

Physik der Sternatmosphären (2nd Edition). By A. Unsöld. 866 pp. Springer-Verlag, Berlin, Germany, 1955. DM 168.00. *Reviewed by A. Beiser, New York University.*

The new edition of Unsöld's well-known text reflects many of the advances in astrophysics since 1938, when the first edition appeared. The book is divided into seven sections, whose titles serve to outline the contents: The Stellar Atmosphere in Thermal Equilibrium; Continuous Spectrum and Structure of a Stellar Atmosphere; Measurement of the Intensity Distribution in Fraunhofer Lines; Physical Principles of the Theory of Fraunhofer Lines; The Origin of Fraunhofer Lines; Physics of the Sun; and Radiofrequency Radiation and Cosmic Rays. Unsöld assumes a minimum of preparation on the part of the reader, and is most complete in his development of the basic ideas. Such modern topics as hydromagnetics and cosmic-ray origin are included—so encyclopedic is the material, in fact, that one hesitates to mention the lack of discussion of low-energy solar corpuscular radiation and its origin. The list of references is a joy—not only is it over fifty pages long, but the titles of the papers cited are given, virtually making it worth the price of the book by itself.

Statistical Mechanics of Irreversible Change. By Richard T. Cox. 130 pp. The Johns Hopkins Press, Baltimore, Md., 1955. \$5.00. *Reviewed by R. B. Lindsay, Brown University.*

In this rather brief but well organized and clearly written volume the author describes irreversible changes in thermodynamic systems in terms of the statistical mechanical method of Gibbs. The book is thus a useful complement to the more usual macroscopic theory of irreversible processes as set forth in books like that of S. R. De Groot (1951). The whole subject has lately attracted considerable interest because of the importance of relaxational phenomena such as those encountered in dielectric and acoustical problems. This is all the more striking since the foundations of the modern theory were really laid by L. Onsager some twenty-five years ago in a paper deducing the important reciprocal relations connecting the phenomenological coefficients in the expansion of "fluxes" (e.g. heat flow) in terms of "forces" (e.g. temperature gradient). Examples of these coefficients are provided by the thermal conductivity, the thermal diffusion coefficient, etc.

It has been the aim of the author of the present work to show, in greater detail than is commonly found in the literature, how the reciprocal relations of Onsager and the earlier ones discovered by Lord Rayleigh can be derived by the use of the principle of microscopic reversibility.

The first part of the book gives a review of the statistical theory of thermodynamic equilibrium and stresses what the author believes to be the advantages of the Gibbsian method as contrasted to both the phenomenological scheme of classical thermodynamics and mo-

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molecular kinetic theory. There is a standard development of the microcanonical and canonical distributions accompanied by the definition of thermodynamic quantities in terms of statistical averages over these distributions.

The second part deals with viscous forces and the theory of Brownian motion. Part Three considers thermal conduction and molecular diffusion. The author introduces the term "adiaferic" to denote a process in which flow of heat is unaccompanied by transport of matter. There is a proof of the principle of the minimum production of entropy. The fourth part contains a discussion of the approach to equilibrium by systems subject to constraints. This provides a chance to bring in chemical reactions.

The theoretical treatment is clearly illustrated by numerous physical and chemical examples. The reviewer can find little to criticize. He would indeed have welcomed a more extensive account of the Gibbs paradox and its avoidance, as this is usually puzzling to students getting their first introduction to statistical mechanics. An adequate bibliography and index are provided. The book should receive a favorable reception by physicists and chemists interested in the application of statistics to thermodynamics.

Spheroidal Wave Functions. By J. A. Stratton, P. M. Morse, L. J. Chu, J. D. C. Little, F. J. Corbató. 613 pp. Technology Press of MIT and John Wiley and Sons, Inc., New York, 1956. \$12.50. *Reviewed by Milton Abramowitz, National Bureau of Standards.*

The lack of extensive tables of spheroidal wave functions for the solution of the wave equation in spheroidal coordinates has been an obstacle for many years. The appearance of the present volume will provide physicists with information which will make possible the practical solution of such problems as the radiation and scattering of waves from wires of finite length and the diffraction of waves through slits and circular openings. The foreword to the volume by P. M. Morse gives an indication of the importance of the tabulated functions. The important mathematical properties are given in a section entitled Elliptic and Spheroidal Wave Functions by L. J. Chu and J. A. Stratton. This is actually a reproduction of an article which appeared previously in the *Journal of Mathematics and Physics* in 1941. This article has long been a standard reference work on the subject and it is unfortunate the known errors contained therein have not been corrected. A third section entitled Introduction to the Tables, by J. D. C. Little and F. J. Corbató, describes the methods of computation of the tables and some of the difficulties encountered in preparing the program to produce the required printing format in the manuscript. The calculations were performed on Whirlwind. It is stated that the computer time necessary to produce the tables was ten hours. The last and principal portion of the volume is devoted to a tabulation of the separation constants and the corresponding coefficients