mal manipulation. The depth of understanding aimed at means that it is not a particularly easy book for graduate students, but the concreteness of the examples provided should considerably aid the mastering of such elusive ideas as vacuum fluctuations, renormalization, real and bare particle states, and other such notions that quantum field theory has made the stock-in-trade of physics.

This is the first textbook that the reviewer recalls encountering which has been priced on the department store principle of making nine look like eight. It should not need that aid to sales.

Atomic Spectra. By H. G. Kuhn. 436 pp. Academic Press Inc., New York, 1962. $13.00. *Reviewed by William F. Meggers, National Bureau of Standards.*

FOLLOWING the discovery of "multiplets" by M. A. Catalán in 1921, there was a flood of scientific papers and books on atomic spectra for some twenty years. Among books, we may mention those by Sommerfeld, by Hund, by Back and Landé, by Pauling and Goudsmit, by Ruark and Urey, by Candler, by White, by Herzberg, and by Condon and Shortley.

In April 1961, H. G. Kuhn of Oxford wrote: "There appears to be a need for an up-to-date book on Atomic Spectra treating the subject in an introductory manner, yet more thoroughly than general text books on modern physics are able to." Kuhn's book has seven chapters: Introduction, Theoretical Methods, The Simple Spectra, Periodic Table and X-ray Spectra, Complex Spectra, Hyperfine Structure and Isotope Shift, Width and Shape of Spectral Lines. A ten-page appendix containing intensity ratios in multiplets, the Periodic Table, ground states and ionization potentials, nuclear moments of natural isotopes, symbols, definitions, and constants, is followed by a 567-item bibliography, and by author and subject indexes.

The author states that "the approach is that of the Physicist, not the Mathematician, starting from observed facts and classical concepts, and intentionally stressing the correspondence between classical and quantum physics." However, the absence of historical development, and the total lack of information about spectroscopic apparatus (light sources, dispersing devices, detectors) and experiments, give the impression that theory is preferred over practice. For example, on page 2 a "discrete" spectrum is said to result from a Fourier analysis performed by the spectroscope!

On page 8, we read "A commission on wavelength standards and spectrum tables set up by the International Astronomical Union has recommended that a line of the isotope 86 of krypton be adopted as a new primary standard". That recommendation originated in an Advisory Committee on Redefining the Meter, appointed in 1953 by the General Conference on Weights and Measures.

On pages 85 and 86, the Lyman, Balmer, Paschen, Brackett, and Pfund series in the spectrum of hydrogen are mentioned but the Humphreys series is ignored. On pages 174 and 186, we are told that intersystem combinations in the first spectrum of beryllium are so weak that they have not been observed with certainty. Such sins of omission and commission are difficult to explain since Prof. Kuhn quotes copiously from three volumes of C. E. Moore's *Atomic Energy Levels* (see Volume 3, pp. 238 and 239 for up-to-date (1958) information on the above topics).

In *Atomic Spectra*, equations, figures, tables, and literature references are numbered serially in each chapter and the latter are collected in a bibliography near the end. Among hundreds of cross references, only a few give the page number; the great majority are indicated by chapter number only. The reader is soon irritated, if not discouraged, in seeking interchapter connections for which no page numbers are given.

This book is illustrated by eighteen halftone plates of well-chosen examples of absorption and emission spectra but, in every case (except one), the reproductions, without warning, are of negatives.

The electron configurations and ground terms of 22 rare-earth elements (57 La to 70 Yb and 89 Ac to 96 Cm) are tabulated (pp. 320 and 321). Ten of these are in parentheses (called brackets) to show that they are theoretical and uncertain; all of them have been experimentally confirmed or corrected.

Despite the above-mentioned, and other minor, defects in the first printing of *Atomic Spectra*, we believe this book will appeal to teachers and advanced students because it is the most modern general discussion of this subject and "It is likely that semi-empirical methods, combining spectroscopic data with theoretical concepts, will continue to play a great part in the study of atoms" (p. 3).

Fundamental Problems in Statistical Mechanics. Proc. NUFFIC Internat'l Summer Course (Netherlands, Aug. 1961). Compiled by E. G. D. Cohen. 249 pp. (North-Holland, Amsterdam) Interscience Division, John Wiley & Sons, Inc., New York, 1962. $7.50. *Reviewed by Nandor L. Balazs, State University of New York at Stony Brook.*

IN the United States, statistical mechanics is not a fashionable subject to be pursued in physics departments, and much of the work is being done either in chemistry departments or in the research laboratories of different organizations. Not so in Holland, where the physics departments at the Universities of Leyden, Utrecht, Amsterdam, and Groningen are all active in this field. For this reason it seems natural that the first summer school in theoretical physics held in Holland (1961) should deal with problems in statistical mechanics. All the lectures that were given are published in this volume, except those by G. E. Uhlenbeck on condensation. The first striking feature is the speed of publication: less than one year elapsed between the summer school and the book's publication; both the editor and the North-Holland Publishing Company should be congratulated for this accomplishment.

Five of the articles deal with the theory of irreversible processes, four others with diverse topics. H. A. Lorentz in his famous Collège de France lectures (1912) coined his famous remark concerning the insensibility of the entropy against its different statistical definitions. Reading these articles on irreversible processes, it seems that there is a similar insensibility of the transport equations against the various assumptions which go into their derivation. N. C. van Kampen, in his article, emphasizes the importance of a macroscopic subdivision of the space in the derivation of the basic "master equation". He is inclined to disbelieve Bogolyubov's method of derivation of the transport equation (p. 185) which in turn forms the content of E. G. D. Cohen's lectures. This is one of the clearest expositions of Bogolyubov's fundamental ideas and of the recent work done in this field by the lecturer and by Uhlenbeck with his school. L. van Hove reports on his work concerning the derivation of the master equation. His ideas in turn differ both from Bogolyubov's and from van Kampen's, since in his approach the irreversible behavior of a physical system depends upon particular properties of the perturbation. E. W. Montroll's paper deals with the derivation of the quantum-mechanical kinetic equations. P. Mazur discusses the foundations of nonequilibrium thermodynamics.

The remaining papers contain different topics. N. M. Hugenholtz describes the field-theoretical approach to the description of interacting fermions. K. Huang gives an elementary outline concerning our understanding of superfluid helium. H. Wergeland discusses special topics in fluctuations and in stochastic processes which engaged his and his co-workers' attention during recent years. Finally, the book starts with a survey of statistical mechanics by B. R. A. Nijboer.

It is hardly necessary to add that all the lectures are clear, comprehensive, and extremely interesting. May it serve as an appetizer to many others.

Analogue Computation. By R. W. Williams. 271 pp. Academic Press Inc., New York, 1961. $9.50. *Reviewed by Peter L. Balise, University of Washington.*

ALTHOUGH Dr. Williams states in his preface that "relatively few books have been written on analogue computing", there is ample variety ranging from laymen's introductions to good treatises. Nevertheless, this work is a unique contribution; emphasizing components, it surveys the subject while discussing interesting details not commonly found elsewhere. And its British flavor, both in equipment described and style of writing, is refreshing.

The book requires no prior knowledge other than elementary calculus and electrical engineering, but it is apparently not at all intended to prepare one to use a computer. Scaling is not mentioned, and there is no explanation of simulating differential equations, even in the chapter on operational amplifiers. The introductory five pages of this chapter emphasize transfer functions obtainable by input and feedback networks; the remainder is devoted to effects of component imperfections and amplifier design. The other chapters include unusually extensive discussions of potentiometer loading, potentiometers as function generators, Hall-effect multipliers, and some other topics both relatively rare and common, but little on techniques of use. For example, the section on time delays only illustrates the second-order Padé approximation and mentions other techniques. The most unusual feature is the attention given to ac methods and servomechanisms. The application of servos to ac computation is emphasized, but there is also considerable discussion of general aspects like servo stabilization.

Notwithstanding its subtitle, *Techniques and Components*, this volume is not recommended as a text or reference for general computer users. But designers and users of special-purpose computers, particularly ac equipment, will find it interesting.

Quantum Mechanics for Mathematicians and Physicists. By Ernest Ikenberry. 269 pp. Oxford U. Press, New York, 1962. $8.00. *Reviewed by J. Gillis, Weizmann Institute of Science.*

THIS book is intended for senior undergraduate or junior graduate students. There are already so many books, all covering more or less the same material, that it is refreshing to be able to recommend this one. The exposition is extremely lucid. Moreover, the presentation leans very heavily on operators, commutators, Poisson brackets, etc., and though this may be conceptually tougher than the straight Schrödinger approach, it is probably a better introduction to more advanced work. Another point is the systematic parallel discussion of many problems in both the coordinate and momentum representations. It happens too often that a student is taught in terms of the former and can never afterwards think of the latter as anything but a mathematical trick. A work in which the equal status of both representations is stressed is to be welcomed. The examples are well chosen and the historical notes are interesting.

Orthogonal Polynomials. Estimates, Asymptotic Formulas, and Series of Polynomials Orthogonal on the Unit Circle and on an Interval. By L. Ya. Geronimus. Transl. from Russian. 242 pp. Consultants Bureau Enterprises, Inc., New York, 1961. $9.75. *Reviewed by T. Teichmann, General Atomic Division, General Dynamics Corporation.*

ORTHOGONAL polynomials form the simplest orthogonal sets, except for the trigonometric functions, and as such are of great interest as a basis for the expansion of various classes of functions. While the physicist is mainly interested in special properties of these series expansions, the mathematician is generally more concerned with questions of convergence and asymptotic behavior, and it is these aspects to which attention is directed here.

Most of the treatment involves polynomials or-