

UNDERGRADUATE OPTICS

Geometrical and Physical Optics

By R. S. Longhurst. Second edition. Pp. xvi+592+4 plates. (London: Longmans, Green and Co., Ltd., 1967.) 40s.

DR LONGHURST is to be congratulated on producing a book which in general is both well written and well presented. Many aspects of geometrical and physical optics are discussed and the range of topics is so wide that inevitably many present-day undergraduates will unfortunately not have the time to study the entire volume. In recent years there has been a renewed interest in optics, and those whose research entails the use of optical techniques will find the current edition a useful reference book.

The chief differences between the first and second editions of *Geometrical and Physical Optics* are summarized in the author's words: "A brief account of partial coherence is now included; the sections on interference and phase contrast microscopy have been expanded; the sections on the metre and on the speed of light have been brought up to date; and accounts are given of the important recent work on interference spectroscopy, on the production and use of diffraction gratings and on image formation". These changes, which sound substantial, do not result in a volume which is vastly dissimilar from the first edition.

In matters of detail there are several points which are worth noting and which could perhaps be improved. In the first chapter there is an elementary account of wave motion in which "particles" (author's inverted commas) are briefly considered in relation to the nature of light. We are told that electromagnetic theory is considered in a later chapter. Surely the idea of "particles", which is rather misleading, could have been completely omitted. The section on interference filters is rather misleading, particularly with regard to Fig. 9-20 which illustrates rather an uncommon design of filter. A student could easily get the erroneous impression that most interference filters are of the type illustrated. An important property of interference filters which is not mentioned in the text is the degradation of bandwidth with increase of incidence angle.

It is pleasing to find a section on holography, but nevertheless it is disappointing to find only a verbal account of the subject. A simple mathematical explanation of the formation of the various images has been given in the literature, and such an account could easily have been included, with advantage, in the present volume. Indeed, the entire section could have been expanded to give a more detailed account of a subject which is creating a lot of interest at the present time.

No one disputes the superb accuracy of the experiments relating to the standards of length and the measurement of the velocity of light, but Dr Longhurst's accounts of these subjects tend to be rather long and tedious, and could well be shortened. It would, perhaps, be better to devote more space to holography and less space to standards. Briefly, the present edition of *Geometrical and Physical Optics* may be considered good in general, but not so good in some of the detail. A. THETFORD

MEASURING THE STARS

Principles of Astrometry

With Special Emphasis on Long-Focus Photographic Astrometry. By Peter van de Kamp. Edited by R. A. Rosenbaum and G. Philip Johnson. (A Series of Books in Mathematics.) Pp. vii+227. (London: W. H. Freeman and Company, Ltd., 1967.) 52s.

ASTROMETRY is "the branch of astronomy that deals with measurements of the celestial bodies involving their

positions and movements". As such it has a long and honourable history, a large body of theory, and a vital and continuing place in modern research in the astrophysics of our galaxy, for of the three physical parameters of a star, its mass, luminosity and radius, the first two can be determined only by methods depending largely on astrometric work. For the teaching of the theory and methods there has been no single book available, and so a text covering the ground of this book would have been welcome anyway, but because it was Professor van de Kamp who was chosen to write it, it has turned out nearly ideal. He is a, probably the, leading authority on the subject and a well-known and entertaining popular lecturer, as well as a figure in astronomical education.

Not that this is a "popular" book—in its 227 pages it combines a good compressed course in spherical trigonometry applied to the celestial sphere, and one in observed patterns of stellar motion and their underlying theory, with a researcher's handbook on the techniques of observation and reduction in astrometry and a useful review of the general results in each branch. Thus it is fairly tersely written and not given to unnecessary digression. The flow of thought, however, is so direct and the relationship between mathematical argument and verbal exegesis so harmonious that it is easier to read than many purely descriptive books. Professor van de Kamp has emphasized particularly the methods of long-focus photographic astrometry, of which he has an especially close knowledge, and refers often to the equipment and its properties at his own Sproul Observatory, of which he is the director, in order to sharpen our ideas of what is possible and attainable in accuracy and precision (two words which are not naturally synonymous, and which, as is shown, need great thought and care to make them so. Four significant figures may look precise, but they won't always be the accurate four.)

The motions of several stars are considered in detail, notably of course Barnard's Star, the discovery of whose planetary companion, of mass only 1.6 times that of Jupiter, and the only known non-luminous body outside the Solar System, is Professor van de Kamp's own most exciting and exacting feat of measurement.

The book ends with a useful pair of appendices on the theory of errors and the method of least squares, written with the same clarity as the rest, and therefore to be welcomed despite the existence of other sources for the material.

This is a book, then, which, while ideal as a student textbook, can still be rewarding to anyone who wants to know how, and how reliably, one of the essential steps in knowing and understanding our cosmic environment is taken. Every serious student of astronomy, professional or amateur, should consider placing it on his shelves or his bedside table. A. D. PETFORD

IN THE SKY

Physics of the Atmosphere

A Course in Meteorology. By P. M. Tverskoi. Edited by E. S. Selezneva. Translated from the Russian by A. Sen and R. N. Sen. Pp. xi+561. (Jerusalem: Israel Program for Scientific Translations; London: Oldbourne Press, 1965.) 173s.

The Air Envelope of the Earth

By Kh. P. Pogosyan. Translated from the Russian by I. Shechtman. Pp. vii+230. (Jerusalem: Israel Program for Scientific Translations; London: Oldbourne Press, 1965.) 108s.

THE first of these books is written for students intending to become professional scientific meteorologists with the aim of giving them a broad general survey of physical meteorology. The translation must be judged on this