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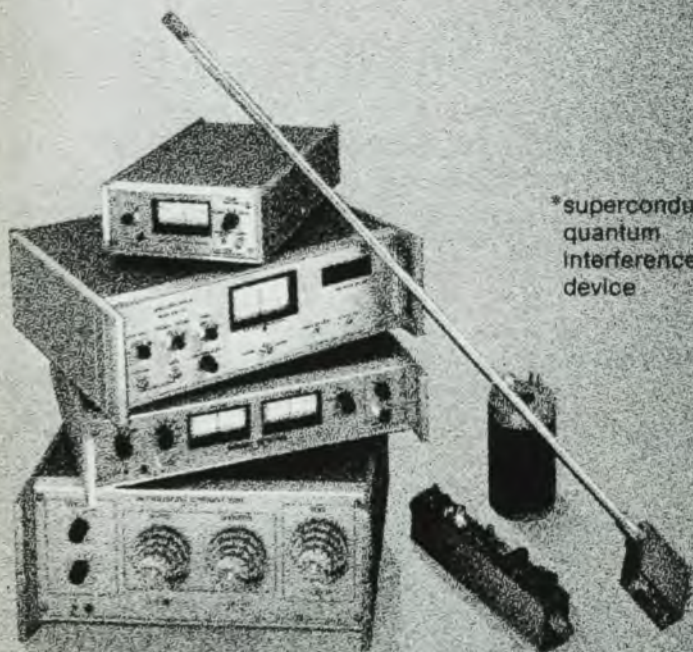
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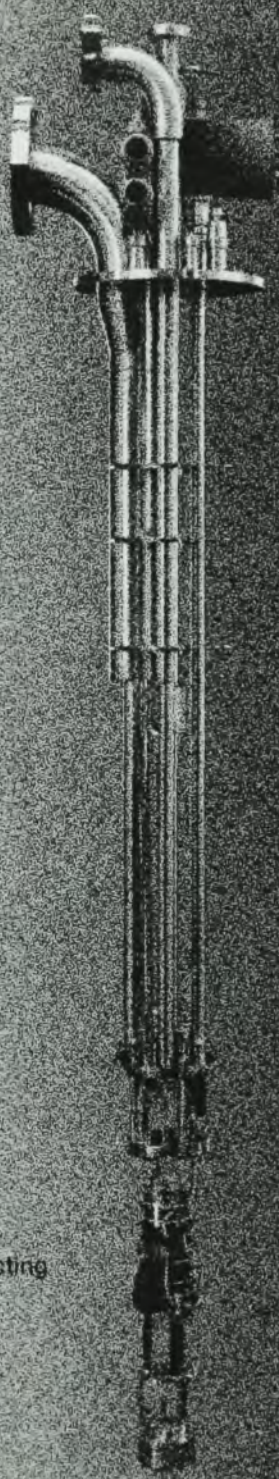


*superconducting quantum interference device



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Speech and Hearing Association¹ and by B. L. Welch and A. S. Welch² appeared, and before the highly competent but less technical books by T. Berland³, R. Taylor⁴, and R. A. Baron⁵ became available.

WILLIAM A. SHURCLIFF
Cambridge, Mass.

References

1. *Noise as a Public Health Hazard*, Proceedings of the American Speech and Hearing Association National Conference, June 13-14, 1968, Washington, DC, W. D. Ward, J. E. Fricke, eds. (1969)
2. B. L. Welch, A. S. Welch, *Physiological Effects of Noise*, Plenum Press, New York. (1970)
3. T. Berland, *The Fight for Quiet*, Prentiss-Hall, Englewood Cliffs, N.J. (1970)
4. R. Taylor, *Noise*, Penguin Books, Middlesex, England. (1970)
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Molecular Interactions and Electronic Spectra

Noboru Matoga, Tanekazu Kubota
504 pp. Marcel Dekker, New York, 1970.
\$28.50

The object of this book is to provide an introduction to the effects on molecular electronic spectra of molecules that result from interactions between molecules. Studies of these effects have been the basis for a very large number of experimental and theoretical papers during the past three decades. Such studies are of interest not only to the pure spectroscopist who notices these effects and wishes to understand them, but also they are fundamental to all branches of chemistry. After all, is not the basis for understanding chemical reactions provided by an understanding of the electronic changes that occur when two molecules come together to begin the reaction? Because this book is one of the first to undertake a unified treatment of these phenomena, it will certainly be welcomed by those who recognize the potential of such studies, but who have not previously been able to find any simple introduction to the subject. The book is written at a level suitable for graduate students, but it will certainly be helpful to anyone wishing an introduction to these problems, as well as stimulating to those already engaged in such studies.

The book begins with a brief introduction to the elements of quantum mechanics, with special emphasis on perturbation theory. This introduction is not for a beginner, but is a useful review for someone already familiar with introductory quantum mechanics.

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This chapter is followed by longer chapters discussing quantum-mechanical methods of calculating the energies and wavefunctions associated with molecular states and the probabilities of a transition between these states induced by radiation. A final introductory chapter reviews radiationless transition processes in molecules, both for gases and for solids or solutions.

In the remaining two-thirds of the book, the authors discuss intermolecular interactions and their effects on the electronic spectra, beginning with the transfer of electronic excitation from one molecule to another. The Förster mechanism for this interaction is given, and several interesting examples are discussed. There are two long chapters on charge-transfer complexes and on hydrogen-bonding complexes. A short discussion of solvent effects is followed by the climactic chapter on excimers.

The authors have been active in this research area: Noboru Mataga has contributed in all areas, but is probably best known for his provocative and innovative interpretation of excimer spectra; Tanekazu Kubota has been especially concerned with spectra of complexes.

In general, the book appears to be very well done. Each subject is begun by a review of the theory, in some cases giving the several points of view that must be considered when trying to understand the phenomena that are observed. In presenting this background the authors sometimes give results from several treatments that are not always consistent. It would have been helpful if they had always given an opinion on which of such conflicting viewpoints might be preferred. However, the authors have provided a very useful introduction to the theoretical models for these different phenomena. For example, the review of the theory of charge-transfer complexes provides a good introduction to this subject that is generally free of the errors and misconceptions that have marred earlier attempts at a concise presentation.

Because the interactions discussed here are weak interactions, it is often difficult to obtain clearcut answers distinguishing between two alternative explanations for a particular observation. For this reason, the reader must often take statements with a grain of salt; the possible explanations are meant to be just that, so that the reader should not always expect them to be the truth, but rather a plausible explanation. Thus, for example, since the book was written, it has become clear in work reported by M. Tamres and by S. D. Christian that the early measurements of formation constants and molar absorption coefficients for the very weak complexes between aromatic

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1964 (2nd prtg., 1971) 282 pp.t
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This volume contains material which otherwise can be found only scattered over several large, specialized textbooks. Emphasis is placed on applications of quantum mechanics to atomic collisions.

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This second edition of a successful text is written for senior undergraduate and graduate courses in modern thermodynamics, kinetic theory and statistical mechanics. The author emphasizes atomic and quantum aspects, and shows how all of thermal physics can be understood in terms of a single probabilistic theory. Thermal Physics is divided into three parts each of which offers much new information as well as strengthened introductory sections.

1969, 431 pp., illus.t
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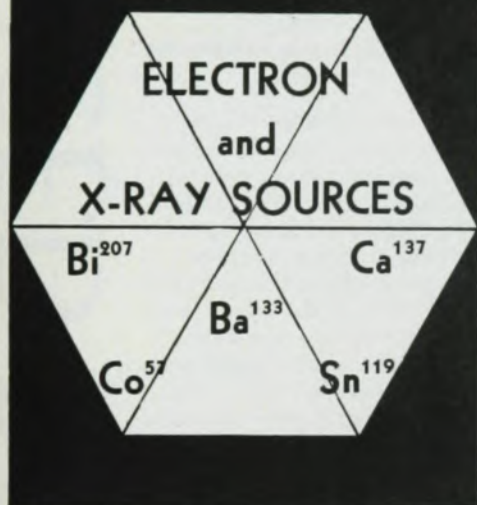
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donor molecules and iodine had much larger experimental errors than was previously admitted. As a result, in the chapter on charge-transfer complexes the complicated discussion of the variation of intensity of the charge transfer band with donor strength for aromatic donor molecules is probably unnecessary, although the discussion does indicate a number of factors that should still be considered. Similarly, the discussion of solvent effects of charge-transfer complexes would now be simplified, since better data for the gas-phase studies of complexes have become available from recent studies, mostly by Tamres.

In summary, this book provides the reader with a good, balanced, provocative, and generally sound introduction to the theory of the effect of intermolecular interactions upon electronic states of molecules and a very useful survey of experimental methods of studying these effects.

WILLIS B. PERSON
*University of Florida
Gainesville*

The Elements of Neutron Interaction Theory

A. Foderaro
582 pp. MIT Press, Cambridge, Mass., 1971. \$19.95

The interactions of neutrons with matter are among the more important fundamental processes that govern the design and operation of fission reactors as well as the fusion reactors of the future. All nuclear-engineering curricula, therefore, provide the student with a thorough understanding of the physical processes involved in these interactions. He learns about the meaning and measurement of neutron cross sections and about the theoretical techniques that permit their estimation when no adequate measurements exist. Anthony Foderaro's text book for a first-year graduate course in nuclear engineering is unique in that it concentrates almost exclusively on the theoretical tools for describing and calculating neutron cross sections.

Assuming a minimum previous knowledge of physics, the first third of the book guides the reader from Newtonian mechanics through the Lagrangian and Hamiltonian formulations to quantum mechanics, including collision theory. This brief but often formally detailed condensation of the traditional course material in classical and elementary quantum mechanics is likely to overwhelm the intended student unless it is supplemented by generous readings from among the many

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