

Books

Nuclear Magnetic Resonance. By E. R. Andrew. 265 pp. Cambridge U. Press, New York, 1955. \$6.50. *Reviewed by H. Y. Carr, Rutgers University.*

New and experienced workers alike have awaited the publication of a comprehensive introductory book in the field of nuclear magnetic resonance. A voluminous collection of articles concerned with a wide variety of subjects has been published in the relatively brief period since Bloch, Purcell, and their co-workers performed the initial experiments in 1945. Ten years later nuclear magnetic resonance still continues to provide valuable means of solving new problems. This is true not only in fundamental physics and chemistry but now more than ever before also in a rapidly expanding group of industrial applications. As a result many workers frequently face the difficult task of obtaining from the extensive literature an introductory survey of nuclear magnetic resonance.

Andrew's excellent book is an immense help in this situation. He gives a concise lucid introduction to a large number of important subjects in nuclear magnetic resonance—the basic theory, experimental techniques, nuclear relaxation, chemical shifts, crystal structure, conduction electron effects in metals, quadrupole effects, etc.

One of the outstanding features of the book is the very careful indication with each subject of the relevant original papers published in the journals. These references mentioned in the text are listed at the end of the book in an excellent bibliography and author index.

Several important conclusions are evident. The book will be extremely useful to new students in the field, both those seeking a general introduction and those desiring guidance for exploring more intensively in the original literature some particular subject. For these same reasons the book will serve as a very valuable reference for every worker in the field.

Messen und Rechnen in der Physik. By Ulrich Stille. 416 pp. Vieweg-Verlag, Braunschweig, Germany, 1955. DM 54.00. *Reviewed by William F. Meggers, National Bureau of Standards.*

Quantities and units determine the representation of physical relationships as well as the evaluation of experimental or theoretical data. Since the introduction of quantities and the definitions of units are largely a

matter of convention it might be assumed that unanimity had been achieved, but a glance at manuals, textbooks, and other publications shows that many divergences still exist in the treatment of physics and technics. For example, many physicists treat inertia and weight as two different manifestations of mass, while others regard them as independent quantities in acceleration mechanics and gravitation. In heat science a distinction between thermodynamic and empirical temperatures, and their corresponding temperature scales, continually appears. The widest divergences occur in electrodynamics, especially about units when the fundamental questions of concepts and quantities are considered. In order to explain such disagreements and avoid misunderstandings Ulrich Stille has published a scholarly study of the entire subject of measuring and calculating in physics. This study embraces all the domains of physics; it gives the complete history, up to 1955, of the development of modern physical concepts, laws, quantities, and units. Part One (36 pp) is devoted to fundamentals and definitions, Part Two (53 pp) to mechanics, Part Three (47 pp) to heat and radiation, Part Four (101 pp) to electricity and magnetism, Part Five (48 pp) to acoustics and phonometry—optical radiation and photometry, Part Six (99 pp) to values of constants and Part Seven (55 pp) to tables of constants, symbols, units, conversion factors, etc. A bibliography of 984 items, and a detailed subject index to more than 2000 items, ranging from Aberrationskonstante to Zyklotronfrequenz, conclude this incomparable volume.

Gas Dynamics of Cosmic Clouds (Symposium, Cambridge, England, 1953). Edited by J. M. Burgers and H. C. van de Hulst. 247 pp. (North Holland, Netherlands) Interscience Publishers, Inc., New York, 1955. \$5.75. *Reviewed by P. Morrison, Cornell University.*

At Cambridge University in the summer of 1953 the second of these joint symposia, which unite astronomers and aerodynamic physicists, was held, with signal success, but with more than enough left undone to plan for another such symposium in 1957. Here is the well-printed and handsomely illustrated report of the papers and discussion, a little late, but very welcome. The forty-odd papers may be summarized with some effort under some half-dozen heads. First comes the status of the observations of gas and dust, in their several dark and shining aspects, as the observers see them. Here the picture, of incipient stars and globes of dust, of shining nebular edges and of the hydrogen clouds in deep space, are alone worth the price of admission. Then the radiative and kinetic energy budget of the gas is drawn up, and its turbulence, its magnetization, and its density variations discussed. The motion of shocks in space, and their interaction, is discussed, with reference to the laboratory experiments of Kantrowitz and others on glowing and conducting shock fronts in the laboratory. This physical background is assembled

to form a tool for attacking definite astronomical problems, like the now famous and very probably meaningful theory of Oort and others, explaining how gas can be fed with kinetic energy and compressive energy by the rocket recoil of a gas cloud heated locally by a very bright star. This effort is carried on, rather speculatively, to the account of the formation of stars and of galaxies themselves, out of the unstable condensations of the gas. Dust is brought in, not only to confuse the reader, but to elucidate the origin and importance of this low mass but optically crucial part of the galaxies.

All this is a vast program, and it is by no means complete. The ideas given here seem for the most part to have held up over two years, if the quantitative enthusiasms of their authors be properly allowed for. Again, the discussion is so varied and often so special that its presence adds more to enliven than to clarify; the summaries by Burgers and by Gold, and the final discussion, help, but not enough. The open question of the behavior of shocks of high Mach number in an ionized plasma seems to gain importance as time goes on, especially for the cloud collisions.

Here is another symposium which the specialist must have, the interested reader may enjoy, and the student need approach with caution.

Imagination's Other Place. Compiled by Helen Plotz. 200 pp. Thomas Y. Crowell Co., New York, 1955. \$3.50. *Reviewed by L. Marton, National Bureau of Standards.*

The subtitle of this anthology is "Poems of Science and Mathematics". When I first saw this title, including the subtitle, I said to myself, "How delightful! At last, somebody had a fine idea of collecting an anthology of that wonderful nonsense which, in some cases, may be bad poetry, but good science." Upon receiving the volume, I found that I was partly wrong. A good part of this relatively small volume is good poetry, but not always good science. Mixed in between, there are some of the kind which I expected to see, and which at one time was called by John Satterly, "post-prandial proceedings". There are a number of poems which do not belong in either class and which only the whimsy of the compiler could classify as "science and mathematics". (Incidentally, isn't mathematics a science?) The last ones often are based upon a concept or a word used normally with scientific connotation, but here taken out of context, and the poem is built around that isolated fragment.

Well! Poetry is largely a matter of taste and in such an unorthodox assembly it is hard to satisfy everybody's taste. Even the most critical ones, however, will find a certain number of these poems delightful, and many others will be happy to see them brought to their attention. Reading them, however, gave me a yearning for more of the "post-prandial" type, and while that may not be everybody's dish, I feel that a good collection of those is largely overdue.

Astronomy. A Textbook for University and College Students (Sixth Edition). By Robert H. Baker. 528 pp. D. Van Nostrand Company, Inc., New York, 1955. \$5.50. *Reviewed by P. M. Morse, Massachusetts Institute of Technology.*

Astronomy is in the throes of a major revolution just now. In addition to the mass of data turned out by the big observatories, the astronomer must fit the completely new data from radio astronomy and the recent developments of nuclear physics into his theories of stellar evolution and cosmology. As we in physics know, it is a situation discouraging to writers of general texts. The preferred text of 15 years ago, the two volumes of Russell, Dugan, and Stewart, is now hopelessly out of date. Consequently, those of us who wish to keep up-to-date in a neighboring field, but who cannot take the time to read the astronomical journals, will welcome this new edition of a standard college-level text, which is up-to-date for the time being, at least.

As with any text of astronomy the first few chapters are concerned with definitions and with simplified discussions of celestial mechanics and of other pertinent parts of physics. These necessary preliminaries are here clearly set forth and are easy to scan. There follows a review of the facts known about the solar system, the sun, the major and minor planets, the comets and the meteor streams, which embodies the results of recent observations.

The last half of the book contains many of the new facts learned about the stars, their positions, motions, behavior, and constitution. The implications of the recent change in scale of the universe, a result of more complete knowledge of the luminosities of variable stars, are discussed. The facts learned from the study of variable stars and from binaries are the subject of several chapters; a couple more deal with stellar atmospheres and interiors, mentioning recent theories of structure and of evolution. Here, of course, no final conclusions are, or could be, given.

In the last two chapters a picture of our galaxy and of other galaxies is given. The facts learned about types I and II stellar populations are set forth, and their distribution with respect to the vast clouds of gas and dust present in many galaxies, though the implications of these facts with respect to stellar and galactic evolution are not dealt with, for they are, as yet, only dimly seen. Perhaps we can read about them in the eighth edition of this text.

The typography is legible, the illustrations are numerous and clear, there is a fairly complete bibliography and an adequate index.

Nuclear Physics. By Alex E. S. Green, 535 pp. McGraw-Hill Book Co., New York, 1955. \$9.00. *Reviewed by Bernard T. Feld, Massachusetts Institute of Technology.*

There are, of course, many approaches to the teaching of a first course in nuclear physics at the gradu-