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By Vladimir Zelevinsky



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This two-volume set can be naturally divided into two semester courses, and contains a full modern graduate course in quantum physics. The idea is to teach graduate students how to practically use quantum physics and theory, presenting the fundamental knowledge, and gradually moving on to applications, including atomic, nuclear and solid state physics, as well as modern subfields, such as quantum chaos and quantum entanglement. The book starts with basic quantum problems, which do not require full quantum formalism but allow the student to gain the necessary experience and elements of quantum thinking. Only then does the fundamental Schrödinger equation appear. The author has included topics that are not usually covered in standard textbooks and has written the book in such a way that every topic contains varying layers of difficulty, so that the instructor can decide where to stop. Although supplementary sources are not required, "Further reading" is given for each chapter, including references to scientific journals and publications, and a glossary is also provided. Problems and solutions are integrated throughout the text.



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Editorial Review

Review

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"I am deeply convinced that this book will be of much value for any students entering the 'quantum world'. It will also be a useful reference for the more experienced scientists, as its topics extend into more recent achievements and approaches."

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"This two-volume set can be naturally divided into two semester courses, and contains a full modern graduate course in quantum physics." (ETDE Energy database, 2011)

From the Back Cover

This two-volume set, naturally divided into two semester parts, contains a full modern graduate course in quantum physics. The idea is to teach graduate students how to practically use quantum theory by presenting the fundamental knowledge and gradually moving on to broad applications, including atomic, nuclear, relativistic and many-body physics, as well as subfields of current interest, such as quantum chaos and quantum entanglement. The author discusses topics that are not usually covered in standard textbooks and has written the book in such a way that every subject contains varying layers of difficulty, so that the instructor can decide where to stop. Problems and solutions are integrated throughout the text.

From the contents:

- Origin of Main Quantum Concepts
- Wave Function and the Simplest Problems
- Bound States
- Dynamical Variables
- Uncertainty Relations
- Hilbert Space and Operators
- Quantum Dynamics
- Discrete Symmetries
- One-Dimensional Motion: Continuum
- Variational Approach and Diagonalization
- Discrete Spectrum and Harmonic Oscillator
- Coherent and Squeezed States
- Introducing Magnetic Field
- Macroscopic Quantum Coherence
- Semiclassical (WKB) Approximation
- Angular Momentum and Spherical Functions

- Motion in a Central Field
- Hydrogen Atom
- Stationary Perturbations
- Spin 1/2
- Finite Rotations and Tensor Operators
- Angular Momentum Coupling
- Fine and Hyperfine Structure
- Atom in a Static Field

About the Author

Vladimir Zelevinsky is Professor at the Department of Physics and Astronomy and National Superconducting Cyclotron laboratory at Michigan State University, USA. He graduated from Moscow University and worked for many years at the Budker Institute of Nuclear Physics in Novosibirsk where he got his Candidate of Science and highest Doctor of Science degrees (equivalent to a PhD). In the eighties he was Head of Theory Division at the Budker Institute and Head of Theoretical Physics at Novosibirsk University. He spent three years as a visiting professor at the Niels Bohr Institute in Copenhagen. He is the author of over 200 scientific publications, co-editor of the *EPL* journal and Associate Editor of the *Nuclear Physics* journal. He has also received many awards as the best teacher at MSU.

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