

Probability and Statistics

By H. Freudenthal. Pp. v+139. (Amsterdam, London and New York: Elsevier Publishing Co., 1965.) 30s.

A SCIENTIST or technologist with modest mathematical skill and no fear of unfamiliar notation could gain considerable insight into statistical thought from this book. He would not advance far in learning standard statistical techniques for use in his own problems because the book does not attempt their systematic presentation. Prof. Freudenthal's strength lies in a largely intuitive approach allied to an attractively easy style. He does not retreat from difficulties, but he refuses to conceal the essential features of a proof by trappings of mathematical rigour appropriate only to more advanced texts.

Early chapters are largely concerned with probability theory, made vivid by excellent simple examples of independence and conditionality. The implication that sampling with replacement is theoretically preferable to sampling without replacement is strange, but possibly translation from the Dutch has permitted entry of a confusion between simplicity of theory and practical desirability. Prof. Freudenthal uses the central limit theorem to justify widespread practical dependence on the normal distribution. The final one-third of the book has chapters concerned with sampling inspection (including sequential sampling), distribution-free tests, games and strategy, and population genetics. None of these topics is taken far, and all are regarded a little abstractly as playgrounds for mathematicians rather than as fields of investigation in which the statistician must make a great contribution. In the context of a book that may make an intellectual appeal to mature readers but that is not suitable as an introductory text, they play their part well. The book can be confidently recommended to those who find its form seeming to meet their needs, but disregarded as of no fundamental importance by those to whom its somewhat unusual style makes no appeal. Of few books on probability and statistics can both these statements be made!

D. J. FINNEY

ALGOL 60 Implementation

The Translation and Use of ALGOL 60 Programs on a Computer. By B. Randell and L. J. Russell. (A.P.I.C. Studies in Data Processing, No. 5.) Pp. xiv+418. (London: Academic Press, Inc. (London), Ltd.; New York: Academic Press, Inc., 1964.) 84s.

THE introduction of automatic computer languages has opened up the use of computers to a large public by making the programming of digital computers much easier. This is due to the development of compilers: the large programmes which translate automatic languages, which are relatively easy to use, into machine languages which are much more difficult to use. Initially automatic languages and their compilers were very much empirical *ad hoc* affairs; the writing of compilers was more of a craft than a science. But recently this state of affairs has changed, an important step in this direction being the publication some five years ago of the ALGOL report. Using the notations and techniques of mathematical logic, this defines precisely a programming language suitable for scientific computations. This stimulated the systematic study of compiling methods and many papers on the subject began to appear.

This book is an excellent and welcome contribution to the literature; it will make more accessible to a large public some of the more commonly used and basic compiler techniques. The compiler described produces in one pass an object programme which is obeyed interpretively by a control routine during run time. This may not be very efficient, but many of the concepts explained in this book are relevant to other forms of compilers. In particular, repeated use is made of the concept of stack or push-down store.

Because this is among the first books on the subject, the form and contents of the book may put off the uninitiated reader, but it is well worth persevering with. An attractive aspect of the book is the large number of very short programmes illustrating the many difficulties a compiler has to deal with.

I. M. KHABAZA

Einführung in die Atomphysik

Von Dr. Wolfgang Finkelburg. Neunte und Zehnte Ergänzte und Neubearbeitete Auflage. Pp. xii+552. (Berlin, Göttingen, und Heidelberg: Springer-Verlag, 1964.) 45 D.M.

THE present issue of *Einführung in die Atomphysik*, by Prof. W. Finkelburg, is the nineteenth and twentieth reprint, revised and brought up to date by the author, who is a member of the Siemens-Schuckertwerke group in Erlangen. It is intended for physicists in the applied fields, engineers, chemists and technical personnel. Its scope is very wide, comprising, besides atomic physics, extensive chapters on quantum mechanics, nuclear physics, 'elementary' particles, molecular and solid-state physics. The author is manifestly an experienced pedagogue who leads the reader in carefully planned steps through the various phases of an argument. It is a magnificent and, on the whole, successful effort to provide a readable text of a complex scientific field.

It is, however, clear that the maximum one can achieve in the circumstances is plausibility, which is probably what the author aimed at. The question then arises if it is a good plan to incorporate a fair proportion of the wave mechanical formalism (according to Sommerfeld), without the mathematical background (see p. 360, where the formula is completely without meaning). It must be admitted that the figures of electron distribution and some wave functions are excellent.

The book, as such, comes up to the expectation one holds for a production from the publishing firm of Springer; it is quite cheap at 45 D.M., and will no doubt greatly contribute to the education of that most important part of the scientific community who apply science.

E. BRETSCHER

Physique des Semiconducteurs

Comptes Rendus du 7^e Congrès International. (Physics of Semiconductors: Proceedings of the 7th International Conference.) Pp. xxii+1368. (Paris: Dunod, 1964.) 145 francs.

PHYSIQUE des Semiconducteurs: Comptes Rendus du 7^e Congrès International contains about 200 distinct original items, five of which are reports on symposia on related topics. It will be an invaluable work of reference pointing to other and fuller papers on certain topics, and indicating the major aspects of present interest in the field. It has been remarked that this field, like women, has become more sophisticated with age, and this volume certainly gives evidence in favour of this assertion. More accurate measurements, and more detailed calculations are reported here, of quantities the broad significance of which has in many cases been known for some years. This impression is strengthened by the fact that the details of the symposia on radiative recombination, radiation damage, and solid-state plasma effects, all very active fields, have been published separately. This still leaves interesting effects within the scope of this volume—effects which were not expected two years before (during the corresponding meeting at Exeter in 1962). The relativistic correction to band structure calculations is an example. The importance of lasers is another example, for they have enhanced the interest in studies of electron transitions in solids, which may compete with radiative transitions. Papers in this volume deal with these and other important effects. It is clear that this field is con-