

MHD when it looks technologically possible for a public utility, and after several are built and operating, we will start worrying about comparative costs.

There appear to be many applications in the whole rocket-aerospace technology, and MHD may prove to be especially useful here. That MHD will become a practical method of generating electric power seems to be certain. When this can be done on a wide scale and in an economic manner may be another, but not unrelated, question.

All together Rosa has assembled a fine book, and certainly it is a valuable addition to the literature if only for the large number of references at the end of each chapter.

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The reviewer is a professor at Marquette University.

Localized-spin magnets

SPIN WAVES. By A. I. Akhiezer, V. G. Bar'yakhtar, S. V. Peletninskii. Trans. from Russian by S. Chomet. 369 pp. Wiley (Interscience), New York, 1968. \$21.50

by MICHAEL WORTIS

"The Theory of Magnetic Insulators at Low Temperatures" might have been a descriptive subtitle for this somewhat disappointing translation from the Russian. The authors confine themselves almost exclusively to localized-spin magnets. There is only a cursory introduction to the physical origin of exchange (based on the Heitler-London hydrogen molecule) and no attempt is made to relate the sign and magnitude of exchange integrals to underlying atomic and solid-state properties.

Within these chosen limitations, the material divides broadly into two sections. The first discusses long wavelength, semiphenomenological and macroscopic magnetism (including macroscopic spin-wave theory, magnetic resonance and magnetoelastic effects). The second deals with the microscopic treatment of the Heisenberg Hamiltonian (including the Holstein-Primakoff transformation, spin-wave dynamics and kinetics and thermodynamics). The discussion covers ferro-, ferri- and antiferromagnetism and includes dipolar effects and anisotropy. Perhaps

the major omission is any mention of the more complicated types of magnetic ordering, for example, spiral structures.

The authors, from the Physico-Technical Institute of the Ukrainian Academy of Sciences in Kharkov, have extremely broad interests (Akhiezer's book with V. B. Berestetsky, *Quantum Electrodynamics*, is well known) and have made important contributions to the theory of magnetism. These contributions are primarily in the area of macroscopic magnetism; so it is not surprising to find that the first section has a coherence and elegance of exposition that the microscopic-development section lacks. The treatment is detailed and readable throughout, if somewhat uneven. At best it is quite lucid; at worst (especially in the microscopics), a mechanical reworking of inadequately acknowledged journal material.

The major defect of the work, however, is its total failure to make contact with experiment. How can a book entitled *Spin Waves*—indeed, a book that discusses the *formalism* of neutron-magnon scattering—fail even to make reference to the direct observation of spin waves by Brockhouse and others? Although a few (very few) experimental references are included, there is no discussion of experiments in the book and no attempt to compare theoretical predictions with experimental observation. This omission will often make it difficult for the uninitiated reader to assess the motivation for and relevance of the theory presented.

It is worth noting the authors' reluctance to use visual aids. There is a total of only 12 figures in the text, of which seven are lifted, without acknowledgment, from a single article and occur on five successive pages. The referencing, particularly in the second section, is inadequate by Western standards (for example, Freeman Dyson's famous T^4 term in the Heisenberg free energy appears for the first time on page 342 without reference).

The level of presentation is appropriate to the first- or second-year graduate student, although a previous exposure to many-particle theory will be helpful in later chapters. Because of its narrow scope, the book would not make a good text for a course on magnetism. For the experts, its sparse referencing will be a drawback.

One might have hoped that this book would be a fitting companion

volume to Conyers Herring's careful and provocative *Exchange Interactions Among Itinerant Electrons* (G. T. Rado and H. Suhl, eds., *Magnetism*, volume 4). Unfortunately, it is not.

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Michael Wortis is an assistant professor at the University of Illinois.

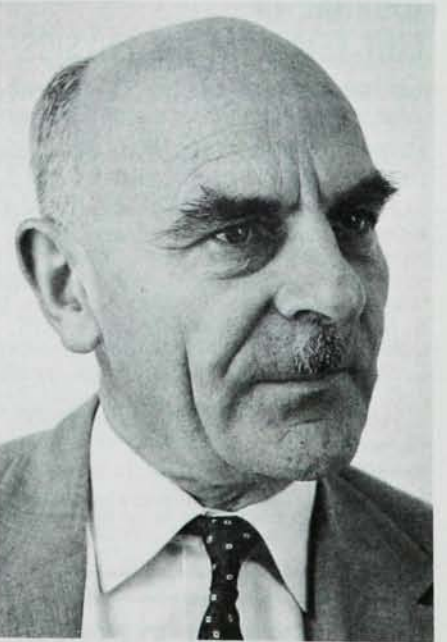
A festschrift to Massey

ADVANCES IN ATOMIC AND MOLECULAR PHYSICS, VOL. 4. D. R. Bates, Immanuel Estermann, eds. 465 pp. Academic, New York, 1968. \$20.00

by SIDNEY BOROWITZ

This volume is the fourth in a series, whose principal function is to provide a topical review of some aspects of atomic and molecular physics. Past volumes in this series have devoted themselves to a broad range of subjects in this general field, the choice of the subjects dictated by some special results and special activity in the area shortly before the volume was published.

This volume maintains the tradition by devoting itself to a large number of topics of current interest. That it can do so is all the more remarkable because the contributors to volume 4 are all former students or colleagues of Sir Harrie Massey, for whom this volume is a festschrift. The list of contributors and the wide range of topics covered are an accurate indica-



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CRYOGENICS AND REFRIGERATION: A BIBLIOGRAPHICAL GUIDE

By **Ellen M. Codlin**, *Librarian, Equipment Division, The British Oxygen Company*

Dealing with the literature of the physics and technology of temperatures in the range below 0°C, this invaluable guide includes the natural low temperatures of ice and frost, controlled temperatures of conventional refrigeration, and cryogenic temperatures approaching absolute zero. With an author and subject index, the volume is divided into subject categories, including safety, food processing, solid gases, nuclear physics, and liquefaction of gases.

288 pages

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tion of Massey's vast influence in making University College London, and the University of Belfast, Northern Ireland, centers of research in atomic and molecular physics.

The distribution of papers also reflects Massey's wide ranging interests. Six are theoretical, three experimental and three deal with applications of atomic physics to astrophysics, the ionosphere and the ionization processes in space. The 13th article is partly experimental and partly theoretical in nature. The articles are intended for the mature practitioner. I found that those articles somewhat away from my field of expertise were very tough sledding indeed. The principal value that any one of the papers would have for a beginner is the excellent bibliographies included with each article.

The volume is in the tradition of the previous books in this series, which it complements. It is an authoritative review of some important areas of current research in atomic physics, notably those areas in which Massey was interested and made an impact. It is a volume of which he could indeed be proud.

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A theoretical atomic physicist who has published in the field of the scattering of electrons by atoms, Sidney Borowitz is currently chairman of the Division of Electron and Atomic Physics of the American Physical Society and acting head of the physics department of New York University.

Layman's technology

GIANT MOLECULES: THE TECHNOLOGY OF PLASTICS, FIBERS AND RUBBER. By Morris Kaufman. 187 pp. Doubleday, New York, 1968. Cloth \$5.95, paper \$2.45

LASERS: TOOLS OF MODERN TECHNOLOGY. By Ronald Brown, 192 pp. Doubleday, New York, 1968. Cloth \$5.95, paper \$2.45

by RICHARD B. ZIPIN

These two new books in the Doubleday Science Series thoroughly treat their respective subjects in easy-to-understand layman's language.

Giant Molecules by Morris Kaufman discusses the chemistry of polymers, their manufacture, their products and the applications of these products. The author gives his non-technically trained readers a good feel for the business of technology, telling them of men responsible for the devel-

opment of plastics, besides discussing the technology itself.

Much the same can be said of *Lasers* by Ronald Brown, which treats the various types of lasers and their applications in communications, holography, medicine, measurements and metalworking.

Both books are interesting reading and have an identical format that contains no references and only very short bibliographies and indexes. But they are attractively illustrated, containing numerous figures, many in full color. They can be recommended as suitable reading for bright high-school students and other laymen interested in an overview of each subject.

For the plasma shelf

ADVANCES IN PLASMA PHYSICS: VOL. 1. Albert Simon, William B. Thompson, eds. 340 pp. Wiley (Interscience), New York, 1968. \$14.95

by B. SAMUEL TANENBAUM

The new editors of the *Reviews of Modern Physics* have correctly stated "In a time when most of our colleagues express the desire to read good reviews, a diminishing fraction seems willing to devote the time and effort to write them." Hence it is a pleasure to welcome the appearance of *Advances in Plasma Physics: Volume 1*, edited by Albert Simon and William B. Thompson.

This volume has a format familiar to readers of other "reviews" and "advances" series. It consists of six individual articles ranging in length from 25 to 104 pages. Two of the articles, on "Plasma in the Magnetosphere" by Frederick L. Scarf and "The Plasma MHD Power Generator" by Thomas R. Brogan, are authoritative summaries of experimental data that make some comparison with theory and provide voluminous references. The Scarf article succeeds in organizing a large amount of recent, often confusing, experimental findings into some semblance of order. Brogan's long paper emphasizes the hard-to-find engineering details of practical MHD generator design.

Another paper on "Minimum-Average-B Stabilization of Toruses" by Harold P. Furth, is an elegant, well referenced, essentially nonmathematical survey of the theory and use of this

The authors are to be commended because these books will certainly be read and understood by young students and may well inspire some of them to pursue technical careers. Although neither author states his purpose in writing the book, no better purpose could have been sought in such a time as now, when so many more scientists and engineers are required in our ever increasingly complex world.

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The reviewer is engaged in the application of laser interferometers as position-measurement devices on large coordinate-measuring machines at the Bendix Corp.

important fusion-confinement scheme. Unfortunately the audience for this article is limited by the author's assumption that the reader is already familiar with the array of plasma instabilities that are so disastrous to present fusion devices. (Papers surveying both the overall status of the fusion program and our present knowledge about instabilities would have been highly desirable additions to this volume.)

The remaining three articles, "Radiation from Plasmas" by John M. Dawson, "Drift Waves" by Nicholas A. Krall and "Thermodynamics of Unstable Plasmas" by T. Kenneth Fowler are tutorial papers treating specific aspects of plasma-physics theory. Of the three, the article by Dawson makes the best reading. Although he limits his discussion by omitting cyclotron and synchrotron radiation, the material covered is treated with clarity and sufficient detail to satisfy the needs of an advanced graduate student or an instructor using the material in a plasma-physics course. The other two articles are shorter and less successful in this respect, and I suspect their use will be more limited.

In all, the editors are to be congratulated for initiating this series and for obtaining articles from well recognized researchers in plasma physics. (An indication of their success in obtaining manuscripts is that the second and third volumes of the series are both scheduled for publication later this year.) One cannot help wishing that the entire volume were more comprehensive in its coverage and more uni-