

the ions forming a uniform background of positive charge. This, however, appears appropriate in view of the introductory nature of the book and the requirements of the audience to which the book is directed.

Each chapter has a summary of the important formulas and a good selection of problems. The bibliography is adequate and attempts to draw attention to almost all available authoritative texts or treatises on the topics covered. Similarly the references to the original literature, although not exhaustive, are sufficient.

Sheo S. Prasad
University of Florida

The Maxwell Equations: Non-Relativistic and Relativistic Derivations from Electron Theory

By S. R. DeGroot

179 pp. Interscience, New York, 1969.
\$8.95

It is well known that at about the beginning of the 20th century Hendrik Lorentz derived Maxwell's electromagnetic field equations for ponderable media from his electron theory with appropriate statistical procedures.

The purpose of the present volume is to provide a review of Lorentz's method together with summaries of the more complete recent work in this field by A. D. Fokker (1920) and P. Mazur and B. R. A. Nijboer (1953). Refinements of the latter investigations are also considered. The author, professor of theoretical physics in the University of Amsterdam, is a well known authority on nonequilibrium thermodynamics.

The field equations are derived by methods that may be characterized as nonrelativistic and relativistic respectively. The program is an ingenious combination of statistical mechanics and electromagnetic theory. Though the analysis is somewhat involved, there is adequate emphasis on the physical significance of the various steps and the final results. The general reader who does not wish to follow the complete development will find the historical introduction of great interest and value.

R. Bruce Lindsay
Brown University,
Providence, R. I.

Plasma Waves in Space and Laboratory, Vol. 1

John C. Thomas, Bjorn Landmark, eds.

486 pp. American Elsevier, New York, 1969. \$23.50

The plasma waves with which this collection of articles is concerned are, by and large, either those propagating in the near-earth environment, or their

laboratory analogues. They are electron plasma waves of natural origin (very low frequency emissions) or man-made (Alouettes, Explorer XX and so on). The papers purport to be tutorial-review material, presented as introductory lectures at the NATO Advanced Study Institute on Plasma Waves in Space and the Laboratory, held at Røros, Norway during April 1968. (Volume II of the proceedings contains the research-level papers.) This book is more than the usual conference proceedings, then, giving as it does something of an overview of geomagnetic plasma resonances and their interpretation, plasma antennas and VLF observations and theory. However, there is much overlap between the articles, with the relevant dispersion relations presented again and again and with much obfuscation arising from the differences in notation. In fact, it is my opinion that the next international conference on plasma waves might well be devoted to selecting a common language, perhaps publishing its proceedings as *Plasma: Laboratory, Astrophysical, and Ionospheric Notations* (PLAIN). To the uninitiated looking for a way into the research literature or to the conference participants, this book will be useful. As with many areas of physics, however, the time is ripe for that labor of love, a good review article or monograph, and plainly several of the authors here could provide it.

J. R. Apel
Johns Hopkins University, Md.

The Invisible University: Postdoctoral Education in the United States

Sponsored by National Research Council

310 pp. National Academy of Sciences, Washington, D. C., 1969. \$10.00

With the great deal of attention given to higher education today, it seems surprising that so little is known and published about one particular aspect of it—postdoctoral education.

During the past 12 years a number of attempts have been made at compiling some statistics and evaluating them. None of these studies provide an overview of the nature and scope of postdoctoral education in the US. For example, in 1962 Bernard Berelson published a report in the *Journal of Higher Education* titled "Postdoctoral Work in American Universities." It was based on visits to 16 campuses, interviews with government representatives and information from questionnaires sent to about 40 universities. A more limited study was the one conducted in 1958 by Arthur S. Cain, Jr and completed by

Lois G. Bowen, which investigated only medical fellowships. In 1965 the National Science Foundation examined different aspects of postdoctoral education at eight universities but never published the findings. Thus, to replace the fragmentary information with a comprehensive study, *The Invisible University—Postdoctoral Education in the United States* fills a real gap. Richard B. Curtis, the study director, explains the need for that study in terms of the success that postdoctoral education experienced. As a larger community becomes aware of a growing number of postdoctoral students, an increasing number of academicians, legislators and administrators seek basic facts about this invisible university to substantiate recommendations for its future.

The idea of a national study of postdoctoral education came from Sanborn C. Brown of the Massachusetts Institute of Technology, who became chairman of an advisory committee. The National Research Council of the National Academy of Sciences sponsored the study and five federal agencies plus the Alfred P. Sloan Foundation provided the financial support. Except for the first six months when Robert A. Albery directed the study, Richard B. Curtis of Indiana University was the full-time director and author of the report.

Starting with a historical view of postdoctoral research and the definition of postdoctoral appointments, the book presents detailed accounts of the following three aspects: (a) sources of funds for postdoctoral fellowships, (b) composition of their recipients and (c) effects on the host institutions.

The largest source of support is the Government. In particular, only one third of the funds for postdoctoral education comes from nongovernment sources, and for physics this fraction is one quarter. With these funds each sponsoring agency or foundation is basically purchasing the creation of knowledge; postdoctoral training for the scholar is just a byproduct. When the author discusses stipends and refers to the relatively higher income scholars forego in accepting fellowships, it becomes obvious that the emphasis has changed in the last two years. A tight job market for physicists places postdoctoral appointments in great demand. But even in 1967 the difference between the stipend and the starting salary for physicists who became assistant professors was rather small. American Institute of Physics studies do not agree with the physicists' salaries measured by the National Academy. They show that the median starting salary was \$800 per month.

A major part of the book is devoted to the composition and analysis of the group that receives this advanced education. The most surprising statistic