

observed from the macroscopic point of view. Today it is apparent that quantum mechanics is becoming more and more necessary to understand the laws of high-speed gas flows, and solid-state physics is becoming merged with the classical mechanics of solids. However, a few outstanding scientists such as Prandtl, von Kármán, G. I. Taylor, and others, in the tradition of Rayleigh, Love, and Lamb, by using classical mechanics alone, have increased our understanding of the flow of fluids and the mechanics of solids. As more physicists turn to problems which involve the properties of fluids and solids, they will find the availability of the collected papers of these men of the greatest value. In particular, the collected works of G. I. Taylor should serve as model and inspiration to workers in the field of fluid and solid mechanics for a long time to come. What is characteristic of Taylor's work as a whole is his apparent enthusiasm for the subject and the deft use of just the sufficient and appropriate mathematics to weave a theory and then the amassing of experimental evidence, usually with the aid of co-workers, to justify and confirm the mathematics.

The first volume of Taylor's works contains his papers on the mechanics of solids. Two more volumes of his papers on fluid mechanics are yet to come. Apparently, the last two will contain the papers on laminar flows, shock waves, and sound, as the volume at hand has as its theme the topic of turbulence in incompressible flows alone. From the very first paper, "Eddy Motion in the Atmosphere", and continuing through the volume, one sees the development of Taylor's ideas on eddying flow which culminated in his statistical theory of turbulence, twenty years later. Included are the most famous papers, such as "Diffusion by Continuous Movements", "Waves and Tides in the Atmosphere", "The Transport of Vorticity and Heat through Fluids in Turbulent Motion", "Statistical Theory of Turbulence" in five parts, "Mechanism of the Production of Small Eddies from Large Ones", and "The Spectrum of Turbulence" among others. Some of the papers are short gems of keen insight and clear analysis.

One well-known physicist is supposed to have said that he would die happy if he could first understand quantum mechanics and turbulence. The prospects do not appear bright, since the problem of turbulence remains today a most difficult one. Other minds have ventured into the field and new and fertile concepts have been proposed, many of which owe a debt to Sir Geoffrey Taylor as well as Prandtl and von Kármán. A complete theory is yet unknown, and, until it is, this volume will be almost indispensable to the worker in the field, especially the newcomer who will find this collection into one volume most convenient for study.

There are other papers on fog, tidal friction, tidal oscillations, waves, and tides in the atmosphere which are not so intimately tied up with the turbulence concept, but which illustrate Taylor's wide interest in natu-

ral phenomena of the fluid dynamical type. Although G. I. Taylor retired from his position at Cambridge as Yarrow Research Professor of the Royal Society in 1951, his writing and research have continued unabated and three of the papers in the present volume were published since then. Like so many great scientists, G. I. Taylor was also an outstanding teacher, and there are today at Cambridge, as well as all around the rest of the world, former students who are carrying forward his pioneering work. One of these is the editor of these four volumes, Professor G. K. Batchelor, who, while he had the assistance of Taylor himself in finding, sorting, and correcting the papers, has done an excellent and obviously time-consuming job of preparing and editing this volume as well as the other three. To him as well as the Syndics of the Cambridge University Press we offer our thanks for a volume which is pleasing to the eye and hand as well as to the mind.

Advances in Spectroscopy, Volume 1. Edited by H. W. Thompson. 363 pp. Interscience Publishers, Inc., New York, 1959. \$12.50. *Reviewed by Stanley S. Ballard, University of Florida.*

ONE might perhaps be pardoned for feeling that there are already quite a few "Advances in . . ." and "Progress in . . ." series, and for questioning whether still another is needed. It does appear, however, that the new series *Advances in Spectroscopy* will indeed be a welcome addition to the literature of this field, which is currently enjoying such a vigorous renaissance. To quote from the editor's introduction to the series, ". . . spectroscopy now occupies a leading place among the modern physicochemical techniques, not only in pure and applied research, but also for many routine scientific operations. The applications in physics, chemistry, and biochemistry cover a wide range; they bear upon questions of atomic and molecular structure, of qualitative and quantitative analysis, and they lead to data about the energy levels of atoms, molecules, ions or aggregates which are useful in relation to physical and chemical properties of materials." Thus the editor undertakes to cover in this series "all important aspects of spectroscopy, pure and applied, atomic and molecular, emission and absorption, relating to physics, chemistry, biology, astrophysics, meteorology and general technique".

Dr. Thompson is well known as an active worker in spectroscopy and as a chemist with very broad scientific interests. On the advisory board for this series are academic and industrial chemists and physicists of wide reputation: R. R. Brattain of the Shell Development Company, G. H. Dieke of Johns Hopkins University, and R. C. Lord of MIT; G. Herzberg and R. N. Jones of the National Research Council of Canada; W. C. Price of King's College, London; and P. Swings of the Astrophysics Institute in Liège, Belgium. One can have confidence that this group of acknowledged experts will choose timely subjects for discussion in the volumes to

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follow. As the editor states: "It is hoped to publish the first few volumes quickly with reviews of the present position in most important fields. Subsequently, volumes will be planned as seem to be required by the state of the subject."

The first volume of the series illustrates the breadth of coverage promised by the editor. There are concise review articles on such conventional but timely subjects as Spectroscopy in the Vacuum Ultraviolet (W. C. Price, 16 pp., 72 refs.) and High-Resolution Raman Spectroscopy (B. P. Stoicheff of the Canadian National Research Council, 80 pp., 135 refs.). A 48-page article by D. A. Ramsay, also of NRC Canada, is devoted to The Spectra of Polyatomic Free Radicals. D. H. Rank of the Pennsylvania State University has contributed a very short article giving formulas for the best values of the refractive index of air, which are of considerable practical importance to spectroscopists in their reduction of data. Dr. Rank also gives a short discussion of the current state of the best value of the velocity of light, in which he emphasizes the later, post-1948 methods. The bibliography, however, includes earlier as well as later determinations and comprises some 80 items, followed by a list of 20 review articles on the velocity of light. Surely this is a most useful, up-to-date compilation of references. Dr. A. Elliott of the British firm of Courtaulds Ltd. presents a 50-page treatment on The Infrared Spectra of Polymers, a field in which there has been tremendous activity during the last ten years. He reviews experimental methods before quoting results and going into structural considerations. A list of 111 references is attached, followed by an 8-page listing of papers on the infrared spectra of polymers—one cannot help feeling that this subject has been exhaustively treated! In the final article in the book, a list of some 212 references follows a 60-page article on Rotational Isomerism About C—C Bonds in Saturated Molecules as Studied by Vibrational Spectroscopy by Dr. N. Sheppard of The Chemical Laboratory of Cambridge University.

An article of special interest to the reviewer is "Modern Infrared Detectors" by T. S. Moss of the Royal Aircraft Establishment of England. This article reports the novel and far-reaching developments that have taken place during and especially since World War II. This excellent, 35-page treatment covers not only thermal detectors but also the more recently developed photoconductive detectors, including the most modern ones: indium antimonide and doped germanium and silicon. Some 87 references are listed. I express the hope that this brief but vigorous review of such a timely and popular subject will come to the attention of the many workers in infrared techniques who do not classify themselves as spectroscopists.

My reaction after perusing the first volume of *Advances in Spectroscopy* was to congratulate Dr. Thompson, his advisory board, and his Volume-1 authors on the excellent, thorough, and authoritative job that has been done. I look forward with anticipation to additional volumes in this new series.

Radioastronomie: Les Méthodes radioélectriques au Service de l'Astrophysique. By J. L. Steinberg and J. Lequeux. 294 pp. Dunod, Paris, 1960. Paperbound 19 NF. Reviewed by E. J. Öpik, University of Maryland.

SPECIAL attention is given to the technique of instrumentation and the astrophysical interpretation of the observations. Solar, galactic, and extragalactic emissions are treated in detail, whereas planetary radio observations are described but briefly. There are copious illustrations and diagrams, and basic literature listed is up to date. The authors are well in the picture of modern developments, including the maser and optical pumping.

They profess to have written the book for the public at large. This, however, is not obvious from its rather technical contents. The "popular presentation" amounts to some looseness of style, details and precise definitions being omitted, formulas unnumbered, and notations consistently not adhered to. For these reasons, more knowledge of physics and astrophysics is required of the reader than in the case of a "special" textbook. There are also inaccuracies in the text which a competent reader would be able to allow for. Thus, on p. 16, the exponent $h\nu/kT$ in Planck's formula is wrongly preceded by a minus sign. On p. 113, ρ_r is called the radiation density per unit volume, whereas it actually is Planck's flux intensity per cm^2 , sec and steradian denoted by $B(\nu)$ on p. 16. The weight factors in spontaneous emission are consistently omitted. On pp. 120 and 185 optical depth (épaisseur) stands for opacity.

Despite these minor shortcomings, the book is valuable and can be recommended to the competent physicist or astrophysicist as a broadly sketched introduction to radio astronomy.

Physics and Microphysics (Reprint of 1955 ed.). By Louis de Broglie. Translated from French by Martin Davidson. 286 pp. Harper Torchbooks, New York, 1960. Paperbound \$1.50.

From Atomos to Atom: The History of the Concept Atom. (Reprint of 1952 ed.) By Andrew G. Van Melsen. 240 pp. Harper Torchbooks, New York, 1960. Paperbound \$1.45. Reviewed by E. Mendoza, University of Manchester.

LOUIS de Broglie's book of essays is divided into three sections: Science, Scientific Philosophy, and History of the Sciences. Those in the first and third sections are of doubtful value; they are quite disconnected, with little indication of the circumstances of their publication. They include among others an odd medley of whimsey and physics entitled "Light in the Physical World", an after-dinner speech delivered at a conference on surface states held in 1945, an essay entitled "The Dawn of the Atomic Era" written in the same year and recording the sudden realization that physicists could no longer think and work in ivory towers. There is also an article which may be useful to students in which de Broglie describes the curious properties of a pack of cards obeying a sort of uncertainty