

PRINCIPLES OF QUANTUM MECHANICS as Applied to Chemistry and Chemical Physics

This text presents a rigorous mathematical account of the principles of quantum mechanics, in particular as applied to chemistry and chemical physics. Applications are used as illustrations of the basic theory.

The first two chapters serve as an introduction to quantum theory, although it is assumed that the reader has been exposed to elementary quantum mechanics as part of an undergraduate physical chemistry or atomic physics course. Following a discussion of wave motion leading to Schrödinger's wave mechanics, the postulates of quantum mechanics are presented along with the essential mathematical concepts and techniques. The postulates are rigorously applied to the harmonic oscillator, angular momentum, the hydrogen atom, the variation method, perturbation theory, and nuclear motion. Modern theoretical concepts such as hermitian operators, Hilbert space, Dirac notation, and ladder operators are introduced and used throughout.

This advanced text is appropriate for beginning graduate students in chemistry, chemical physics, molecular physics, and materials science.

A native of the state of New Hampshire, Donald Fitts developed an interest in chemistry at the age of eleven. He was awarded an A.B. degree, *magna cum laude* with highest honors in chemistry, in 1954 from Harvard University and a Ph.D. degree in chemistry in 1957 from Yale University for his theoretical work with John G. Kirkwood. After one-year appointments as a National Science Foundation Postdoctoral Fellow at the Institute for Theoretical Physics, University of Amsterdam, and as a Research Fellow at Yale's Chemistry Department, he joined the faculty of the University of Pennsylvania, rising to the rank of Professor of Chemistry.

In Penn's School of Arts and Sciences, Professor Fitts also served as Acting Dean for one year and as Associate Dean and Director of the Graduate Division for fifteen years. His sabbatical leaves were spent in Britain as a NATO Senior Science Fellow at Imperial College, London, as an Academic Visitor in Physical Chemistry, University of Oxford, and as a Visiting Fellow at Corpus Christi College, Cambridge.

He is the author of two other books, *Nonequilibrium Thermodynamics* (1962) and *Vector Analysis in Chemistry* (1974), and has published research articles on the theory of optical rotation, statistical mechanical theory of transport processes, nonequilibrium thermodynamics, molecular quantum mechanics, theory of liquids, intermolecular forces, and surface phenomena.