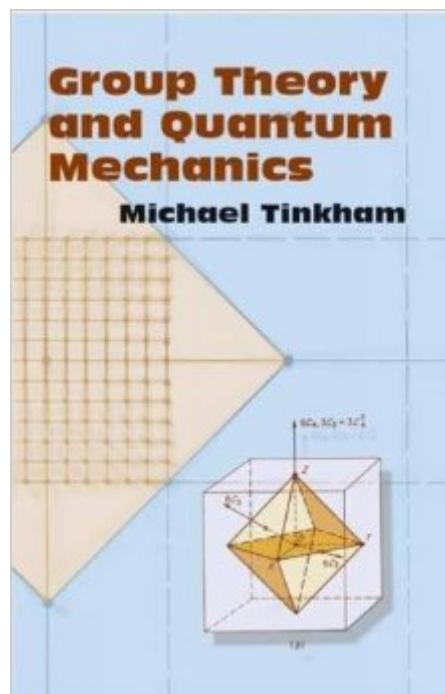


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Group Theory And Quantum Mechanics (Dover Books On Chemistry)



Synopsis

This graduate-level text develops the aspects of group theory most relevant to physics and chemistry (such as the theory of representations) and illustrates their applications to quantum mechanics. The first five chapters focus chiefly on the introduction of methods, illustrated by physical examples, and the final three chapters offer a systematic treatment of the quantum theory of atoms, molecules, and solids. The formal theory of finite groups and their representation is developed in Chapters 1 through 4 and illustrated by examples from the crystallographic point groups basic to solid-state and molecular theory. Chapter 5 is devoted to the theory of systems with full rotational symmetry, Chapter 6 to the systematic presentation of atomic structure, and Chapter 7 to molecular quantum mechanics. Chapter 8, which deals with solid-state physics, treats electronic energy band theory and magnetic crystal symmetry. A compact and worthwhile compilation of the scattered material on standard methods, this volume presumes a basic understanding of quantum theory.

Book Information

Series: Dover Books on Chemistry

Paperback: 340 pages

Publisher: Dover Publications (December 17, 2003)

Language: English

ISBN-10: 0486432475

ISBN-13: 978-0486432472

Product Dimensions: 5.6 x 0.7 x 8.5 inches

Shipping Weight: 12.8 ounces (View shipping rates and policies)

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Customer Reviews

I have attempted to read other books on group theory, especially those intended for physicists, including Weyl's book *The Theory of Groups and Quantum Mechanics*. Tinkham's book, however, is the only one that I have been able to understand relatively well. Tinkham gently takes you by the hand and starts you out on a tutorial that addresses the symmetry of a simple example from plane

geometry, and then gradually builds up to more sophisticated problems. Character tables and the various orthogonality and normalization relations that make them useful are developed and used for both simple (e.g. plane geometry) and more sophisticated problems. Lie Groups, Schur's Lemma, angular momentum, crystal symmetry, and nature's inability to conserve parity are among the topics addressed. The treatment of Lorentz and Poincare groups required for a more sophisticated understanding of quantum field theory, however, is not included in this book--for those topics Weinberg's (The Quantum Theory of Fields, Volume 1: Foundations) suggestion of Tung's Group Theory in Physics would seem to be reasonable. I was also not able to understand Tinkham's proof of the Vector Addition Theorem for angular momentum.

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