

standard work. Although Tycho Brahe rejected the Copernican theory, he improved instruments of observations, star and planetary tables and laid the foundation of later dynamical astronomy.

The narrative of his life is extraordinary. His uncle kidnapped him as a baby and kept him until he entered college. At the university he fought a duel which cost him a part of his nose, which he replaced with precious metals. His choice of a life partner from among the peasantry caused a permanent breach with his noble relations. Dreyer gives a detailed account of his empire of scientific research on the 2,000 acre Island of Hveen, given to him by King Frederick II, and on which he built Uraniborg, a sixteenth-century Herstonceux. So comprehensive was the establishment that not only did it contain a printing shop, but also a paper-making works, for the star catalogues ran into hundreds of pages. The accuracy of the celestial observations which were possible before the use of telescopes was quite remarkable. Copernicus had grumbled that he could scarcely do better than ten minutes of arc, but Tycho Brahe could often work to an accuracy of one minute. The book deals with Tycho Brahe's later life in Bohemia, his influence on Kepler, and the fate of Uraniborg and its instruments.

Unlike some other nineteenth-century biographies of scientists, Dreyer's work gives a vivid account of the scientific, political and social climate of the times. Astrology was still important and Tycho Brahe spent much time casting horoscopes for his patrons. The original illustrations are useful, and it is interesting to note that the picture of Tycho Brahe first appeared in *Nature* (15, 406; 1877).

While it is appreciated that the work here reviewed is intentionally a reprint, it might have been of more value to the student if some explanatory notes and modern references had been added. Long passages in old German and Latin are left untranslated. Many pages are devoted to astrological speculations concerning the new star which appeared in Cassiopeia in 1572. A footnote on the nature of the star as it is understood to-day might have been helpful. The re-publication in paper-back form of some of the important, but lesser-known, classics of the history of science is to be welcomed.

W. L. SUMNER

STRESS, STRENGTH AND DESIGN

Handbook of Stress and Strength

Design and Material Applications. By Prof. Charles Lipson and Prof. Robert C. Juvinall. Pp. xi + 447. (New York: The Macmillan Company; London: Collier-Macmillan, Ltd., 1963.) 125s.

THE objective of *Handbook of Stress and Strength* is to show the procedures necessary to achieve a proper balance between stress and strength in design. It is stated that "The book is written for use in college courses . . . engineering, engineering mechanics and some courses in metallurgy. Professional engineers will also find this book a helpful summary of current practices and procedures". In trying to serve these two different requirements the authors appear to give too little of the derivation of formulae, etc., for the student and possibly are too elementary, in Part 1, for the design engineer.

Part 1 deals with the consideration of stress: "the significant stress, which is that imposed on a member by service loads, assembly conditions and fabrication". This proceeds by way of chapters on normal and shear stresses to combined stresses and their representation by Mohr's circle. The effects of stress concentration and the determination of suitable factors are then considered, followed by contact stresses and residual stresses.

Part 2 considers the strength of the material: "the allowable, or maximum, stress which the material in its

fabricated form can sustain when subjected to [the conditions of] service loads, assembly and fabrication". Topics discussed are static and impact strength, fatigue strength, fatigue damage, surface treatment and corrosion and surface fatigue.

Having outlined these basic principles the authors then deal with the problem of balancing the two concepts and include a useful chapter on factors of safety.

This is followed by a chapter on the appearance of fatigue fractures. This seems a little out of place at this point, since although failures are considered to be primarily due to fatigue, it is to be hoped that the successful designer will not have to study many failures. There are two short chapters on elastic deflexion and elastic stability before reaching Part 5, which constitutes more than half the book and is composed of charts and sample problems covering stress concentration factors, fatigue curves and Goodman diagrams for steels, cast iron and aluminium and tables of miscellaneous physical properties.

For a book which is sub-titled *Design and Material Applications* it is unfortunate that non-ferrous metals do not occupy many pages and non-metallic materials are scarcely mentioned at all. The problems of joining members also appear to be omitted except for one page of diagrams showing stresses in welds.

However, the general presentation is pleasant and strikes a refreshingly new approach to an old problem. Most chapters are accompanied by a list of references to other books or papers for further reading.

There are a number of typographical errors, but these are usually apparent—except for a wrong subscript to the denominator in the formula on p. 167. On several occasions in the chapter introducing the concept of significant strength there is an over-simplification considering the ability of potential readers. For example, when considering environment, after saying that "many materials are temperature sensitive" there is the simple statement that "High temperatures cause the phenomena of creep". With the present growth in the use of thermoplastic materials the qualification "High temperature" is rather a misnomer.

The considerable mass of data presented in the charts and tables will be of great assistance to the design engineer, and their use is adequately explained. Some of the terms may not be immediately familiar to readers in Britain, but familiarity in use should soon overcome this difficulty.

If design of steel components for dynamic loading is the problem, then this book could be of assistance. If, however, materials other than steel are being used, then the book could shed light on the problem but will probably not solve it.

J. F. ALDER

LOW- AND HIGH-ENERGY PHYSICS

Nuclear Physics

Part B. Edited by Luke C. L. Yuan and Chien-Shiung Wu. (Methods of Experimental Physics, Vol. 5, Part B.) Pp. xviii + 886. (New York: Academic Press, Inc.; London: Academic Press, Inc. (London), Ltd., 1963.) 160s. 6d.

THE purpose of Volume 5 of *Nuclear Physics* is to provide reliable and up-to-date information on the principal methods and their relative merits for measurement of specific quantities in the field of low- and high-energy physics. Volume 5A, published previously, covered in the first section methods of particle detection and in the second section methods for the measurement of the fundamental quantities, including charge and size, energy and momentum of charged particles, neutrons, γ -rays, cosmic rays and neutrinos. Volume 5B continues