

the linear accelerator, Van de Graaff generator, and the cyclotron. The naturally occurring radioactive elements are included in the section on sources of radiation, while artificial radioactive isotopes are introduced in later chapters in connection with their immediate clinical applications.

Curiously enough, an attractive feature has been brought about by the need for brevity. There is considerable ground covered in the subjects ranging from diagnostic radiography, through the complex area of biological effects of radiation, to the questions of health hazards and protection. Since it is formulated as a textbook it gives only well authenticated facts and does so succinctly. The last six chapters are commendable because they introduce the outsider to the salient methods and problems of radiology. For specializing students these chapters form a basic foundation. At the end of each chapter are examination questions of a borderline field of study. How does one formulate questions about physics for students in other fields, as far removed as clinical therapy? For example, at the end of chapter two, "give a short account of thermionic emission", or at the end of chapter eleven, "Upon what factors does the percentage depth dose of x rays at any point in a water phantom depend?"

The index is adequate; there are 184 diagrams; and the format makes for easy reading. As an outline guide for a course in radiologic physics the text will serve admirably although it presents no more than the minimum essentials.

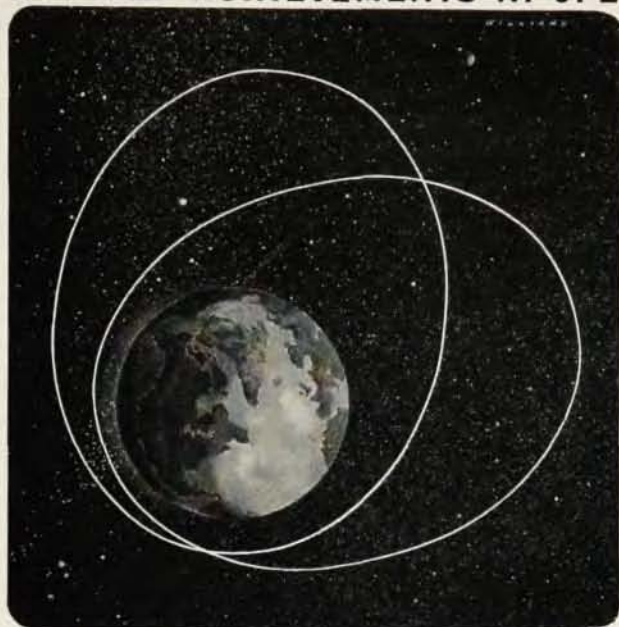
**Progress in Semiconductors**, Vol. 2. Edited by Alan F. Gibson, R. E. Burgess, P. Aigrain. 280 pp. John Wiley & Sons, Inc., New York, 1957. \$10.50. *Reviewed by C. Kittel, University of California.*

Series of books reporting on "Progress" or "Advances" are now appearing in many fields of physics. The series vary considerably in usefulness. The most useful are always those which provide elementary critical readable introductions and intellectual insight into well-defined problems of current importance. The least useful series present bibliographies in prose form; these are of service principally to other bibliographers. In my opinion the value of a review is usually inversely proportional to the density of the phrase "it has been shown". The review should give as fully as necessary the physical core of every question treated. There is, however, a service which is badly needed and which could be appropriately presented in reviews: the collection and tabulation of important physical data.

The selection of topics in the present volume on semiconductors is excellent—all the topics are of lively current importance. Almost every paper would be improved markedly if it were twice as long—the average length is 35 pages, inclusive of figures and bibliography. The topics are too large to be discussed adequately in such a small compass.

The subjects treated are "Semiconductor Alloys", by F. Herman, M. Glicksman, and R. H. Parmenter;

## NOTABLE ACHIEVEMENTS AT JPL



### NEWS FROM OUTER SPACE VIA EXPLORER I AND III

Since the successful launchings of the Explorer I and III Satellites under the joint cooperation of the Army Ballistic Missile Agency and JPL, literally, bales of information on conditions outside the earth's atmosphere have been transmitted earthward from both satellites.

This information on cosmic ray activity, micro-meteorite density, and radiative heat flux is providing valuable new and accurate data of immense value to scientific research. Explorer III with its more sophisticated instrumentation is producing more complete data than Explorer I. This is partly due to the wider range of altitudes traversed by the orbit of Explorer III, but principally due to the presence in Explorer III of a tape recorder. Designed by Dr. Van Allen of the State University of Iowa it is no larger than a cigarette package and is capable of transmitting two hours of collected cosmic ray information in a space of five seconds.

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"Properties of the III-V Compound Semiconductors", by F. A. Cunnell and E. W. Saker; "Radiation Effects in Semiconductors", by J. H. Crawford and J. W. Cleland; "Lifetimes of Free Electrons and Holes in Solids", by A. Rose; "The Production of High-Quality Germanium Single Crystals", by L. G. Cressell and J. A. Powell; "Impurities in Germanium", by W. Crawford Dunlap, Jr.; "High Electric Field Effects in Semiconductors", by F. B. Gunn; and "Theories of Electroluminescence", by D. Curie.

**Artificial Stimulation of Rain:** Proceedings of 1st Conf. on Physics of Cloud & Precipitation Particles (Woods Hole, Mass., Sept. 1955). Edited by Helmut Weickmann and Waldo Smith. 427 pp. Pergamon Press, London & New York, 1957. \$15.00. *Reviewed by Ferguson Hall, US Weather Bureau.*

This work is a collection of papers which were read at a conference on cloud and precipitation physics held at Woods Hole, Mass., in September, 1955, under the auspices of the American Geophysical Union. The title is apt to be somewhat misleading, since only one paper discusses the results of an actual rain-increasing project (inconclusive), and only a few other papers deal directly with cloud seeding or related techniques. On the other hand the book provides an excellent cross section of the wide spectrum of research now under way in connection with natural clouds and with the mechanisms by which raindrops and snowflakes form and reach the ground. As such, however, it will serve primarily as a valuable reference work to those already engaged in this research field. The nonspecialist and the general reader will find it difficult to obtain a well-rounded picture of the current state of knowledge of cloud and precipitation physics, since none of the papers attempts a survey of the field, and most assume considerable familiarity with the subject matter treated. The book will, however, give an excellent picture of the cloud physicist at work, the methods employed in different phases of research, and of the great amount of additional work which will be needed before a complete description of cloud behavior and precipitation phenomena can be attempted. It will also bring out forcefully the extreme complexity of the precipitation process and the difficulty of assessing the potentialities of artificial intervention within the present limited framework of knowledge.

**The Molecular Theory of Solutions.** By I. Prigogine. 448 pp. (North-Holland, Holland) Interscience Publishers, Inc., New York, 1957. \$13.25. *Reviewed by Robert T. Beyer, Brown University.*

The scope of this text is somewhat more limited than its title suggests, since the entire field of aqueous solutions, including electrolytes, has been omitted. Within the framework laid out in the introduction, however, the author has produced an excellent, systematic presentation of the present state of our knowledge of solutions in terms of one-particle descriptions.

After exhibiting the tools of the trade—the variables and methods of classical and statistical mechanics and making use of such simplified examples as a one-dimensional model of solutions, the author enters upon the major work of the text by presenting the theory of conformational solutions and the cell model. In the latter case, Professor Prigogine has given a neat summary of the cell model of the pure liquid. These treatments are followed by a more extensive treatment of the average potential model for mixtures, a theory largely developed by the author and his co-workers.

The second half of the book is devoted to the application of these methods to the problems of solutions. These include critical phenomena, interaction between polyatomic molecules, orientational effects, and a pair of chapters devoted to polymers. Quantum and isotopic effects are discussed briefly in the concluding chapters.

This book contains a great fund of information. Specific examples are analyzed in detail, and a large number of graphs and tables are included to assist in the evaluation of a particular situation. There is no question that this book represents a milestone marking our present ability to solve the problems of solutions within the framework of one-particle descriptions.

At the same time, it is also a milestone in the sense of its occupying a position short of the ultimate goal. There is much that remains to be done in the molecular theory of solutions. The methods of "collective coordinates" will undoubtedly have their impact upon solutions as on the rest of physics, but the time for writing a survey of these methods in solution theory is not yet, and Professor Prigogine has wisely omitted the topic. This book can well serve as a point of departure for future work in the field.

## Books Received

**FUNDAMENTAL PRINCIPLES OF TRANSISTORS.** By J. Evans. 255 pp. D. Van Nostrand Co., Inc., Princeton, N. J., 1958. \$6.75.

**L'IONOSPHERE ET L'OPTIQUE GÉOMÉTRIQUE DES ONDES COURTES.** By R. Dumont. 101 pp. Dunod, Paris, France, 1958. 580 fr.

**THREE DIMENSIONAL DYNAMICS: A Vectorial Treatment.** By C. E. Easthope. 277 pp. (Butterworths, England) Academic Press Inc., New York, 1958. \$7.80.

**ATOM—GESTERN UND HEUTE: die Geschichte des Atombegriffs von der Antike bis zur Gegenwart.** By A. G. M. van Melsen. 315 pp. Verlag Karl Alber, Freiburg/München, Germany, 1957. DM 23.80.

**PROGRESS IN BIOPHYSICS AND BIOPHYSICAL CHEMISTRY, Vol. 8.** Edited by J. A. V. Butler and B. Katz. 409 pp. Pergamon Press, London & New York, 1957. \$17.50.

**THEORETICAL PHYSICS: Thermodynamics, Electromagnetism, Waves, and Particles.** By F. Woodbridge Constant. 364 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1958. \$7.50.

**QUANTUM MECHANICS, ONE- AND TWO-ELECTRON ATOMS** (Reprinted from *Handbuch der Physik*, Vol. 35). By Hans A. Bethe and Edwin E. Salpeter. 369 pp. (Springer, Germany) Academic Press Inc., New York, 1958. \$10.00.