

procedure used has led to bad curvature, appearing as distorted print in a number of the articles.

Since it has often been remarked how expensive volumes of this type are, it should be pointed out that this volume is relatively inexpensive, indeed being less than one cent per page in the paperbound version.

Theory of Superconductivity. By J. R. Schrieffer. 282 pp. Benjamin, New York, 1964. \$10.00.

Reviewed by John E. Mansfield, Harvard University.

For those who like presentations of good theories by the originator, this volume will be a nice acquisition. The stress is on the fundamentals of soft superconductors. The treatment of pairing correlations is handled by several techniques; one is gratified that the clarity of presentation has not been destroyed by this, though elegance suffers a bit. A good-sized set of applications of pairing to a variety of nonsuperconductivity problems is very welcome. Some attention is given to phonon interactions in Green's functions.

Actually, superconductivity is relegated to the last eighty pages. This is really not a loss, as the weight given to the pairing approach in earlier chapters makes the going easy here and allows the author to proceed in his customary elegance. A long section on electromagnetic properties of superconductors is especially well done and gives a good sketch of the main results.

A somewhat more comprehensive index would make this an admirable textbook. The exemplary purpose of the Benjamin series is somewhat defeated by not having this volume available in paperback.

The Ambidextrous Universe. By Martin Gardner. 294 pp. Basic Books, New York, 1964. \$5.95.

Reviewed by L. Marton, National Bureau of Standards.

My first impression after reading Martin Gardner's new book was that I ought to write this book review in verse. To be precise, what I wanted to do is to follow the style and format of *The Walrus and the Carpenter* from Lewis Carroll's *Through the*

Looking Glass. My justification for doing so was twofold. First of all Gardner refers quite often to *Through the Looking Glass* in his new book, and, second, his style is sufficiently whimsical to justify the writing of the book review in the style of *The Walrus and the Carpenter*. I am sorry to report that I sadly failed in this task. My talents are not sufficient, and the few little attempts I made I had to throw away. You will have to content yourself with a review in prose.

Martin Gardner hardly needs an introduction to readers of *Physics Today*. I belong to the very numerous fans who look forward with great pleasure to his monthly column of mathematical puzzles and similar problems in the *Scientific American*. I must confess to a certain prejudice in favor of the book even before I started reading it. In the book he starts out with considerations of mirrors and mirror problems and leads us by easy stages into all considerations of symmetry in physics, chemistry, astronomy, biology, art, music, poetry, and even in magic. He writes in a deceptively easy style which makes the book exceedingly good reading for all kinds of audiences. If I say all kinds, I do mean from young to old because what appears to be at first a very easy introduction into the matter gradually develops into some very profound observations and ends up with problems of the conservation of parity. Toward the end of the book he comes to what he calls the "Ozma problem". The name derives from Project Ozma which was started in 1960 and which attempted to establish communications with other living creatures somewhere out in the universe. The problem which Gardner analyzes very thoroughly is how to convey certain notions to an entirely different civilization and whether there is a means to convey such notions as left and right, north and south, clockwise and counterclockwise. He points out in a very thorough and excellent analysis that until the advent of our new knowledge about nonconservation of parity, there was absolutely no way of conveying any of these ideas to somebody who was not actually cog-

nizant with the definition of these notions. These notions are entirely based on convention. For the first time, however, we possess means of conveying information about one experiment which would distinguish these conventional definitions and which we can relay without ambiguity.

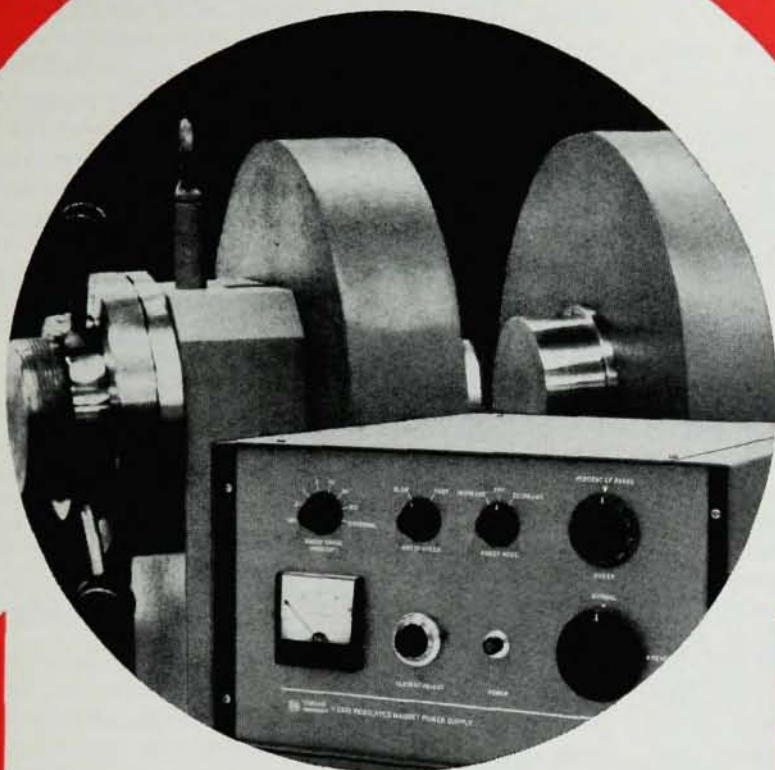
All in all I am really happy that I had the opportunity of reviewing this book. It contains a certain number of very simple problems which make it useful as teaching material, and the simple illustrations by John Mackey are very nice. I recommend the book without any reservations.

The Theory of Analytic Functions. By A. I. Markushevich. Translation from the Russian. 374 pp. Hindustan Publishing Co., Delhi, 1963. \$10.00.

Reviewed by Dagmar Renate Henney, The George Washington University.

Markushevich, Marcouchevitch, Markuševič or whichever way the reader finds the author's name transcribed is one of the most popular Russian mathematicians. His popularity is of course well deserved and is exemplified in this book also.

The Indian version of his *Theory of Analytic Functions* is based on the Russian text which was first published in Moscow in 1944 and then complemented and revised for the 1961 edition. The book is intended as a textbook on the theory of analytic functions. As such it covers the syllabus of the physics-mathematics departments of the Soviet universities. It provides an excellent and detailed text for graduate students of various universities and technical institutes though the beginning of the book represents essentially an introduction to the general theory and a preparation for the study of special functions and of various recent developments. The author develops a multitude of examples, many of them of an applied nature. The proofs of the theorems are extremely lucid and precise, and the reader is reminded of Knopp's volume on the *Theory of Functions*, though Markushevich's text is much more advanced and gives more examples. It is also on a much higher level than, for example, the books by Franklin or Churchill on



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the same subject matter. Even a topologist might enjoy reading Markushevich's chapter on Riemann surfaces in which he develops the general theory of such surfaces by using topological tools.

After a descriptive and historical introduction, the author discusses mainly fundamental notions of the theory in the first three chapters. Complex numbers and operations on them, point-sets in the plane, complex functions, differentiation, and integration are considered, and geometrical interpretations as well as hydromechanical interpretations are given. The third chapter also contains ramifications of Cauchy's theorem. A very nice proof of Cauchy's integral theorem is given in Chapter 5. The author discusses Cauchy's integral formula, Liouville's theorem, Morera's theorem, Weierstrass' theorem, the Poisson integral, and Schwartz' formula in Chapter 6. The remaining four chapters cover in detail—and again with various examples—Laurent series, isolated singularities, entire and meromorphic functions, residues and their applications, the principle of the argument, analytic functions, Riemann surfaces, elliptic functions, and the Christoffel-Schwartz formula.

This book represents indeed a welcome addition to the library of any mathematician, physicist, or engineer who is interested in the theory of analytic functions and its many beautiful applications.

Atomic Spectra and the Vector Model. (2nd ed.). By Chris Candler. 412 pp. Van Nostrand, Princeton, N. J., 1964. \$18.50. Reviewed by William F. Meggers, National Bureau of Standards.

After the lapse of a quarter century since the publication of a major treatise on atomic spectra, the present decade has already produced at least five, viz., *Quantum Theory of Atomic Spectra* by J. C. Slater in 1960 (reviewed in *Physics Today*, May 1961, p. 40); *Atomic and Molecular Spectroscopy* by M. A. El'yashevich in 1962; *Atomic Spectra* by H. G. Kuhn in 1962 (reviewed in *Physics Today*, December 1962, p. 64); *Optical Spectra of Atoms* by S. E. Frish in 1963;

and *Atomic Spectra and the Vector Model* by Chris Candler in 1964.

The last is a complete revision of a two-volume first edition published in 1937. In both editions Candler has omitted the heavy mathematics of quantum mechanics and striven to hang the immensely complicated facts of atomic spectra on the easily comprehended vector model. For justification, he quotes the following letter from Michael Faraday to Clerk Maxwell: "There is one thing I would be glad to ask you. When a mathematician engaged in investigating physical actions and results has arrived at his own conclusions, may they not be expressed in common language as fully, clearly, and definitely as in mathematical formulae? If so, would it not be a great boon to such as we to express them so—translating them out of their hieroglyphics that we also might work upon them by experiment." Furthermore, a dozen physicists and probably a hundred chemists use the spectrograph for every one who is interested in the theory of atomic energy states. In particular, a spectrochemist wishing to make rational choices of analysis lines requires experimental information primarily concerning wavelengths (or wavenumbers), relative intensities, quantum numbers, and observed excitation energies.

Candler's *Atomic Spectra and the Vector Model* gives relatively few of these data but it is almost unique in explaining their importance and where they can be found. All phases of atomic spectroscopy, from Absorption Spectra to Zeeman Effect (except Stark Effect), are presented in twenty chapters, each ending with a brief bibliography and selected references, frequently to first announcements, but also including some dated 1964. This second edition, like the first, contains a profusion of figures and tables, but eight photographic plates that aptly illustrated the first have been omitted from the second. This omission of photographed spectra is regretted, in view of what Confucius is reputed to have said about a picture.

This volume includes five appendixes: 1. Natural Atomic Units (in mks and Atomic Units); 2. General Bibliography; 3. Rydberg Term Table

(recomputed with the modern value of the Rydberg constant); 4. Grottrian Diagrams; and 5. Tables of Protonic Nuclei, Neutronic Nuclei and Deuteron Nuclei; it ends with a 10-page general index. Among the appendixes, simplified Grottrian diagrams of 82 spectra characteristic of 72 chemical elements (excluding lanthanons and actinons) are original and unique; they give the wavelengths of intense radiations arising mainly from transitions of one excited electron to the ground (or to a metastable) level of the atom or ion.

Candler's pragmatic account of atomic spectra will certainly appeal to all applied spectroscopists and to students who are frightened by quantum mechanics.

Physical Chemistry (2nd ed.). By E. A. Moelwyn-Hughes. 1334 pp. (Pergamon, Oxford) Macmillan, New York, 1964. \$12.50.

Reviewed by Victor W. Bolie, Autonautics Division, North American Aviation.

It is unfortunate that so many textbooks in physical chemistry are amateurish in mathematics and thus hazy in theoretical foundation. An exception is this well-written, comprehensive text which presumes the reader is fluent in applied mathematics through the level of partial differential equations and boundary-value problems.

The result is a carefully woven net of rigorous, but modestly bounded, theory around which the host of experimental facts of physical chemistry are fitted. The few typographical errors remaining in the new edition (e.g., the axis labels in the illustration on page 81, and the designation of gram instead of gram-mole on page 99) are trivial and do not detract from the concise style of presentation.

The book begins with the mathematical and experimental foundations of molecular kinetics and the quantum theory and then goes on to a discussion of periodicity and radioactivity, thermodynamics, intermolecular energy, partition functions, light dispersion and absorption, triatomic molecules, and the Raman effect. The various states of matter, including the crystalline, gaseous, metallic, liquid,