

very useful contribution and will be appreciated by all readers. They should serve to save time in selecting a particular method for programming. The only aspect in which the material seems dated is in the discussion of the use of standard punch card equipment. This volume is a welcome addition to the literature on matrix methods. It will probably become standard equipment in all computing laboratories.

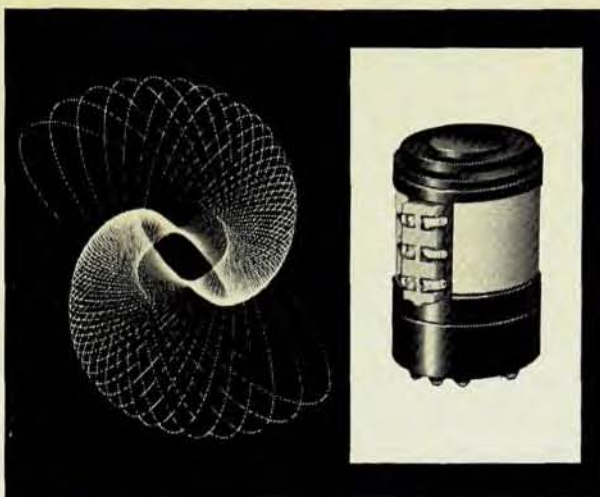
Introduction to Atomic Physics (4th Edition). By S. Tolansky. 435 pp. Longmans, Green and Co., Inc., New York, 1956. \$5.00. *Reviewed by William F. Meggers, National Bureau of Standards.*

First published in 1942, Tolansky's *Introduction to Atomic Physics* had its origin in a series of lectures given to second-year honors physics students at Manchester University. After the student has mastered classical physics he has to be introduced to modern (20th century) physics which is fundamentally more complex and powerful because all physical phenomena are regarded from an atomistic point of view. The student should become aware of certain shortcomings of classical physics, and of the brilliant successes of atomic and radiation physics, including the new quantum mechanics. To form a background for the student's final year of intensive study, this introduction to atomic physics should eschew difficult mathematical treatments, avoid giving too many details, but stress the qualitative description of phenomena and their interpretation. These specifications are admirably met by Tolansky's book.

The subject matter is, in general, presented in historical sequence, beginning with the conduction of electricity through gases, which led to the discovery of the electron, and ending with nuclear fission. The rapid and spectacular development of atomic physics makes it necessary frequently to revise and expand any treatment of the subject; the previous pages dealing with isotopes, heavy elements, cosmic rays, etc., have had to be rewritten and 21 chapters have been increased to 25 by adding four new chapters dealing respectively with (1) The Detection of Single Atomic Particles, (2) Mesons, (3) High-energy Particle Accelerators, and (4) Nuclear Reactors.

Atomic Physics now encompasses everything from elementary particles to solid matter, including energy and radiation of all kinds (waves or particles), and it is not easy to present the whole with balance and continuity. Molecular spectra and structures are excluded from Tolansky's book, although a chapter is devoted to the Structures of Crystals. A brief but adequate chapter on the Relativity Theory is included only because mass has been found to vary with velocity, and is equivalent to energy according to the now famous equation $E = mc^2$.

To this reviewer it seems that the chapter on Atomic Spectra and the Periodic Table could be expanded somewhat since it was the principal proving ground for quantum theory and wave mechanics. For example, the



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Zeeman effect is barely mentioned (p. 150) in connection with the Pauli Exclusion Principle, whereas its experimental observation and quantum interpretation leads directly to the identification of spectral terms and electron configurations of atoms and ions. Incidentally, atomic energy levels are sometimes confused with spectral terms (p. 144) and spectral terms that run to a limit are called a "sequence" instead of a spectral series. Also the index should include important items like Landé interval rule, 149, Paschen-Back effect, 151, Rydberg constant, 96, Zeeman effect, 150, etc. etc.

At the end of most chapters, one or two other books are listed as references; the majority are dated 1913 to 1935, and many could be replaced by newer publications. This volume contains many simple diagrams but only five half-tone plates, restricted to mass spectra, optical spectra, x-ray diffraction patterns, and particle tracks in expansion chambers. The book might be more attractive to modern students if it contained more pictures. The above comments are intended to be constructive; in the opinion of the reviewer there are really no serious defects in the Fourth Edition of Tolansky's *Introduction to Atomic Physics*, that excels in lucid descriptions of instruments, experiments, and principles which are continuing to develop a better understanding and control of the physical world.

Books Received

MIND AND THE WORLD-ORDER: Outline of a Theory of Knowledge. By Clarence Irving Lewis. 446 pp. Dover Publications, Inc., New York, 1956. Paperbound \$1.95.

METALLURGY AND FUELS, Vol. 1. Series 5 of Progress in Nuclear Energy. Edited by H. M. Finniston and J. P. Howe. 805 pp. McGraw-Hill Book Co., Inc., New York, 1956. \$21.00.

NUCLEAR METALLURGY, Vol. 3 (IMD Symp., Cleveland, Ohio, Oct. 1956). By George H. Vineyard, Donald E. Thomas, Douglas S. Billington. 54 pp. American Inst. of Mining, Metallurgical, and Petroleum Engineers, New York, 1956. Paperbound \$3.75.

ELECTRONIC COMPUTERS: Principles and Applications. Edited by T. E. Ivall. 167 pp. (Iiffe, England) Philosophical Library, New York, 1956. \$10.00.

FATIGUE IN AIRCRAFT STRUCTURES: Proceedings of Internat'l Conf. (Columbia U., Jan. 1956). Edited by Alfred M. Freudenthal. 456 pp. Academic Press Inc., New York, 1956. \$12.00.

MODERN METHODS OF MICROSCOPY (Reprinted papers from *Research*). Edited by A. E. J. Vickers. 114 pp. (Butterworths, England) Interscience Publishers, Inc., New York, 1956. Paperbound \$3.50.

LOW TEMPERATURE PHYSICS 11. Vol. 15 of Handbuch der Physik. Edited by S. Flügge. 477 pp. Springer-Verlag, Berlin, Germany, 1956. DM 112.00 (if part of series DM 89.60).

THE LEIBNIZ-CLARKE CORRESPONDENCE. Edited by H. G. Alexander. 200 pp. Philosophical Library, Inc., New York, 1956. \$4.75.

PHYSICS. By John S. Marshall and Elton R. Pounder. 906 pp. The Macmillan Co., New York, 1957. \$8.50.