

Books

Atomic Physics: An Atomic Description of Physical Phenomena. By G. P. Harnwell and W. E. Stephens. 401 pp. McGraw-Hill Book Co., Inc., New York, 1955. \$8.00. *Reviewed by B. T. Feld, Massachusetts Institute of Technology.*

Time was (and not so long ago) when a course in atomic physics was the apex of a good undergraduate physics program. These days, with the tendency in many physics departments to incorporate the concepts and techniques of modern physics (i.e., quantum mechanics) early in the undergraduate curriculum, the undergraduate course in atomic physics is generally regarded as providing a breathing spell, during which the student is introduced to the quantum concepts and given a little time for them to become incorporated into his thought patterns, before being plunged into those courses on the various aspects of modern physics which are the sine qua non of the present day physicist. At the same time, the atomic physics course is used to instill in the student that minimum of historical perspective (and reverence for bygone genius) which is still thought to be an integral part of his professional education.

However, one of the major problems faced by our physics graduate schools is the wide disparity in the backgrounds of the entering students; a large fraction comes from small, liberal-arts colleges, in which the physics curricula follow the old pattern. As a result, many of the first-year graduate courses must have the main purpose of establishing a common level of background from which the more advanced courses can freely draw. The text on *Atomic Physics* by Professors Harnwell and Stephens of the University of Pennsylvania is eminently suited to this end.

At the same time, this book serves another and perhaps more important purpose. It attempts to develop a concept of the unity of modern physics which is so easily lost in the usual sequence of specialized graduate courses followed by the normal graduate student.

The first three chapters (Classical Foundations of Atomic Theory; Atomic Nature of Matter and Radiation; Atomic Structure) are intended to achieve the leveling process. They suffer somewhat from the usual fault of such attempts: they are too brief for the uninitiated and too detailed for the sophisticated student. However, assuming a prior or, at least, a concurrent course in quantum mechanics, these chapters contain a great deal of useful background material, usefully

coordinated (e.g., the very condensed but very complete summary of the quantum theory of radiation and its applications).

The remainder of the book (Electron Spin and Polyelectronic Atoms; Molecular Structure; Statistics and Atomic Processes; Elementary Properties of Matter) constitutes the meat, of which there is a great deal. The main features of these chapters are the attention paid to detail and the great care which has been lavished on attempts to transform formal derivations into physically understandable and mathematically simple treatments. These, as well as the previous chapters, reflect much hard work and teaching experience on the part of the authors. Their effectiveness is reduced somewhat by a number of attempts to include last-minute developments. These attempts are generally not as successful as the older portions and tend to detract from the continuity of their discussion. However, the authors' decision to forego completely the historical approach is regrettable in that (aside from the loss to the students' education) it results in a certain lack of motivation in the development which, while it can possibly be overcome in the teaching process, makes it considerably more difficult for the reader to appreciate the significance of subject matter so carefully selected by the authors.

The Science Book of Space Travel. By Harold Leland Goodwin. 213 pp. Pocket Books, Inc., New York, 1956. Paperbound \$35. *Reviewed by J. R. Pierce, Bell Telephone Laboratories.*

With one reservation, this is a rave review. This thirty-five cent reprint (I missed the hard-cover original) summarizes about all there is to be said about satellites and space travel, although it does miss ion rockets. The author has read widely and he hasn't been stuffy about his sources. Thus, the organization of the satellite program, Newton's laws, stepped rockets, and something of relativity are reviewed, but we also have reflections on baths in free fall, space scooters and other aspects of space flight which show a wide acquaintance with science fiction. In general, interesting ideas are set forth correctly and clearly, and without overcommitment on the part of the author. This sometimes leads to amusing summaries as: "... Dr. Milton Rosen ... says that a practical unmanned satellite is the first need—not an enormous space station fully equipped with spacemen and Civil Service job descriptions." "... the more optimistic have hopes that *homo sapiens* can adjust to the uncertainties of space as easily as he has adjusted to the man-made horrors of television and Sunday traffic."

In reading this book I was at first annoyed by a few statements which I felt to be either wrong or misleading; I believe they show that the author's knowledge of science is broader than it is deep. But in all I noted only 9 examples. I suppose a chemist or a biologist would pick up others. Most are not clearly wrong, and