as to what they mean. The book entertainingly rejects quantum disinformation, the MKS unit system (obsolete), pompous non-explanations, pompous people, the hoax of the 'uncertainty principle' (it is just a math relation), and the accumulated junk-DNA that got into the quantum operating system by misreporting it. The order of presentation is new and also unique by warning about traps to be avoided, while separating topics such as quantum probability to let the Schroedinger equation be appreciated in the simplest way on its own terms. This is also the first book on quantum theory that is not based on arbitrary and confusing axioms or foundation principles. The author is so unprincipled he shows where obsolete principles duplicated basic math facts, became redundant, and sometimes were just pawns in academic turf wars. The book has many original topics not found elsewhere, and completely researched references to original historical sources and anecdotes concerting the unrecognized scientists who actually did discover things, did not all get Nobel prizes, and yet had interesting productive lives.

Physics for Scientists and Engineers University of Chicago Press

This book presents a comprehensive course of quantum mechanics for undergraduate and graduate students. After a brief outline of the innovative ideas that lead up to the quantum theory, the book reviews properties of the Schrödinger equation, the quantization phenomena and the physical meaning of wave functions. The book discusses, in a direct and intelligible style, topics of the standard quantum formalism like the dynamical operators and their expected values, the Heisenberg and matrix representation, the approximate methods, the Dirac notation, harmonic oscillator, angular momentum and hydrogen atom, the spin-field and spin-orbit interactions, identical particles and Bose-Einstein condensation etc. Special emphasis is devoted to study the tunneling phenomena, transmission coefficients, phase coherence, energy levels splitting and related phenomena, of interest for quantum devices and heterostructures. The discussion of these problems and the WKB approximation is done using the transfer matrix method, introduced at a tutorial level. This book is a textbook for upper undergraduate physics and electronic engineering students.

Quantum Mechanics for Applied Physics and Engineering World Scientific Publishing Company

This widely anticipated book by a leading expert in the field, is designed to meet the changing quantum mechanics needs of general and applied physicists involved in such areas as solid state research, quantum electronics, materials science, etc. This book uses new and less abstract ways to present formal concepts. For electrical engineers in the semiconductor areas.

Fundamentals of Quantum Physics Morgan & Claypool Publishers

The untold story of the heretical thinkers who dared to question the nature of our quantum universe Every physicist agrees quantum mechanics is among humanity's finest scientific achievements. But ask what it means, and the result will be a brawl. For a century, most physicists have followed Niels Bohr's Copenhagen interpretation and dismissed questions about the reality underlying quantum physics as meaningless. A mishmash of solipsism and poor reasoning, Copenhagen endured, as Bohr's students vigorously protected his legacy, and the physics community favored practical experiments over philosophical arguments. As a result, questioning the status quo long meant professional ruin. And yet, from the 1920s

to today, physicists like John Bell, David Bohm, and Hugh Everett persisted in seeking the true meaning of quantum mechanics. What Is Real? is the gripping story of this battle of ideas and the courageous scientists who dared to stand up for truth.

Vol. 3 Modern Physics, Quantum Mechanics, Relativity, & the Structure of Matter W. H. Freeman

This book presents a comprehensive course of quantum mechanics for undergraduate and graduate students. After a brief outline of the innovative ideas that lead up to the quantum theory, the book reviews properties of the Schrödinger equation, the quantization phenomena and the physical meaning of wave functions. The book discusses, in a direct and intelligible style, topics of the standard quantum formalism like the dynamical operators and their expected values, the Heisenberg and matrix representation, the approximate methods, the Dirac notation, harmonic oscillator, angular momentum and hydrogen atom, the spin-field and spin-orbit interactions, identical particles and Bose-Einstein condensation etc. Special emphasis is devoted to study the tunneling phenomena, transmission coefficients, phase coherence, energy levels splitting and related phenomena, of interest for quantum devices and heterostructures. The discussion of these problems and the WKB approximation is done using the transfer matrix method, introduced at a tutorial level. This book is a textbook for upper undergraduate physics and electronic engineering students.

Quantum Mechanics John Wiley & Sons

This book has two sections. The section Selected Topics in Applications of Quantum Mechanics provides seven chapters about different applications of quantum mechanics in science and technology. The section Selected Topics in Foundations of Quantum Mechanics provides seven chapters about the foundations of quantum mechanics. This book is written by a community of expert scientists from different research institutes and universities from all over the world. Without a doubt, quantum mechanics is the greatest discovery of the 20th century. Therefore, its history and foundations are of great interest to scientists and students. This book covers some of the applications of quantum mechanics in nuclear physics, medical science, information technology, atomic physics and material science, as well as selected topics of quantum mechanics through different bases and ideas about quantum mechanics. The basic idea of the publication of this book is to make scientists and researchers, as well as graduate students, familiar with the foundations of quantum mechanics.

With Applications to Chemistry Basic Books

From the bestselling author of The Theoretical Minimum, a DIY introduction to the math and science of quantum physics First he taught you classical mechanics. Now, physicist Leonard Susskind has teamed up with data engineer Art Friedman to present the theory and associated mathematics of the strange world of quantum mechanics. In this follow-up to The Theoretical Minimum, Susskind and Friedman provide a lively introduction to this famously difficult field, which attempts to understand the behavior of sub-atomic objects through mathematical abstractions. Unlike other popularizations that shy away from quantum mechanics' weirdness, Quantum Mechanics embraces the utter strangeness of quantum logic. The authors offer crystal-clear explanations of the principles of quantum states, uncertainty and time dependence, entanglement, and particle and wave states, among other topics, and each chapter includes exercises to ensure mastery of each area. Like The Theoretical Minimum, this volume runs parallel to Susskind's eponymous Stanford University-hosted continuing education course. An approachable yet rigorous introduction to a famously difficult topic, Quantum Mechanics provides a tool kit for amateur scientists to learn physics at their own pace.

An Introduction to Quantum Physics CRC Press

After a quarter century of discoveries that rattled the foundations of classical mechanics and electrodynamics, the year 1926 saw the publication of two works intended to provide a theoretical structure to support new quantum explanations of the subatomic world. Heisenberg's matrix mechanics and Schrodinger's wave mechanics provided compatible but mathematically disparate ways of unifying the discoveries of Planck, Einstein, Bohr and many others. Efforts began immediately to prove the equivalence of these two structures, culminated successfully by John von Neumann's 1932 volume "Mathematical Foundations of Quantum Mechanics." This forms the springboard for the current effort. We begin with a presentation of a minimal set of von Neumann postulates while introducing language and notation to facilitate subsequent discussion of quantum calculations based in finite dimensional Hilbert spaces. Chapters which follow address two-state quantum systems (with spin one-half as the primary example), entanglement of multiple two-state systems, quantum angular momentum theory and quantum approaches to statistical mechanics. A concluding chapter gives an overview of issues associated with quantum mechanics in continuous infinite-dimensional Hilbert spaces.

Textbook for Students of Science and Engineering MIT Press

"Meticulously researched and unapologetically romantic, How the Hippies Saved Physics makes the history of science fun again." —Science In the 1970s, an eccentric group of physicists in Berkeley, California, banded together to explore the wilder side of science. Dubbing themselves the "Fundamental Fysiks Group," they pursued an audacious, speculative approach to physics, studying quantum entanglement in terms of Eastern mysticism and psychic mind reading. As David Kaiser reveals, these unlikely heroes spun modern physics in a new direction, forcing mainstream physicists to pay attention to the strange but exciting underpinnings of quantum theory.

What Is Real? John Wiley & Sons

"Physicists have grappled with quantum theory for over a century. They have learned to wring precise answers from the theory's governing equations, and no experiment to date has found compelling evidence to contradict it. Even so, the conceptual apparatus remains stubbornly, famously bizarre. Physicists have tackled these conceptual uncertainties while navigating still larger ones: the rise of fascism, cataclysmic world wars and a new nuclear age, an unsteady Cold War stand-off and its unexpected end. Quantum Legacies introduces readers to physics' still-unfolding quest by treating iconic moments of discovery and debate among well-known figures like Albert Einstein, Erwin Schrödinger, and Stephen Hawking, and many others whose contributions have indelibly shaped our understanding of nature"--

Problem Solving in Quantum Mechanics Springer

This modern textbook offers an introduction to Quantum Mechanics as a theory that underlies the world around us, from atoms and molecules to materials, lasers, and other applications. The main features of the book are: Emphasis on the key principles with minimal mathematical formalism Demystifying discussions of the basic features of quantum systems, using dimensional analysis and order-of-magnitude estimates to develop intuition Comprehensive overview of the key

concepts of quantum chemistry and the electronic structure of solids Extensive discussion of the basic processes and applications of light-matter interactions Online supplement with advanced theory, multiple-choice quizzes, etc.

Applied Quantum Mechanics Springer Science & Business Media

Quantum Mechanics for Scientists and Engineers

Textbook for Students of Science and Engineering Academic Press

Classic undergraduate text explores wave functions for the hydrogen atom, perturbation theory, the Pauli exclusion principle, and the structure of simple and complex molecules. Numerous tables and figures.

A Second Course in Quantum Theory Cambridge University Press

This revised and updated textbook has been designed for advanced quantum physics courses. It includes discussion of scattering and integral quantum mechanics, relativistic quantum mechanics, quantum fields and many-body theory.

Lectures on Quantum Mechanics John Wiley & Sons

Quantum mechanics is one of the most challenging subjects to learn. It is challenging because quantum phenomenon is counterintuitive, and the mathematics used to explain such a phenomenon is very abstract, and difficult to grasp. This textbook is an attempt to overcome these challenges. Every chapter presents quantum ideas step- by- step in a structured way with a comparison between quantum and classical concepts. It provides a clear distinction between classical and quantum logic. Conceptual questions are provided after every important section so that the reader can test their understanding at every step. Such an approach aids in preventing misconceptions. Problem solving is not restricted to solving differential equations and integration. But it requires to systematically and creatively analyze a problem, to apply the new and powerful concepts for finding a solution and to understand the physical meaning of the solution. The tutorials on special topics are an effort to teach problem solving by actively engaging the reader in a thinking process, to apply the concepts and to understand the physical meaning of the solution. The simulations are provided for some of the topics. The simulations aid in the visualization of the quantum phenomenon, and for meaningful understanding of the mathematics. This approach may lead to development of "quantum mechanical intuition "as well as learning mathematical techniques for problem solving. Most importantly, the book is not flooded with numerous topics that makes the reader confused and distracted, rather the most important topics are discussed at a deeper level. The understanding of quantum mechanics is incomplete without understanding the early ideas and experiments that lead to the development of the quantum theory. Thus, the first two chapters of the book are dedicated to such topics. The key features of this book are: A simplified, structured, and step-by-step introduction to quantum mechanics. The simplification is attained through use of two-level system, step- by- step discussion of important topics in a simplified language at a deeper level, analogies, and visualization using illustrations and simulations A systematic arrangement of topics, and numerous worked- out examples. The presentation of the structure in the mathematical formalism of quantum mechanics provides clarity in understanding complicated and abstract mathematics. It also helps to understand the distinction between the quantum mechanical and classical approaches Conceptual questions at the end of every important section. The conceptual questions can be used in a classroom as a point of discussion between an instructor and students Tutorials on special topics. Simulations on special topics aid in the visualization of the physical phenomenon, and demonstration of the application of mathematics An in-depth discussion of the wave-particle duality, measurement problem, and their philosophical implications in Chapter 2 provides an understanding of the broader meaning of quantum mechanics