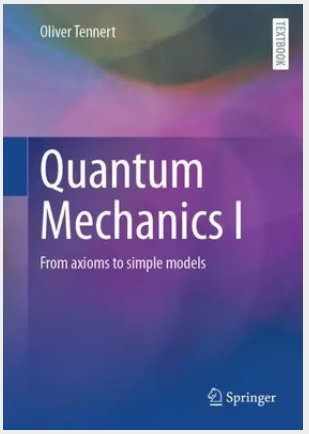
Tennert

Quantum Mechanics I

From axioms to simple models



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In a comprehensive presentation, the four volumes of this textbook develop and explore the foundations of non-relativistic quantum mechanics in depth, which makes them also ideally suited as a reference work. The first volume begins with a fascinating historical overview, rich in anecdotes, which introduces the key protagonists in quantum theory and the major milestones in their work. The text then proceeds to develop the Hilbert space formulation axiomatically and covers key fundamental topics: one-dimensional problems, the harmonic oscillator, and the WKB approximation as a link to classical physics. Special Features: Even complex topics are explained clearly and with illustrating examples. Numerous mathematical digressions elucidate general mathematical concepts. Particular highlights of the book include the development of propagator methods early on, the detailed mathematical treatment of coherent and squeezed states of the harmonic oscillator, and the thorough investigation of the classical limit. Translated with AI assistance and revised by the author. Contents: 1. Historical outline: The path to quantum mechanics - 2. The theoretical formalism of quantum mechanics - 3. One-dimensional problems - 4. The harmonic oscillator in quantum mechanics - 5. The WKB approximation and the classical limit Audience: The book is aimed at both undergraduate and graduate students and their instructors. Due to its multi-volume format, the wide range of topics, and references to original scientific papers, it is also a must-have for the bookshelf of anyone working in physics. Previous knowledge: Knowledge of theoretical mechanics, electrodynamics, and special relativity, as well as real analysis, linear algebra, and complex analysis, is assumed.

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