BACKGROUND ASTROPHYSICS

High-Energy Astrophysics

By Trevor C. Weekes. Pp. xi + 209. (Chapman and Hall: London, July 1969.) 60*s*.

ASTROPHYSICS, like many other subjects, is moving forward at a fantastic pace; but in few other subjects have so many fascinating discoveries been made in the past few decades—pulsars were discovered in February 1968, quasars in 1963, the microwave background of the universe in 1965, X-ray astronomy was started in 1962, gamma-ray astronomy in 1966, neutrino astrophysics in 1964 and the grandfather of them all, radio astronomy, only dates back to 1946. Not only have we seen advances in experimental techniques and observational data but theories have kept apace. Thoughts of neutron stars and colliding galaxies are now commonplace, and cosmology, with the competing theories of steady state, big-bang and oscillating universe, has even got the physicists thinking that the conservation of matter might not be one of the fundamental truths. Who can say what other "truths" might be questioned in future decades? Every month, the journals contain papers with new observations, more advanced techniques and more profound theories. For every important piece of observed data there are probably a dozen theories; in no other field has a theorist so much room to manoeuvre. Astronomers and astrophysicists not directly working in the field of high energy astrophysics cannot help being enthralled by these new advances, but they need some help in tackling the spate of new results and publications.

Trevor Weekes has come to our aid. He has provided in this book a background account of these new subjects which will enable us to follow all the new developments. A reader cannot fail to capture the author's enthusiasm; one's interest is not only retained but expanded. The book is clearly and concisely written and contains many useful diagrams and tables. It is an excellent addition to the fine series of monographs published by Chapman and Hall in their "International Astrophysics Series". The subject matter has been restricted to high energy astrophysics: high energies related to the rest mass of the object (novae, supernovae, radio galaxies, quasars, pulsars), individual quanta possessing high energy (cosmic rays, X-rays, gamma-rays), and the possible large cosmic energy densities (neutrinos, microwaves).

The book starts with an introduction to the terminology used in astrophysics and then continues with chapters on magnetic bremsstrahlung and Compton radiation, novae and supernovae, the origin of cosmic radiation, radio galaxies, quasars, theories of extragalactic radio sources, X-ray astronomy, gamma ray astronomy, neutrino astrophysics, microwave background and pulsars. Each chapter deals with the discovery of the phenomena and the observational data, experimental techniques and current theories associated with them. The author stresses observations. In a subject that is so sparsely blessed with observations, the few that have been made take on a greater importance and the extension of experimental techniques becomes vital in the development of the discipline. Most of the theories are presented in outline with details and mathematics omitted. The book ends with a useful reference list of the basic papers in high energy astrophysics.

DAVID W. HUGHES

SUBSIDIARY PHYSICS

Introductory Physics

A Model Approach. By Robert Karplus. Pp. xix + 498. (Benjamin: New York and Amsterdam, 1969.) $13.75.

THIS book is intended for readers with very little scientific background—for example, for arts students taking physics as a subsidiary subject.

The author avoids a rigid adherence to a historical approach for, as he quite rightly remarks, this makes it necessary to introduce Newtonian mechanics at an early stage. For the beginner in science it is extremely difficult to understand Newton's tremendous conceptual leap from observation to theory. A difficulty of this magnitude early in the course could well be a disincentive to further study and so it is the last of the four parts of the book which is devoted to Newton's laws of motion and universal gravitation.

The early parts of the book deal with those aspects of physics which are more intuitive and can be illustrated in terms of everyday phenomena and easily visualized models. In the first part, there is a general review of the principles which underlie the whole of physics—interactions, equilibrium, coupled systems and the like. The second part deals with wave motion in its various manifestations, in particular light and sound, concluding with a brief but clear introduction to the ideas of wave mechanics and atomic structure. The concept of energy—thermal, chemical, mechanical and electrical—is developed in the third part where the gravitational field of the Earth is also introduced. This leads conveniently to the topic of universal gravitation in the final part.

After the formal instructional part of the book there is a short epilogue, historical and philosophical in style, which discusses the origin of scientific method and the role of the scientist in the community. Finally, there are some appendices dealing with the basic mathematical tools required for an understanding of the book.

At the end of each chapter there are numerous examples which are well graded and searching, and solutions to the numerical problems are given.

The writing is a little verbose and there are over-elaborate explanations of physical concepts in terms of everyday phenomena. One can get so involved in the complex analogies that the overall effect can be distracting rather than helpful. In spite of this criticism, this is without doubt a successful book which puts over a great deal of material in a deceptively casual way.

M. M. WOOLFSON

COLOUR SCIENCE

The Measurement of Colour

By W. D. Wright. Fourth edition. Pp. x + 340 + 10 plates. (Hilger: London, July 1969.) 80*s*.

SINCE the publication of the first edition in 1944, this book has become firmly established as a standard work on the measurement of colour. Its author, well known as a leading authority on the subject, was responsible for much of the experimental work on which the present internationally agreed system of colour specification and measurement was based. He has provided a book which, for a quarter of a century, has introduced many to the fascination of the subject.

In the fourth edition, the book has been revised and extended to take account of developments in colorimetry which have occurred in the past five years. These include the adoption by the Commission Internationale de l'Eclairage (CIE) in 1964 of colour matching functions for a 10° visual field based on the results of Stiles and Speranskaya; standard spectral energy distributions at correlated colour temperatures of 5,500 K, 6,500 K and 7,500 K to represent different phases of daylight and also the CIE recommendations in 1967 of four alternative arrangements of illuminating and viewing conditions in colorimeters and spectrophotometers.

Two new chapters have been added which give valuable treatments of metamerism, including a physiological assessment of metamerism and the important industrial problem of metamerism between surface colours and colour difference metrology including the just noticeable